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EXTRA! EXTRA! READ ALL ABOUT IT: FAILURES IN THE ASSOCIATION BETWEEN
LAW AND SOCIAL SCIENCE

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Dedication

To C.A.P.

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INTRODUCTION

‘Please to regard’ the case of Sad Cypress.¹ Elinor Carlisle stood trial for the double murder of her aunt, Mrs. Laura Welman, and Mary Gerrard (Mrs. Welman’s protegee, and as is later revealed, her illegitimate daughter). The Prosecution presented damning evidence of Elinor’s guilt: she had opportunity (following receipt of an anonymous letter, she visited her aunt and Mary just prior to the murders), motive (Mrs. Welman died intestate so that her considerable assets were to be transferred to Elinor – her only living blood relative); and the means (large amounts of Morphine were accessible to her). During trial it also became evident that Elinor’s fiancé, Rodrick, was actually in love with Mary, prompting him to call off the engagement. Matters were looking bleak for Elinor.

Enter world-renowned Belgian sleuth, the great Hercule Poirot, at the behest of the defense attorney. Under Poirot’s studious eye, the defense proffered evidence on the cause and time of death obtained via scientific methods and backed by the testimony of a physician, as well as physical evidence acquired due to Poirot’s extensive expertise of the human mind (psychology) and his superior powers of deduction (using his ‘little grey cells’). In fact, it was Nurse Hopkins all along. Elinor was acquitted, and resumed the love affair with Peter Lord that began during trial.

This is the fairytale version of how Science intervenes in the judicial process to ensure that a fair and just resolution is rendered. Consider however, how many potential pitfalls this (sadly) concise version of Sad Cypress entails, as they pertain to the use of Scientific evidence in court. Perhaps the methods used to reveal the cause of death (a lethal dose of Morphine) were

¹ Christie, Agatha. Sad Cypress: A Hercule Poirot Mystery. United States: HarperCollins, 2011.

sloppy and could not reveal traces of the said substance or the time of death. Or maybe the methods used yielded an inconclusive result. Perhaps the testifying physician disagreed with the results obtained, proffering a different cause of death based on his expertise. How was the court to apply the general tenets of psychology and the grieving process specifically to Elinor? Was the court proficient enough in the methods used during exhumation to be satisfied that the evidence obtained was valid? Was the court satisfied that the testifying physician was a qualified witness? Perhaps the court had personal relationship with the physician, as the inquest was held in a quaint British town of modest proportions. When the use of Science in court does not espouse the fairytale model, various complications may ensue, ultimately resulting in unjust case outcomes and systemic failures (Faigman 1999).

Nevertheless, the benefits of bringing Science to court far outweigh the costs (Faigman 2013; Faigman 1999; Haack 2009). In particular, courts have been drawing increasingly upon the Social Sciences to provide empirical evidence and scientific expertise in sub-fields such as Family Law (Robertson and Broadhurst 2019; Huntington 2018: 229-230; Rathus 2018), Criminal Law (Hilbert 2019; Donohue and Wolfers 2008; Bernstein 1968), and Mental Health Law (Mosher and Berman 2015; Hafemeister 1992). Indeed, Law and Social Science have formed a unique bond over time (Faigman 1989; Haack 2009; Sanders 2009), whereby Social Science manufactures empirical evidence that is used to assist the court (Mertz 2008), by making law, finding fact, and/or providing context (Monahan and Walker 2011). This frequently occurs, despite the fact that Social Science is a tool located outside the traditional tool box employed by judges (Robertson and Broadhurst 2019), thus rendering it Extra-Legal Knowledge (Rathus 2012). But the relationship formed between Law and Social Science is not all peaches and

cream, as some glaring failures have been identified.² Many of these problems stem from the unique characteristics that each of Law and Social Science exhibit, or in other words, the two are not perfectly compatible. In studying these realms – each a standalone system of information, though still linked to the other (Calavita 2016) – one must consider both the differences and similarities they exhibit, as well as the actual manner in which information flows from one to the other.

It is thus helpful to conceive of Law and Social Science as interconnected Knowledge Networks. In these networks, nodes can be represented by individual identities (e.g., judges, attorneys, researchers, etc.) to form social networks. But nodes can also come to represent sources of information (e.g., Law Review articles, Scientific publications, and caselaw), where ties among the nodes are constituted by citations. While the use of citation analysis is now a septuagenarian method well recognized in Legal and Social Scientific academia,³ conceptualization as a Knowledge Network is relatively new (e.g., Nunes and Hartmann 2021; Sadl and Olsen 2017).

Examining the Knowledge Networks of Law and Social Science presents a number of benefits. First, it provides the opportunity to employ network analysis, and thus to track the flow of information, the functional position different sources assume within the network, and the association between node attributes (e.g., the type of source), and outcomes (e.g., the salience of a source). Second, coupling network analysis with a qualitative analysis of the sources allows interrogation of how a source's position within in the network associates with the stance a source has taken with regards to a particular issue (e.g., accepting or rejecting Scientific evidence).

² See *infra*, Chapter 1.

³ For an encompassing survey of publications applying citation analysis to the law, see: Sirico 2000 (FN1), and Falk 1994 (FN25).

Third, the examination of a Knowledge Network composed of both realms facilitates a broader view, such that the ‘use of Social Science in court’ becomes the ‘association between Law and Social Science’, which allows for the examination of new topics not typically considered in traditional citation analysis, such as the flow of information from court to academia.

By conceptualizing Law and Social Science as Knowledge Networks and employing quantitative and network analysis, new light can be shed on the tension apparent in the relationship between Law and Social Science. Thus, faulty information flows can be operationalized as conveying too much, or too little traffic (i.e., volume of mutual citations) between various groups in the network (e.g., courts and Scientific journals). More, it is possible to track the progress of one or multiple issues and the manner in which they disseminate throughout the network to determine the length of time an idea spent in the network, where it originated, where it proliferated, how it was received by different groups (e.g., Law Reviews compared to Peer-Reviewed journals), and if and when it departed from the network.

This thesis employs three original studies conducted in the legal sub-field of Family Law to add nuance to existing failures previously identified in the use of Social Science in court. More importantly however, the analysis exploits the unique datasets constructed to demonstrate the existence of new failures in the association between Law and Social Science. The first dataset includes the complete universe of sources participating in the debate regarding the Parental Alienation Syndrome, in courts, academia, and other related sources (n=684). The second dataset includes a representative sample of State Court litigation pertaining to three legal issues: The Best Interest of the Child; Nuptial Agreements; and Psychotherapist-Patient Privilege, litigated between January of 1994, and August of 2020 (n=5,132).

The data on Parental Alienation Syndrome produced two separate (but empirically linked) studies. The first study demonstrates an instance in which an unsettled idea (Parental Alienation Syndrome) prematurely entered the Knowledge Network, resulting in poor outcomes. One of the most egregious outcomes observed was the unusual longevity this idea exhibited, whereby it managed to live on in courts over a decade after consensus was reached in academia regarding its invalidity. The second study tracks the flow of information rather than the idea itself, to illustrate that – as applied to the case of Parental Alienation Syndrome – courts were citing the wrong sources, while also mirroring a majority of (faulty) earlier citations made in support of Parental Alienation Syndrome to form a judicial echo chamber imbuing these earlier (faulty) sources with artificial authority. Furthermore, these data illustrate a break – or structural hole (Burt 2005) – between Scientific sources and the court, a void which was filled by Non-Peer-Reviewed sources and Legal sources, functionally rendering them gatekeepers of Scientific Knowledge in the network. It is then argued that this is an improper role for Legal sources and Non-Peer-Reviewed sources to assume, suggesting that this dynamic may have contributed both to the premature entry of Parental Alienation Syndrome into the Knowledge Network, as well as to its entrenchment within the network, long after it was deemed “junk science” by the relevant academic community.

The data on State Courts provide additional answers to explain the bizarre entrenchment of Parental Alienation Syndrome in the court system. These data examine the unique attributes of State Court cases making use of Extra-Legal Knowledge (i.e., Social Science citations and/or the use of expert testimony), compared to the attributes of cases that do not make such use. Three primary findings indicate that (a) Extra-Legal Knowledge diffuses extensively throughout the network, so that it becomes disproportionately impactful within the Knowledge Network; (b) that

different types of Extra-Legal Knowledge associate statistically, such that Legal sources and Scientific sources are complimentary, but that they compete with the use of expert testimony; and (c) that different jurisdictions rely on Extra-Legal Knowledge in a manner that is statistically distinguishable, such that significantly disparate modes of obtaining Extra-Legal Knowledge can be observed among State Courts in the U.S.

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CHAPTER 1: CURRENT USE OF SOCIAL SCIENCE IN COURTS

Social Science, broadly defined, is a system of information external to the system of information embodied by courts. While these two systems of information often interact (Cotterrell 1975; Davis 1962; Parsons 1962; Simmel 1950; Pound 1943; Jhering 1879), and are empirically intertwined (Calavita 2016; Silbey and Sarat 1987), they nevertheless exhibit disparate modes of knowledge production (Haack 2009:12-14¹; Nelken 2001; Acker 1990), methods of inquiry (Faigman 1989; White 1987), and even unique language (Calavita 2016: 42-43; Faigman 2010; Merz 2000). Thus, while these systems of information are distinct, they frequently interact, sometimes in predictable manners, but not always (Monahan and Walker 2011; Monahan and Walker 1991; Monahan and Walker 1988). Important in this respect is the observation, made hitherto by numerous inquisitive scholars, that Social Sciences serve as an input to the legal algorithm. In other words, in adjudicating cases, judges often refer to, and even rely upon, knowledge from the social sciences (Monahan and Walker 2011) – knowledge that is inherently Extra-Legal in nature, such that it is not subject to the same checks and balances (Acker 1990; Silbey and Sarat 1987), but rather to a different set of pressures (Merton 1973[1942]²).

Therefore, if Social Science serves as a cardinal instrument outside the traditional tool box employed by judges (Acker 1990), yet unshackled by various constraints built-in to the legal system (Rathus 2012; Faigman 1989), it merits a deeper consideration, especially as a potential force driving legal change (Turner 1974). Indeed, a plethora of brilliant scholars, hailing from

¹ Providing detail on the disparate logistical constraints, value systems, and normative goals each of law and science are subject to, resulting in vastly divergent modes of knowledge production.

² Identifying a Mathew Effect in academia, where more publications associate with a greater probability of future publication (and citation) which is the main driver of scholars, i.e., the prestige/recognition of prominence in a discipline or scholarly field. Nevertheless, Social Scientists are not disinterested in the manner in which their work is eventually disseminated, as a wide and useful application of their work may become a powerful driver (Hafemeister 1992).

various disciplines, have given Social Science very deep consideration, to tackle issues relating to its impact on law and its proper, normatively desirable use in courts.³ But such use of a (relatively) unfettered force also raises more pragmatic questions such as why is Social Science involved in the legal algorithm at all (Calavita 2016⁴) and when it is, how exactly is it used? This is the focus of the current segment, which will present the answers to these pragmatic questions, as they appear in the relevant literature.⁵

Why is Social Science Used in Court?

Social Science is used in court when it is helpful to do so. This generally sweeping and unsatisfying statement can be given flesh and blood by looking closer at the instances in which Social Science is used by judges and the institutional circumstances of said use. The most intuitive instance of why Social Science is used in court is when an element of uncertainty is involved in the adjudication process. This may manifest in a number of ways, including: an observed circuit split (Rublin 2011), a particularly complex and/or important case (Petherbridge and Schwartz 2012), or when the governing legal standard or rule are difficult to determine (e.g., Mnookin 1975).

³ For an encompassing survey of the field, see generally: Mertz 2008: Introduction (XIII-XIV).

⁴ Calavita 2016: Chapter 1 pp. 4-5 (describing a competing view, whereby the law is a closed system which does not admit external knowledge into its 'decision-making algorithm'). Support for this view echoes from the halls of SCOTUS, as Chief Justice Roberts has once dubbed himself an umpire calling balls and strikes, rather than actively making the rules (see: Chief Justice Roberts' opening statement during his nomination hearings before the Senate Judiciary Committee, September 12, 2005; Available at: <http://www.cnn.com/2005/POLITICS/09/12/roberts.statement/> (last visited, July 3, 2021)). Whether or not the law ought to be a closed system or not, the life of the law in the 20th century has shown that SCOTUS is not at all averse to entering Social Science into its decision-making algorithm. (Monahan and Walker 1991; Melton. 1990; Faigman 1989).

⁵ While this segment focuses on the more particular questions of why and how Social Science is used in courts, there are other questions relating to the history of association between Science and Law, and the value that Social Science brings to courts. For a riveting account of these questions, see: Faigman 1999; and Feldman 2009. For more on the unique and inherent tie between Social Science and Legal Scholarship, see: Rublin 1997. For a discussion on the use of Social Science in mid-20th century SCOTUS adjudication (with a focus on Brown), see: Collins 1978 ; and Cahn 1955.

Social Science is also used in court due to particular pressures arising from the nature of the adversarial system. This can be a result of battling attorneys seeking to gain an edge during trial (Nelken 2001) in a system that manufactures either/or results (Katz 2011), or the result of third parties contributing to litigation via Amici Briefs (Collins, Corley, and Hamner 2015; Rustad and Koenig 1993⁶). Other such instances include the use of expert testimony, itself an important facilitator of Social Science in court (Collins 1978). Thus, in the same way that an attorney may summon a particularly appealing empirical study to bolster an argument (Robertson and Broadhurst 2019), so may she (or the judge) summon a witness to furnish the court with scientific expertise (Faigman 2013; Sanders 2009), sometimes leading to the dreaded ‘battle of experts’ (Nelken 2001; Levine 1984).

Other instances in which Social Science is invited into the courtroom include the type of issue being adjudicated, the relevant legal sub-field, particular norms developed in a courtroom, and the weight of public opinion. The type of issue and the relevant legal sub-field (typically linked) serve as a strong indicator for the involvement of Social Science, as some areas of legal inquiry are simply more inviting of Social Science than others.⁷ This may be tied to the particular subject matters discussed within a sub-field or issue, or it may be tied to the prevailing legal mechanisms used in connection with a sub-field or issue, so that if scientific evidence, expert

⁶ Describing how Amici may become a gateway for “junk science” to enter courts; Collins, Corley, and Hamner. 2015: 917–44 (providing empirical evidence to show that “justices systematically incorporate language from amicus briefs into the Court’s majority opinions based on their perceptions as to whether those briefs will enhance their ability to make effective law and policy. We find that the justices borrow more language from high quality amicus briefs that, in turn, better enable them to author high quality majority opinions. Justices also incorporate more language from amicus briefs that repeat arguments advanced in other information sources, suggesting they are more likely to view that information as credible. Moreover, the justices adopt more language from amicus briefs that correspond to their ideological preferences, and those filed by high status interest groups” (id. 938)). For a review of the undue influence of interest groups on court, via Amici, see: Songer and Sheehan 1993.

⁷ For instance, Acker (1990): 5-7 indicates constitutional issues as more welcoming of Social Science, and in particular, constitutional challenges to a statute or official rule. Concerning legal sub-fields, one specific sub-field identified by various scholars as having a unique and intimate tie to Social Science, is Family Law; see: Robertson and Broadhurst 2019; Zelizer 2005; Rublin 2011; Rathus 2018; Richman 2004.

testimony, and legal standards are habitually used during litigation, Social Science is more likely to be utilized in court.⁸ Additionally, the norms developed in a courtroom, may be inviting or inhospitable towards Social Science for various reasons. Such norms may relate to judges' warm or cold attitudes towards expert witnesses,⁹ legal procedure pertaining to the admittance of scientific evidence (Faigman 2013¹⁰), the manner in which instructions are related to the jury (Monahan and Walker 1988), or even unobserved informal norms stemming from close-knit ties which form in smaller court systems such as Juvenile Courts (Buss 2021). Finally, the weight of public opinion bears on the use of Social Science in that judges may find it easier to fortify their opinion with Scientific evidence when both opinion and evidence are compatible with the public's opinion (McCloskey 2016; Rublin 2011; Rosenberg 2008; Horowitz 1977).¹¹

How is Social Science used in Courts?

Judges do not operate in a vacuum; rather, they interact strategically to promote certain goals, subject to institutional (Epstein and Knight 1998), and reputational constraints (Garoupa and Ginsburg 2015). Thus, the use of Social Science can be viewed as functional and patterned, in the sense that it is used in predictable ways to achieve particular ends (Lempert 1988¹²). As

⁸ For a survey of the importance, ubiquity, and inherent uncertainty connected to the 'Best Interest of the Child' standard, see: Mason 2012; for the inherent link between legal standards and uncertainty, see: Kaplow 1992; Craswell 1986.

⁹ Most sources discussing the use of expert witnesses include both sides of this debate, i.e., experts are helpful to court, but this help comes at a cost: Robertson and Broadhurst 2019; Haack 2009; Sanders 2009; Richman 2004.

¹⁰ Suggesting that States and jurisdictions employing the Daubert standard for admittance of expert testimony force judges to accept a more managerial role as adjudicators of science, as it requires them to make a sophisticated finding regarding the external validity of scientific evidence presented to them.

¹¹ A fourth category of Social Science use in courts relates to judges' personal attributes (Lempert 1988) such that liberal leaning, activist judges are thought to rely more frequently on Social Science, as well as judges who have a more intimate to social science whether via formal training or personal experience (Blake 2019; Acker 1990). And of course, a judge's personal style of writing is an influential factor as well.

¹² Lempert 1988: 191 ("...research into the social science literature almost necessarily involves uses of social science that are legitimating or strategic, for it typically occurs as part of the opinion writing process after the judge has reached a decision.").

more and more scholars, both in- and outside legal academia, began to investigate the ways in which courts use Social Science,¹³ these patterns began to emerge, and eventually a general framework for the use of Social Science in courts was set out by Monahan and Walker in the mid 1980s.¹⁴ Adopted by many and heavily cited, this framework remains today the leading theoretical approach to understand the functional use of Social Science by judges. The remainder of this segment provides a brief description of Monahan and Walker's framework.¹⁵

Monahan and Walker suggest that Social Science fulfills three functions in court: (1) to make law ("Social Authority"); (2) to determine facts ("Social Fact"); and (3) to provide context ("Social Framework"). They differentiate between these functions by employing the analytical break between adjudicative facts and legislative facts set out by Davis in 1942.¹⁶ Thus, when making law via Social Science, judges are primarily concerned with legislative facts; when determining facts, judges address adjudicative facts; and when they seek out Social Science to provide context, they are making use of both types of facts, thereby creating a general social framework within which the holding shall be embedded.¹⁷

¹³ Interest in this topic, particularly empirical surveys examining the use of Social Science by courts (utilizing citations as an imperfect proxy for said usage) seems to have peaked around the late 1980s and throughout the 1990s, though few sources date back as far back as the 1950s and 1960s, e.g., see: Newland 1959; Scurlock 1964; Bernstein 1968; and Merryman 1954.

¹⁴ Monahan and Walker 1991; Monahan and Walker 1988; Monahan and Walker 1986. It is interesting to note that this framework, as well as future elaborations thereupon, was published mostly in Social Scientific Journals rather than traditional Law Reviews.

¹⁵ The purpose of this essay is not to provide theoretical intervention for the Monahan and Walker framework, but rather to contribute to the literature by highlighting hitherto new and under-explored failures identified in the Knowledge Network implicating courts and Social Science (legal academia included), and discuss the implications flowing therefrom. Hence, this brief account of the framework is intended only to provide a more robust background of the field of study.

¹⁶ While helpful in distinguishing between judicial law-making and judicial fact-finding, Davis' approach does not prove helpful in understanding the third category of Social Context, as these are cases where Social Science is used to both modify law and determine fact (Monahan and Walker 1988: 471).

¹⁷ In setting out such a social framework, judges are forced to constantly match social categories of ties, to pre-determined legal categories of ties so that when egregious mismatches occur – precedent is created and/or law changes (Zelizer 2005, 2000). Indeed, with regards to Family Law, various legal scholars have observed a certain 'lag' between family life and Family Law (Grossman and Friedman 2011; Davis 1962).

Monahan and Walker (1988) exhibit unique insight regarding the pragmatic steps necessary to adopt Social Science in court. First, the framework explicitly recognizes that the adoption of different kinds of Extra-Legal Knowledge, and involves a ‘step-0’, whereby the information must first be obtained; and this is of course true of all three functions. In obtaining Scientific information, Monahan and Walker suggest that Briefs and Judicial Research are preferable to the testimony of experts (1988: 467). Following ‘step-0’, the court must then evaluate the merits of the Social Science if it is to be adopted; again, this is true for all three functions. In this respect Monahan and Walker analogize to well-established indicators for influential prior case law,¹⁸ to construct four tests that ought to be conducted by a judge when performing a ‘quality control’. Thus, useful Social Science: “(a) has survived the critical review of the scientific community, (b) has used valid research methods, (c) is generalizable to the legal question at issue, and (d) is supported by a body of other research (1988: 468).” Clearly, these tests place an onus on judges to determine the external validity, relevancy, and importance of the scientific evidence presented.

To briefly summarize, when Social Science is used in court (due to uncertainty, the institutional features of the adversarial system, or the unique nature of the sub-field being litigated), Monahan and Walker suggest that it is used to either make new law,¹⁹ determine a social fact,²⁰ or provide context to a particular type of case.²¹ Paying special attention to the

¹⁸ The four indicators identified by Monahan and Walker determining the influence of a case are: (a) cases decided by higher tribunals are more influential; (b) sound logic and reason render a case more impactful; (c) a strong nexus between the facts of the examined case and the tried case should lead to greater influence; and (d) prior validation by courts render a case more impactful (1988: 468).

¹⁹ For example, Social Science was frequently used to shape the law of racial discrimination (see: Monahan and Walker 2011:76). For a concrete example of such use, see: Wisdom 1975.

²⁰ For example, Social Science research was used to identify violations of Intellectual property and trademarks (Monahan and Walker 2011:75).

²¹ For example, Social Science is routinely used as a risk assessment tool in determining bail and parole (Monahan and Walker 2011:77).

process by which the information itself enters the courtroom (how Social Science is obtained), Monahan and Walker (1988; 1991) suggest that judges must conduct a series of tests (regardless of the function Social Science is fulfilling) to determine whether the evidence presented is worthy and normatively useful. While there are other uses and functions for Social Science in court,²² Monahan and Walker's framework remains the most general and widely accepted in academia today (Grunwald 2013), despite not having changed much in over two decades (compare Monahan and Walker 1988, *with* Monahan and Walker 2011).

Existing Failures in the Use of Social Science in Court

As aptly stated by Monahan and Walker: "A previously unimagined amount of scholarship now addresses the use of scientific evidence in court..." (2011: 74-75). This literature examines the use of Social Science utilizing three primary modes of inquiry: a quantitative study of citations (e.g., Blake 2019), a deep qualitative examination of small-n samples (e.g., Rublin 2011), and a wholistic theoretical approach to Social Science and the Law (e.g., Melton 1990). Common to many of these illuminating publications is a discussion of the potential hazards and pitfalls – potential or observed – in the use of Social Science in court.

Below follows a survey of the primary failures identified in the literature, summarized in Table

1.1.

²² Falk (1994) compellingly demonstrates how courts use Social Science in a "justificatory function" when litigating controversial and novel matters such as gay rights, i.e., Social Science is used in cutting-edge/border-line litigation to support a view that breaks with status quo (though perhaps falling short of making law or creating precedent). Huntington (2018: 291-92) describes how Family Courts use science to provide 'political cover' and justification for a normative judgment. Conversely, Lempert (1988: 189-90) suggests that Social Science can be used by courts to delegitimize an argument or opinion, or even to simply avoid debate on a particular issue on grounds that the relevant science has yet to be settled. Other functions and uses for Social Science include: camouflaging hidden agendas (Sperlich 1979); adding "... 'window dressing' for conclusions reached upon other grounds" (Acker 1990: 13); using Social Science as explanatory reference and pedagogical tool (Bernstein 1968:79); and signaling to the public that the court is aware of the prevailing research reflecting certain norms, i.e., is 'enlightened', or perhaps as one would colloquially say at present, "woke" (Lempert 1988: 188-89).

INHERENT DIFFERENCES BETWEEN THE LAW AND SCIENCE

As aforementioned, each of Law and Science are uniquely constructed systems of knowledge, exhibiting disparate modes of knowledge production, methods of inquiry, and generally organizational and systemic traits. While both systems of knowledge are very much tied to social life, their particular differences create certain barriers in the conveyance of information from one world to the other.²³

(1) Disparity of Goals

A very fundamental difference between Law and Science is the disparity of goals each system strives to obtain (Huntington 2018; Haack 2009; Melton 1990; Faigman 1989). Thus, the scientific system of inquiry sets out to uncover the objective truth, be it social fact or phenomena, in such a way that it incrementally builds upon previous knowledge, allowing for scholarly debate, trial-and-error, and open-ended answers. Conversely, the legal system, which is primarily tasked with settling disputes, must manufacture a definite result, typically binary in nature, thus producing certainty by way of closure (Katz 2011; Lempert 1988; Scurlock 1964: 261). These disparate aims are not discordant *per se*, but are also not perfectly harmonious (Sanders 2009).

(2) Generalizability of Results

A second important pitfall in the application of Social Science in courts resulting in the differences between the two systems of knowledge is the generalizability of results (Robertson and Broadhurst 2019; Grunwald 2013; Faigman 2010: 1124; Scurlock 1964: 262). Thus, the researcher seeks to produce a result that is externally valid, replicable, and mobile (in the sense that it applies to a broad swath of social phenomena). At the same time, a judge is guided

²³ Note that when construed broadly, many of the following failures described in this sub-segment are not necessarily unique to Law and Science, but can be observed on the boundary between other systems of knowledge as well.

primarily by the particular case at hand, aiming to provide a particular answer to the specific legal question presented. Once more, the tension between generality and specificity is not entirely prohibitive. Thus, researchers do base results on specific data, sometimes even very small-n studies investigating a narrow hypothesis, which can be analogized to the particulars of a case in court. Or, a witness may bring her expertise to bear on a particular set of facts raised in court. Similarly, judges dispose of their cases with a view to precedent and the ripples their opinion may send throughout the system, so that there is a generalizable aspect to caselaw as well. However, by and large, the two features are at odds.²⁴ This tension can then lead judges to mis-use and mis-apply Social Science to the facts of a particular case (Bernstein 1968: 80).

(3) No legal basis for the use of Social Science in court.

Scientific inquiry, rigorous as it may be, has no *de jure* basis for its use in court (Rathus 2012). In other words, the traditional tools employed by judges – statutes, rules, and regulations, prior caselaw, legislative history, etc., are all constrained by various political pressures constructed via a transparent democratic process (Scurlock 1964: 259). Thus, accuracy and diligence notwithstanding, scientific data have not the fundamental veneer of justice in their support. Even in admitting expert testimony as prescribed by the governing rules of evidence, there is no legal linchpin upon which to measure the content of the information furnished to the court. Perhaps this would be less troubling if science was indeed limited to the “objective truth” (Faigman 1989), however, the questions asked, the results found, and the conclusions made, are

²⁴ There is a further complication here as Social Science also does not provide any form of ‘intensity guidance’, i.e., while Social Science can provide guidance on the existence and even importance of different social facts, it typically does not balance or compare between the two – a task that judges are often called upon to do (Huntington 2018); best interest determinations in family court are a prime example, where multiple elements must be considered and balanced to make such a determination (Mnookin 1975).

susceptible to manipulation and bias during inquiry (Collins 1975), and even more so upon entrance into the adversarial arena (Rathus 2018).

(4) Science is not objective.

Though it is typically presented as the TRUTH (Haack 2009), Social Science is subject to various pressures from the social world. Early work in the subjectivity of science was conducted by Collins (1975), who set out an encultural model which demonstrates how cultural constraints shape the process of knowledge production and the ideas thus produced. Other forms of extra-scientific social pressures include unique organizational structures and norms, agenda setting properties subject to political pressures, and organizational cultures (Knorr-Cetina 2003; Epstein 2007, McKenzie 2011). Note that these social pressures are not malicious or explicit, but yet unavoidable. Furthermore, there are additional individual level effects that ‘taint’ the objectivity of scientific findings, typically referred to as researcher bias. These may relate to the sampling of data, its analyses, and/or its interpretation (Huntington 2018; Grunwald 2013; Faigman 1989). Again, while not inherently malicious these biases are ever-present, even if only to a minimal degree, in all Social Science. The overarching result is that Social Science, to the extent that it serves as an additional extra-legal source for judges, is not unimpeachable, such that a non-zero amount of the knowledge entering courts is at best inaccurate, but at worst – fundamentally flawed and misleading.

ORGANIZATIONAL FEATURES OF THE ADVERSARIAL SYSTEM

(1) The Adversarial system distorts, rather than verifies scientific evidence.

The evidence presented in court must endure the crucible of the adversary system, whether by cross-examination or other means (Levine 1984). Ostensibly, this would suggest that only the most veracious, accurate and relevant of Social Scientific evidence would survive, rendering the adversarial process as an efficient filter. However, in practice, the opposite is achieved, as information is routinely distorted in the court room to bolster or discount particulars arguments raised by the litigating parties (Robertson and Broadhurst 2019; Faigman 2013; Sanders 2009; Faigman 1989; Lempert 1988; Levine 1984), so that the original or true purpose of the scientific source is no longer the crux, but rather a minor point, or perhaps a creative interpretation thereof (Haack 2009; Rustad and Koenig 1993). Furthermore, as litigation itself is more controversial – raising more complex questions – so does the science introduced become more exploratory and less settled (Rublin 2011; Falk 1994). The open-ended nature of still-evolving scientific concepts (much like developing legal doctrine) can then be used in a manner wholly unintended by the original scientific researcher (Lempert 1988: 193). Additionally, there is a very real concern that the process of locating and obtaining knowledge used by litigating parties is itself flawed, as each sides cherry picks the science that best suits its arguments, discarding any sources to the contrary (Robertson and Broadhurst 2019; Rathus 2018). Finally, to make matters worse, Social Science has been found to quantitatively associate with the salience of a case (Blake 2019; Petherbridge and Schwartz 2012). Thus, the distorting adversarial pressures are most likely to occur in important, complex cases which have a disproportionate impact on the court system.

(2) Path Dependency and Entrenchment.

Once Social Science has made its way into caselaw, its presence is not fleeting; rather, under the principles of *Stare Decisis*, it in fact becomes entrenched to some degree – even if it does not constitute legal precedent *per se* (Perry and Melton 1984; Suggs 1979). This is further complicated by the fact that Social Science is used to make law or to create a social context (Monahan and Walker 1988), both of which may endure in the legal system for quite some time (Perry and Melton 1984; Suggs 1979). Problematic here, is that the Social Science may actually be ‘bad’. Various authors employ different euphemisms to describe science that is of questionable quality,²⁵ and thus presents low probative value (for the legal system generally, and for the adjudicating judge in particular), but it would appear that all authors would agree that this bad science occasionally makes its way into court, and long overstays its welcome. Of course, such bad science becomes entrenched when it becomes precedent, or when it is cited by high tribunals, but perhaps more concerning is simply that once bad science is cited it becomes a part of the court system, and can be cited even if it lacks any binding power. Furthermore, courts are venues designed to settle disputes between litigants, but not between scientific concepts. In other words, once bad science has burrowed into the system, there is no exit mechanism in place to correct course and expel the faulty scientific knowledge unless it is tied to law or precedent (Huntington 2018; Haack 2009).

(3) Experts and Amici selection biases.

The adversarial system attracts actors of a certain kind. The Experts that testify in court are typically more confident, willing to say more based on less evidence, and not averse to promoting a certain approach – whether personal or professional (Robertson and Broadhurst

²⁵ “Suppositional Science” (Faigman 1989); “Junk Science” (Rustad and Koenig 1993; Blake 2019); “Sub-Optimal Science” (Grunwald 2013).

2019; Haack 2009; Sanders 2009; Rosen 1977). A litigating party will seek to procure an expert that will best support her argument, so that naturally, the opposing side will – by the very structure of the system – end up hiring an expert that is willing to present an opposing view, even though both experts (typically in the same field) are ostensibly furnishing the court with expert testimony based on objective science. These dynamics may culminate in a battle of experts, a drawn-out lengthy process that is known to devour judicial resources and litigants’ coffers (Haack 2009), but also to be emotionally taxing on litigants and their children (Elrond and Dale 2008). Moreover, experts are not drawn from an anonymous or infinite pool; judges and attorneys have specific lists of experts that can be “utilized” for particular ends, so that the choice of expert is subject to various social and professional dynamics that are similar to those observed when obtaining legal representation (Gilson and Mnookin 1994). While experts are supposed to bring their expertise to bear, thus providing context and guidance to judges, they can in fact raise the level of uncertainty tied to disposition, encouraging early sub-optimal settlement, conducted far removed from the shadow of the law (Rathus 2018; Haack 2009; Mnookin and Kornhauser 1979). Amici also exhibit certain biases, and are sometimes considered “lobbyists of the court” rather than friends thereof (Rustad and Koenig 1993). Thus, powerful interest groups wielding vast resources can potentially intervene in litigation to advance their self-interest (Collins et al 2015). At times, such Amici may draft briefs that include reference to Social Science, even if it is of questionable quality (“Junk Science”) so long as it supports the point being made (or lobbied) (Rustad and Koenig 1993).

(4) Insufficient scrutiny of incoming scientific knowledge.

The second most popular critique of the use of Social Science in court is the procedural process regulating the entry of Social Science into court. Much of the grievances in this respect

are foisted upon *Daubert* and the standard it sets for admissibility of expert testimony, but voices aplenty remain to disparage the general process as a whole. If to this point the court system and Social Science were seen as different systems of information, then clearly attention must be given to the boundary issues between the two worlds, i.e., if information habitually migrates from Social Science to courts, it would be wise to take a closer look at the customs officials. The problem most authors identify in connection with this regulation of migrating information is that it is ineffectual at best, and non-existent at worse (Reinhard 2020; Rathus 2018; Huntignton 2018; Monahan and Walker 1988; Suggs 1979; Scurlock 1964: 259). This means that there are no set procedures that ensure that Social Science can be properly obtained and evaluated to include only ‘good’ science. Multiple authors have already advocated for the creation of specialized bodies whose task it will be to evaluate the merit of science entering the court room (Huntignton 2018; Levine 1984; Sperlich 1980), others have suggested enacting mandatory evaluation tests for incoming extra-legal knowledge (Monahan and Walker 1988), and others still have entertained the idea of applying special professional codes of conduct to experts (Sanders 2009), or extending the *Daubert* functions of judicial review of Science to sources of information beyond expert testimony (Ramsey and Kelley 2004). None of the above have been adopted, and scholars’ exasperation continues to grow. Note that this is a systemic, procedural quandary so that judges and attorneys are not to blame (though they will be castigated for other reasons, promptly).

INDIVIDUAL FEATURES OF LEGALISTS

(1) Legalists are not proficient in the Scientific Method.

The most popular and ubiquitous critique came in the form of social scientists and scientifically inclined legalists bemoaning the complete lack of scientific skills courtroom actors possess: judges, clerks, and attorneys are unequipped to locate the best possible social scientific evidence, and to assess and evaluate the relevancy, methodology, and application of a scientific source (Reinhard 2020; Blake 2019; Robertson & Broadhurst 2019; Rathus 2018; Grunwald 2013; Rathus 2012; Faigman 2006; Rustad & Koenig 1993; Acker 1990; Faigman 1989; Lempert 1988; Perry and Melton 1984; Sperlich 1980b; Suggs 1979; Scurlock 1964: 259). The lack of a uniform procedure in obtaining and evaluating said sources is certainly unhelpful in this regard. Moreover, when court actors seek out Social Science, they tend to revisit the same sources time and again (read: elite Law Reviews), as these sources are comfortably familiar (Reinhard 2020; Sirico 2000; Sirico & Margulies 1986; Bernstein 1968), entail lower search costs (Scurlock 1964), and eschew “abstruse, statistics laden discussions” (Acker 1990: 14).

(2) Lost in translation

Regardless of one’s level of proficiency in either of Law or Science, there is the simple fact that each employs a different language, jargon, customs and norms (Faigman 2010; Haack 2009; Mertz 2000; White 1987). This means that in addition to the concerns regarding the quality of the sources entering the courtroom, there is potential for information loss/decay due to translation issues (Huntington 2018; Rathus 2012; Levine 1984). Thus, even a high-quality source by all accounts, may be mis-used or mis-applied. This also exposes a source to manipulation by a translator brought into court, such as an expert witness. Manipulation in this

sense need not be viewed as malevolent, for if science is not purely objective, then the translator may provide her view on the issue, so that other reasonable interpretations are neglected.

Table 1.1: Failures in the Use of Social Science in Court

Source of Failure	Symptom of Failure
A. Inherent Differences between Law and Science	<ol style="list-style-type: none"> 1. Disparity of Goals 2. Generalization level of results 3. No Legal Basis for Social Science 4. Science is not Purely Objective
B. Organizational Features of the Adversary System	<ol style="list-style-type: none"> 1. Adversarial System Distortions 2. Path Dependency and Entrenchment 3. Expert and Amici Selection Bias 4. Insufficient Scrutiny of Scientific Knowledge
C. Individual Features of Legalists	<ol style="list-style-type: none"> 1. Legalists not Proficient in Scientific Method 2. Translation Loss of Information

Daubert vs. Frye: One of Many Elephants in the Room

The rules of evidence exclude evidence that (a) has too low a probative value (efficiency), and (b) was not collected pursuant to the prescribed manner (fairness) (Lilly, Capra, and Salzburg 2012; Edwards and Elliot 2007). Thus, for evidence to be admitted, social scientific or otherwise, it must pass a certain legal threshold. In the U.S. today, there are two separate legal standards for the admission of evidence via expert testimony: the Frye standard,²⁶ and the

²⁶ Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

Daubert standard.^{27,28} The primary difference between these two standards is the threshold for acceptance of novel scientific issues (Jensen 2003). Thus, the Frye standard is tailored to be more flexible, and includes a general acceptance test, whereby even evidence found using novel techniques – so long as they have “*general acceptance in the scientific community*”²⁹ – may be admitted into court. The Daubert standard is more restrictive and requires evidence to be derived only from a scientific process that is methodologically sound (a judge must make a preliminary finding to this end (Lilly, Capra, and Salzburg 2012: 356-58; Parry 2004: 136-40). The identity of states applying either Frye or Daubert (or maverick jurisdictions applying a unique standard of their own) is rather fluid.³⁰

Despite the obvious nexus between the rules of evidence and the use of Social Science in court, there are at least three reasons to explain why the choice of a Daubert or Frye standard is simply one more elephant in the room, i.e., a potential pitfall that can be tucked into one of the 10 described above (Failure B.4. to be exact). First, there is a growing literature claiming that the choice of standard simply does not matter: while the two standards may be distinct *de jure*, they cannot be empirically differentiated *de facto*.³¹ Second, the application of the standards is not uniform across jurisdictions, so that courts resort to certain external indicia when evaluating the

²⁷ Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579 (1994). Most of the remaining states apply the Daubert standard, but there are some exceptions, e.g., ND (which has never officially accepted the Daubert standard, but applies it nevertheless). The standard applied in Federal Courts is the Daubert standard.

²⁸ For an encompassing history on the road from Frye to Daubert, see: Hilbert 2019; Faigman 2013; Sanders, Diamond and Vidmar 2002.

²⁹ Frye, at 567. See also: Parry 2004; Jensen 2003.

³⁰ Currently, seven states still employ the more traditional Frye standard, while the majority of states (approx. 40) apply Daubert, and the remaining three ‘Maverick’ states utilize a standard that is unique standard. These data are gathered according to the designation made by the “Expert Institute” an evidence based organization that arbitrates between experts and the legal system (see: <https://www.expertinstitute.com/about/our-story/>, last visited July 4, 2021), which identifies 40 Daubert states, 7 Frye states (CA, FL, WA, IL, NJ, NY, and PA), and 3 Maverick states (NV, ND, and VA).

³¹ Garrett and Fabricant 2017; Hilbert 2019; Cheng and Yoon 2005; Groscup, Penrod, Studebaker, Huss, and O’Neil 2002; Pfeffer 2015; Jensen 2003. However, there has been some writing to suggest that Daubert did result in more restriction of expert testimony, especially in the field of toxic torts, see: Sanders 2010; Hilbert 2019: 791-792.

science presented (Reinhard 2020; Sanders 2010; Shuman and Sales 1999). And third, that the choice of standard relates only to the admissibility of expert testimony (Parry 2004), which is but one avenue through which Social Science enters the courtroom (Ramsey and Kelly 2004).

However, it may be wise to take a step back from this strong position degrading the importance of Frye or Daubert, as the case may be, for the three reasons suggested each elicits some worthy response. First, the question of whether Daubert made any change in practice is an empirical one that can be measured in more ways than one. Even if results are inconclusive as of yet (Hilbert 2019: 791-92), further research may be required to amass a body of empirical evidence one way or the other, especially as the relevant sample size is still modest (Faigman 2013). Moreover, the impact of Daubert need manifest not only in a significantly different volume of admissible testimony, but as even the potential presence of an expert may be tied to the outcome of a case (Rathus 2018; Haack 2009: 21), Daubert may take its toll in the Shadow of the Law (Mnookin and Kornhauser 1979). Second, if judges do in fact mix certain external indicia with a Daubert determination (some of which may be tied to the biases experts are subject to due to the features of the Adversarial system, as described above), then these factors merit closer study and examination, especially if certain patterns can be identified. Third, while the standard regulating the admissibility of expert testimony does not extend to other forms of Social Science, it may be empirically linked thereto, such that experts may serve in a competing function with other sources of Social Science.

Thus, while Daubert is not the focus of this thesis, it still remains one of the elephants in the room, such that the use of Social Science in court cannot be fully studied without it. In particular, the third concern raised – regarding the possible link between the use of expert testimony and other forms of Social Science – has received little attention in the literature despite

the important ramifications it entails. Indeed, as is detailed in Chapter 3, results indicate the existence of a competing relationship between the use of expert testimony and reference to other Social Science sources, suggesting perhaps that the standard chosen indirectly implicates the use of additional sources of Social Science.

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CHAPTER 2: PARENTAL ALIENATION SYNDROME AND THE DANGERS OF PREMATURE TRANSFER

Abstract: This paper demonstrates how a single idea exhibits different life courses in disparate social environments, such that while an idea may be considered invalid in one social environment, its validity endures in a second social environment. A single idea is examined – ‘Parental Alienation Syndrome’ (PAS) – in two social environments, by studying 430 sources published in academia, alongside 229 court cases considering, *inter alia*, whether PAS should be included in the Diagnostic and Statistical Manual of Mental Disorders, a debate raging since 1985. To contrast and compare between PAS in each social environment, a novel framework is developed based on insights from the Sociology of Knowledge, the Sociology of Ideas and Life Course Theory to suggest that ideas exhibit three predictable and observable stages throughout their life course, allowing examination of the timing and valence of potential consensus. Spline regression and one-way ANOVA are utilized to differentiate between the stages of PAS’s life course across social environments. Network Modularity analyses provide robust results. Primary findings indicate that courts applied PAS nearly 20 years before it attained closure in academia, and that after PAS attained negative consensus in academia, it nevertheless endured in courts for roughly 10 years. I call this “Premature Transfer”.

Introduction

Ideas frequently enter and exit our lives; but not all ideas are good, and sometimes bad ideas wreak havoc in their wake producing costly unintended consequences. In this paper, a particular idea – Parental Alienation Syndrome – is tracked throughout its life in two distinct social environments: social scientific publications and Family Courts. In doing so, it is empirically demonstrated that when ideas travel to new social environments, they can become independent of the engendering social environment. Findings demonstrate that one consequence of said idea’s independence, is that it may endure in one social environment, long after the originating social environment has deemed the idea invalid.

The argument therefore, is that “bad” ideas are expected to linger when premature transfer is observed: the transfer of an idea from the originating environment, before the idea has attained consensus, to a new environment, where it will become independent of the originating environment. A number of potential reasons are set out to explain premature transfer and duration problems: the degree of independence between relevant social environments, the sub-optimal application of formal mediation mechanisms between social environments (e.g., legal standards), and the quality of brokerage between both social environments.

This project seeks to contribute to the literature in four ways. First, by offering an analytic framework to identify various trajectories that ideas may espouse during their lifetime. Using insights from the Sociology of Knowledge, the Sociology of Ideas, and central concepts from Life Course Theory, this framework conceptualizes the life course of an idea from its first appearance (birth), and until it either attains positive consensus (accepted as valid), or negative consensus (after which the idea will die).

Second, this analytic framework enables the identification of an idea's life course across multiple social environments, testing whether the same idea takes on a distinct life course in different social environments. This method is unique in that it applies both qualitative and quantitative methods to capture predictable stages and events in the life course of an idea, including empirical measures such as the validity and visibility of an idea. In doing so, analytical tools are provided to (a) identify and differentiate between various stages in an idea's life course; (b) identify whether and when consensus has been attained; and (c) identify the valence of that consensus (positive or negative) across multiple social environments.

Third, this work settles a long-enduring debate regarding Parental Alienation Syndrome, both in academia and in courts, regarding its validity, its current state in both social environments, and the timing of its demise (Saini, et al. 2016; Hoult 2006). The proffered analytical framework establishes that Parental Alienation Syndrome is now invalid in both social environments (but not in all jurisdictions). It is important to note, however, that findings pertaining to the validity of Parental Alienation Syndrome are not to be taken as intrinsically true (Frickel and Gross 2005: 208), but rather a reflection of its state within the social environments investigated.

Finally, and most importantly, the data and framework deployed *infra* illuminate an important interstitial dynamic present on the margins of social environments and worlds of knowledge. Thus, generalizing from the case of Parental Alienation Syndrome, one aspect of the transfer of knowledge between

Theoretical Background

This article regards ideas during their life, and the social influences to which ideas are susceptible, thus combining insights from the Sociology of Knowledge – suggesting that the knowledge produced is dependent upon the thought collective in which it developed (Fleck 1935 [1979]), and the [new] Sociology of Ideas – whereby an idea may develop a “social life”, exhibiting various trajectories over time (Santoro and Sapiro 2017; Camic and Gross 2001). In other words, the underlying hypothesis tested is that due to a dependence upon its social environment, an idea may exhibit disparate trajectories in distinct social environments, and that such mis-aligned trajectories may yield negative consequences, due, inter alia, to the premature transfer of an idea from one social environment to another, before the idea is validated.

In the beginning, there was Ludwig Fleck; and he set forth an insight that has been visited and revisited many times over by social scientists of all shades: pure objectivity, as it relates to an empirical fact, is a fiction (1935[1979]). Thus, empirical facts (let us call these ideas) are a function of the thought collective within which they were created, i.e., the social environment shapes how we understand, access, process and most importantly, produce knowledge. Therefore, different ideas take on varying attributes and characteristics, depending on the engendering social environment.

Over the years, a great deal of ink has been lavished on Fleck’s insight. For instance, Collins (1975) set out his encultural model supported by evidence in the field of gravitational waves, to show that certain cultural constraints can and do shape the process of knowledge production, and as a result – the ideas produced thereby. This encultural model has since been applied, explicitly or implicitly, to illuminate other forms of extra-scientific pressure: Knorr-Cetina (2003) demonstrates that unique organizational structures and norms render the field of

high-energy physics an outlier in the hard sciences; Epstein (2007) shows that agenda setting properties are far from objective, as they pertain to scientific research, and can be controlled politically; and McKenzie (2011) dove deep into the machinations of pre-2008 financial organizations to show that cultural and organizational failures led to a faulty dissemination of knowledge, and thus to the Great Recession. Moreover, the social environment has influenced the manner in which ideas are classified – both on the micro (Bowker and Star 1999) and the macro levels (Abbott 1988). This line of inquiry focuses on the environment prior to the creation of an idea and builds upon Fleck’s insight.

Other works have paid particular attention to the trajectory an idea may espouse throughout its life, and how it develops over time after it has been introduced. These works address important questions regarding the state of an idea at different times. Thus, Shwed and Bearman (2010) use modularity algorithms to detect communities within citations networks and empirically assess whether consensus has been attained with respect to a particular issue in a scientific field. Navon and Shwed (2012) add nuance by showing how boundary objects play a role in the formation of consensus, and Adams and Light (2015) provide a systematic approach to resolve the scientific debate regarding consensus in different time periods. While these works address the crucial question of consensus formation, it is not the only point of interest throughout an idea’s life.

Other important aspects include the trajectory an idea has exhibited during its life time. Shwed and Bearman (2010) study 7 different ideas to offer a more encompassing typology of trajectories an idea may exhibit throughout its life: spiral, cyclical, and flat. While instructive, these trajectories offer little insight into the pre-consensus stages of an idea’s life, so that it is

difficult to categorize, measure or compare these trajectories, especially when the idea presents itself in more than one social environment.

Recently, Hallet, Stapleton, and Sauder (2019) have undertaken to investigate the life of public ideas – those insights that originate in the social sciences and are later used as objects of interest or interpretants, or a combination thereof (2019: 547). In this work, two key parameters of ideas are measured (number of observations and function of observation) to create a typology of public ideas, or types of careers an idea may espouse throughout its lifetime. These tools are useful in studying the social life of public ideas, but provide no empirical tools to assess when and whether consensus has been attained, and cannot be applied to new social environments.

Using quantitative methods coupled with a deep qualitative assessment, this paper offers an analytical framework that approaches the life of an idea as a life course with predictable stages, including consensus formation, in two different social environments. By examining various dynamics which manifest in the life of an idea – validity, breadth of opinion, number of observations, competing ideas, ambivalence and network centrality – analytical tools are provided to track the early stages of an idea’s life course, and capture the great variance presented thereby. Being able to conduct such analyses is important, as they will allow us to better understand what factors may influence an idea’s life span, survival rate, degree of diffusion, and more. Below, the power of the proposed framework is explored in depth, by demonstrating how the premature transfer of an idea from one social environment to another – before closure has been attained – results in sub-optimal duration outcomes, such that a scientifically invalid idea exhibits an unjustifiably long-life course.

In addition to the simultaneous evaluation of an idea’s life course in different social environments, the combination of qualitative and quantitative examination of the sources in

which the idea is expressed overcome the potential perceived gap between what the state of an idea objectively is, and what we subjectively think it might be. Shwed and Bearman (2010) expertly show that experts can be mistaken about the timing of consensus formation with regards to a particular idea in their own field (2010: 829). While this malady may seem inherent to academic fields, the gap between subjective and objective assessments may have negative consequences, especially in social environments such as the legal system, where decisions based on faulty science have a major and direct impact on peoples' lives (Adams and Light 2015; Faigman 2006). In this sense, the proffered framework not only includes a new manner of assessing the occurrence and timing of closure/consensus, but also the valence of closure (i.e., if negative or positive consensus has been attained), as well as other events in an idea's life course, effectively nullifying the gap between qualitative and quantitative assessments of the state of an idea (in a particular social environment).

Moreover, qualitative examination of sources allows consideration of the full breadth of opinion in a debate. Previous work does not discriminate between positive and negative observations, despite recent findings that negative observations may bear upon the structure of modularity, and hence consensus or the trajectory/career of an idea (Bruggeman, Traag, and Uitermark 2012). By scaling all sources' appreciation of an idea's validity, the proffered framework not only discriminates between positive and negative observations, but also ranks them by intensity to provide a more accurate illustration of the current state an idea exhibits at time t .

Finally, the examination of academia and courts as social environments provides a new venue to the question of knowledge formation. Various scholars have undertaken to compare and contrast the process of knowledge production in multiple social environments (as defined

herein), such as molecular biology, psychology, sociology, political science, high-energy physics, the tobacco industry, and newspapers (Hallet et al. 2019; Peterson 2015; Shwed 2015; Walton 2005; Knorr-Cetina 2003). Others have explored consensus formation within courts (Adams and Light 2015). This paper examines both social environments in tandem offering a unique view into the development of an idea once it has left the mothership. This is important for two reasons. First, courts are significant downstream consumers of social science (Calavita 2010; Horowitz 2010; Feldman 2009; Melton 1992; Monahan and Walker 1991; Monahan and Walker 1988), and examining the fate of one such ‘product’ (even if unsuccessful) may provide insight into other social scientific theory. Second, courts and academia share few cultural and organizational features, and are driven by disparate goals (compare: Merton 1973 with: Katz 2011; Rosenberg 2008). This work provides an opportunity to explore the process of knowledge formation in a social environment that is distant from the traditional venue studied by scholars, providing greater variance in observations and further insight into how the two social environments interact.

Old Idea, New Social Environment – Why does Law Look to the Social Sciences?

Before the proposed framework is laid out, it is prudent to discuss the subject of inquiry, Parental Alienation Syndrome, as well as the relevant aspects of the legal system studied. This substantive background first tackles the question of how social science enters courts in the first place, and why ideas might take on an independent life course therein. A brief background on Parental Alienation Syndrome is then provided, followed by a number of justifications for utilizing Parental Alienation Syndrome and the legal system as the object of inquiry.

During his opening statement in front of the Senate Appointment Committee, then Judge Roberts (now Chief Justice Roberts) stated: “[...] it's my job to call balls and strikes and not to pitch or bat. .”¹ This statement suggests that law is a complete and exhaustive set of rules, where there is always one right legal answer to every dispute (either a ball or a strike). Unfortunately for society (yet, luckily for attorneys), this is not always the case. At times, there is no clear legal solution: the answer is extremely complex, or even indeterminate (Mnookin 1975). Indeed, such is the case when allocating parental responsibility (more colloquially known as child custody proceedings). The indeterminacy in such cases is inextricably linked to the legal standard regulating custody: the best interest of the child (Scott and Emery 2014; Emery Otto, and O’Donohue, 2005).

Despite many modifications over the years (Mason 2012), the best interest standard is today extremely vague and hard to predict, so much so, that it has in fact been dubbed an indeterminable standard (Mnookin 1975). Not only does this standard vary by state (varying both in text and interpretation), but it varies by county, municipal district, and even by judge (Elrod and Dale 2008). Thus, different judges espouse different views on what is best for a child given the same circumstances.²

One solution to the problem of indeterminacy was set forth in the early 20th century as part of a legal philosophy known as ‘Sociological Jurisprudence’, which sought to consider the sociological aspects of law and dispute resolution (Lyman 2002; Pound 1943) by supporting

¹ Chief Justice Roberts' opening statement during his nomination hearings before the Senate Judiciary Committee, September 12, 2005; Available at: <http://www.cnn.com/2005/POLITICS/09/12/roberts.statement/> (last visited, November 27, 2019).

² This is not to say that legal standards are inherently flawed. Most (if not all) legal systems must accommodate the inherent tension between rules and standards: on the one hand, laws and regulations can be highly specific so as to lower the costs of illegitimacy and uncertainty; but on the other hand, they must be sufficiently flexible to deal with the constantly changing vagaries of social life (Kaplow, 1992). Therefore, flexible (and vague) legal standards are required, and have become a common feature of Law.

legal claims with social scientific evidence. Today, the introduction of social scientific evidence into legal briefs and judges' opinions is common practice. Thus, during custody proceedings, when a judge faces a difficult, possibly indeterminate ruling, she may seek guidance from mental health experts, findings set out by social scientific researchers, or both (Huntington 2018; Gould and Martindale 2007; Hoult 2006; Ramsey and Kelly, 2004; Myers 1993). Thus, courts provide a unique opportunity to track the life course of an idea in a new social environment outside social scientific scholarship.

This project explores an idea imported into the legal system via the best interest standard: Parental Alienation Syndrome (PAS). PAS was set out in the early 1980s by Dr. Richard Gardner, a Clinical Psychiatrist (Gardner 1985). In his view, children of divorcing parents, particularly during high-conflict divorce, are susceptible to PAS – a case in which one parent (the alienator) engages in a campaign of denigration and systematically programs the children against the other parent (the targeted parent) (Gardner 1998; Gardner 1987). Gardner's proposed remedy included the isolation of the children from the alienating parent, and placement with the targeted parent (Gardner 1987; Gardner 1998). Despite numerous attempts (Bernet and Baker 2013; Gardner 2002), PAS was never included in the DSM IV (1994), the DSM IV-TR (2000) or the DSM V (2013)³ (Saini, et al. 2016).

Nevertheless, PAS was routinely utilized by matrimonial attorneys in contested custody litigation with some initial success (Wood 1994). In the early 1990s, PAS became highly contentious in the scientific community (Bruch 2001; Gardner 2002) and by the early 2000s, a

³ DSM is the 'Diagnostic and Statistical Manual of Mental Disorders', a treatise that compiles all recognized mental health disorders. This treatise is highly influential in fields such as social work and law and is often determinative of social policy (Rocheffort, 2014).

large group of scholars deemed PAS invalid, a discredited theory of “junk science”.⁴ On the other hand, there is a core of Gardner’s colleagues and former students who still today advocate for the validity of PAS and its inclusion in the DSM.⁵ The PAS debate is by no means limited to the United States, and has spread to other countries across the globe.⁶

Over the years, attempts have been made by legal and social scientific scholars to settle the PAS debate: should be it considered a medical syndrome listed in the DSM? Such inquiries were made mostly with regards to the state of PAS in the field of social scientific and legal scholarship, but also with respect to the positive and normative state of PAS in the legal system. A comprehensive study of PAS, conducted by Jennifer Hoult in 2006, found that PAS is an invalid scientific theory, and should be inadmissible in court. However, this study, like many others (See: Whitcombe 2013; Lorandos 2013; Houchin, et al. 2012; Walker et al., 2004) is based on purely qualitative methods, all of which present the problem of subjective assessments. An encompassing meta-analysis of PAS research conducted by Saini, et al. (2016), makes claims regarding the then-current state of the PAS debate (that it is not a scientifically valid syndrome), but offers no statements regarding the timing of consensus, and the trajectory PAS has taken.

The debate regarding the validity of PAS has raged in Family Courts as well. While some jurisdictions are unequivocal about their rejection of PAS (e.g., New York in *People vs. Fortin*, 289 A.D. 2d 590 (2001); and *N.K. vs. M.K.*, 17 Misc.3d 1123(A) (2007)), other jurisdictions are

⁴ For a sample of recent scholarship heavily criticizing PAS, *See*: Huntington, 2018; Puppo, 2018; Meier and Dickson, 2017; Saini, et al., 2016; Clemente and Padilla-Racer, 2015a; Clemente and Padilla-Racer, 2015b; Sanders, et al., 2015.

⁵ For a sample of recent scholarship heavily promoting PAS as a syndrome that ought to be included in the DSM, *See*: Boch-Galhau, 2018; Woodall and Woodall, 2017; Lorandos and Bone, 2016; Bernet, Verrocchio, and Korosi, 2015; Bernet and Baker, 2013.

⁶ The PAS debate has traveled to the UK (Hobbs, 2002), Germany and Austria (Boch-Galhau, 2018), Canada (Godbout and Parent, 2012), Italy (Lavadera *et al.*, 2012), Spain (Lopez, Iglesias and Garcia, 2014), South Africa (Viljoen and Rensburg, 2014), the Netherlands (Spruijt, *et al.*, 2005), Israel and the Czech Republic (Gardner, Sauber and Demosthenes eds., 2006).

anything but (e.g.: Ohio in *Habo v. Khattab*, 2013 WL 6869804 (unreported) (2013); or Rhode Island in *Johnson v. Kosseff*, 2013 R.I. Super. LEXIS 11 (2013)). It should be noted that the timeframe of PAS in both the social sciences, and the legal system is very similar, as PAS was first set out in the literature in 1985, and first raised in a California court in 1987⁷ (though this was an appellate court which suggests that PAS may have presented itself earlier in lower court decisions).

PAS still surfaces in courtrooms today. While experts in relevant scholarly fields may agree that PAS has become discredited (or, a ‘negative consensus’ – the idea was found to be invalid),⁸ it engendered the idea of parental alienation (not as a syndrome, but simply as a malicious act) which is still frequently used successfully in courts today and is ostensibly recognized by the social scientific community as a valid idea (Bernet, et al. 2018; Saini, et al. 2016; Nichols 2014).

When studying the life courses of ideas, there are many advantages to selecting the court system as an object of inquiry in addition to the social scientific literature. The veracity of social scientific ideas is sometimes formed in the crucible of courts, and vice versa. More, once a legal rule is set (in this instance – PAS is, or is not a recognized syndrome) this has far reaching implications for the legal system, as precedent can be set, binding all potential future litigants who will bargain in the shadow of the law⁹ (Mnookin and Lewis Kornhauser 1979). Thus, a

⁷ *Coursey v. Superior Court*, 194 Cal.App.3d 147 (1987).

⁸ It is important to distinguish between negative consensus and death, as the former always takes place prior to the latter. Once an idea has been deemed invalid (negative-consensus reached), it may take some time – depending on the idea and the relevant social environment – to meet the grim reaper. Death presents as very few mentions of an idea, and the few that do exist are substantively hollow. For instance, references to Phrenology (a dead idea by all accounts) are made in the context of ridicule or of an historic fact.

⁹ Mnookin and Kornhauser (1979) discuss the dynamics taking place outside the courtroom, and how they influence the decision-making processes of litigants. Bargaining in the shadow of the law suggests that litigants orient their behavior based on their expectations of the judge’s interpretation of the law. This is a powerful insight as it suggests that law has a much broader scope of influence (whether we are aware or not). This concept can also be understood

well-defined debate with high stakes is ideal to explore the life course of an idea, as it shall produce debate dynamics, and may exhibit a tumultuous trajectory. Furthermore, the two social environments are not independent of each other, especially with regards to the life course of PAS – certain determinations in one environment sometimes spill over to the other environment, and are used to support a shift in the position of a source/institution regarding PAS. Thus, a complete understanding of the debate must include both social environments.¹⁰

PAS serves well as a case study due to the highly contested nature of the debate it produced. Indeed, the PAS question extends far beyond inclusion or exclusion in the DSM, the outcome of one case or another, or even the creation of legal precedent. PAS has become the battle ground for various social battles, including the dangers of expert opinion and clinical findings (Bruch 2001; Faller 1998; Wood 1994), scientific standards of evidence in the social sciences (Emery, Otto, and O’Donohue 2005), gender inequality (Dinner 2016; Berg 2011; Meier 2009; Adams 2006), and even a fertile breeding ground for vicious personal attacks (See: Dallam 1998; Lorandos 2006; Bruch 2001; Gardner 1998; Faller 1998). Such highly contested debates render the dynamics of the PAS debate more extreme, and thus more visible and amenable to patterning and analysis.

Theoretical Framework

The stages in an idea’s life course have received attention in the past, though this was limited to one social environment – science. Mulkay, Gilbert and Woolgar (1975) discuss the

in terms of Neo-Institutional Theory, as there may be a spill-over of law from the “Regulative Pillar” to the “Normative” and “Cognitive” pillars (Scott, 2014).

¹⁰ An examination of both contemplated social environments is not exhaustive, as other social environments may be relevant to this analysis, for instance, state legislators. This latter social environment was considered, but eventually dropped from the data due to a paucity of observations (fewer than 60). That I do not include data from all possible social environments is a limitation, however I believe I have collected sufficient data for the two social environments most important to the PAS debate.

manner in which a scientific research community aligns vis-à-vis a new and problematic idea, suggesting three predictable stages, including an exploratory phase (groups in the network trying to define the idea); a unification phase (research groups begin to negotiate, building toward consensus); and a phase of decline, where the research network/community has no more growth potential. Latour (1999) describes the “blood flow” of science, arguing that an idea exhibits five predictable stages: (1) Mobilization (findings, data, theory); (2) Autonomization (validation from peers); (3) Alliances (accumulating resources); (4) Public Representation (making idea socially palatable); and (5) Links & Knots (developing the core scientific concept). Thus, Latour’s framework explicitly considers pressure from extra-scientific components, and recognizes that ideas – and the process of knowledge production – are embedded within social environments.

Mulkay, Gilbert and Woolgar’s tripartite framework is modified as such: (1) once born, an idea is first explored by relevant parties in a particular field, taking shape and forming through a process of fine-tuning. This is the Exploration stage, during which an idea is first presented and developed by a supporting intellectual community. (2) Over time, more interested parties, from different intellectual communities enter the debate, test and evaluate the idea, eventually building towards consensus. This is the Negotiation stage, during which the broader community decides whether this is a valid or invalid idea. (3) Finally, the idea will either attract further attention and development, or exhibit a process of death. This is the Post-Consensus stage.

Latour’s framework is compatible with the three stages set out above. Thus, Latour’s stage (1) is roughly equivalent to Exploration; Latour’s stages (2), (3), and (4) fall within the bounds of Negotiation (in this respect, Latour draws out and separates various mechanisms related to Negotiation); and stage (5) is roughly equivalent to Post-Consensus.

Life course theory represents a contribution to the framework, as it prescribes a method that allows researchers to follow and map the trajectory of individuals' life, while considering important events (e.g., marriage and divorce), as well as large-scale social forces and period effects (e.g., WWII or economic depressions). Key concepts in the theory include the notion of trajectories (the path an individual followed from beginning point A to final point Z), transitions (events that change the state of an individual, for instance, from single to married), and duration (the length of time that has passed between various transitions) (Elder, Johnson, and Crosnoe 2003). When data are collected to bear out these concepts, social pathways common to various populations can be constructed (Elder 1978; Hareven 1978).

Mapping Life Course concepts onto the Idea Life Course framework serves to qualitatively clarify the three stages, i.e., transition points function as border-lines between the stages. Thus, transition points signal the passage from one stage to the next (e.g., shift from Exploration to Negotiation). Duration of each stage will serve as another instrument to compare between different trajectories, and trajectory can be thought of as the particular pattern an idea exhibits: the manner in which it transitions between stages, and the duration between each point.

The two key parameters measured when tracking the life course of an idea are time and validity. Time is measured as the actual time an event occurred or relative time (since birth) that has passed. Validity is the primary predictor of an idea's life course and the main dependent variable that will guide the analyses below. Validity is operationalized as a measure of how an idea is received by a particular person(s) or institution at time t . There are a number of objective indicia to relate not only whether an idea is considered valid by source X at time t , but also the degree to which it is valid. To be able to compare and contrast between different social environments, the same validity scale will be used (ranging from a validity score of '-2': idea

fully rejected, to a validity score of '+2': idea fully adopted). The assessment of validity scores is itself a highly qualitative assessment borne of a deep examination of the entire source (rather than simply a quick skimming of abstracts). Due to the particularity of the legal system, as well as the empirical component frequently raised in social scientific literature, such qualitative assessments required specialized knowledge in both fields and could not be conducted using computational techniques.

Figure 2.1: Theoretical Framework for the Life Course of an Idea

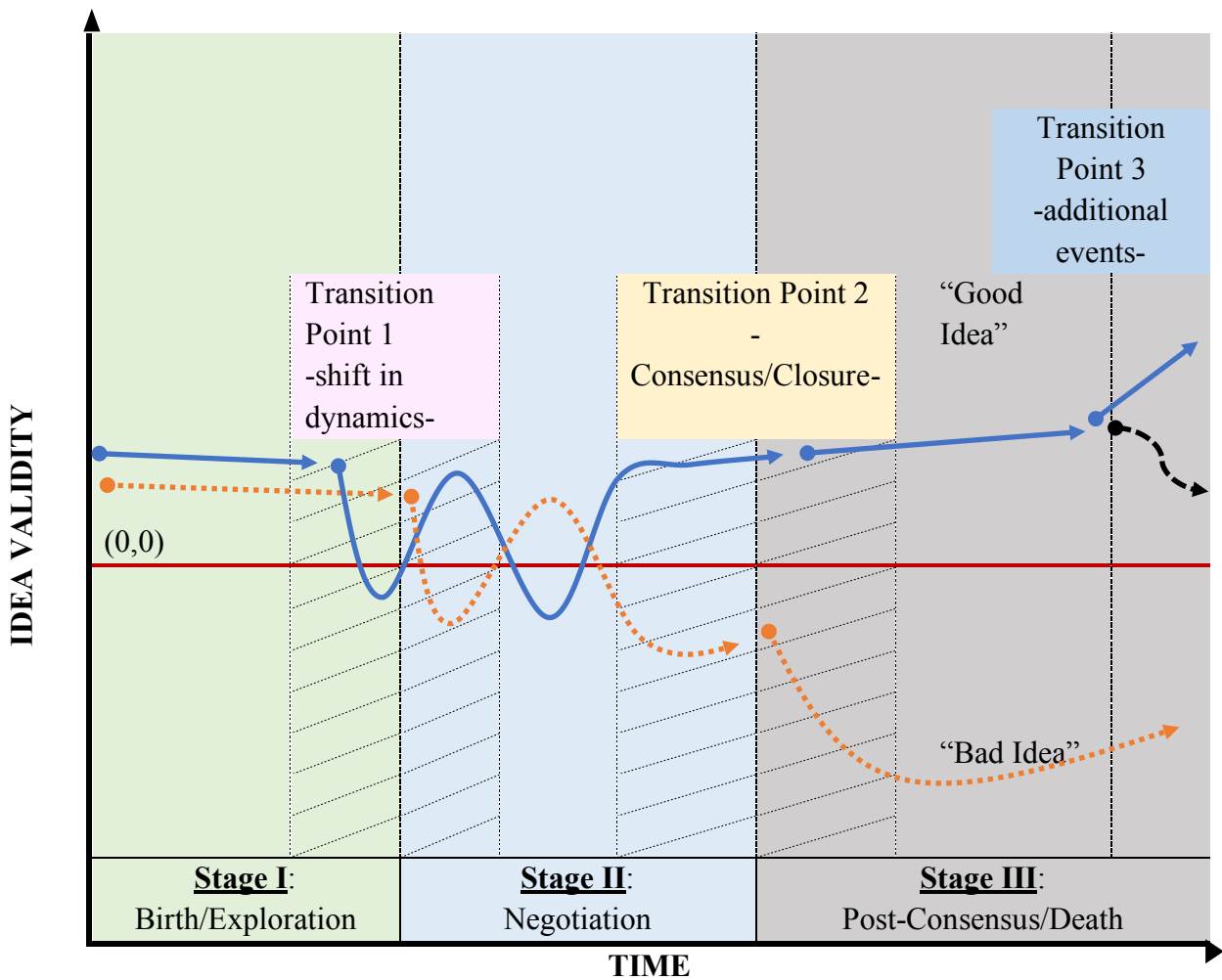


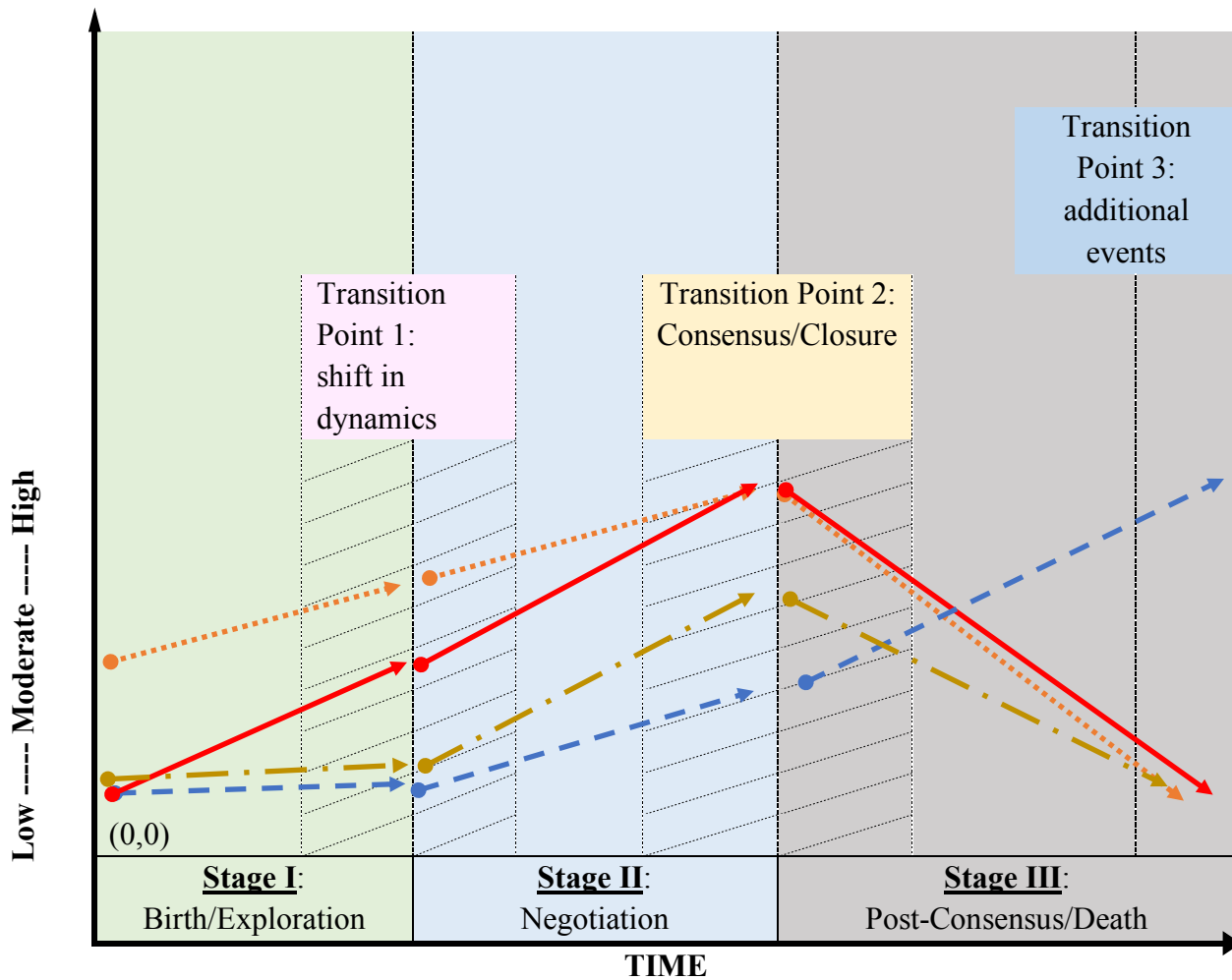
Figure 2.1 provides a visual illustration of the theoretical framework. It suggests that an idea might follow various trajectories to obtain disparate ends. In this conceptualization, two examples are set out to demonstrate how the framework applies to the life courses of ideas. The Y axis provides a measure of the degree of validity an idea is exhibiting (averaged across multiple sources at time t), with the horizontal line extending out from the point of origin signifying a theoretical threshold for ambivalence – when an idea has surpassed this threshold, it is considered valid (although there may not yet be consensus regarding its validity). The X axis provides a measure of time. Each of the solid and dotted lines serve as ideal types for ideas that have progressed through their life course, but where dotted line meets with negative consensus (“Bad Idea”), the solid line is met with positive consensus (“Good Idea”). The manner these ideal-type ideas are presented constitute the hypotheses for ideas’ life courses, although ideas can follow multiple “successful” or “unsuccessful” life courses while exhibiting disparate trajectories.

In addition to validity and duration, further features that differentiate between such trajectories can be found in the debate dynamics exhibited by the idea throughout its life course. Five such measures are identified: (a) the breadth of opinions exhibited – measured as the standard deviation in validity at time t ; (b) visibility – number of actors involved in the debate at time t ; (c) competing idea – in both instances, the debate studied produced a derivative/competing idea, which is then tracked in the relevant community; (d) ambivalence – whether a source substantively engaged the issue, but took no side in the debate; and (e) network centrality – a measure of how central a source is to the citation network of each social environment.

These various debate dynamics, coupled with validity and duration, shall provide a more nuanced view of an idea's life course, as each will provide a different lens with which to examine the life course of PAS; but in the end, they should all tell a similar story, providing robust evidence to support claims regarding the life course of PAS in both social environments. It is to be expected that both idea validity and debate dynamics shift noticeably and significantly when an idea transitions from Exploration to Negotiation, and from Negotiation to Post-Consensus. Importantly, the debate dynamics identified above (with the possible exception of competing ideas, relevant only when they surface in a debate), can be measured for debates in most social environments, *mutatis mutandis*.

An idea is expected to begin its life with moderate to high validity in the community, exhibiting a zero or slightly negative slope during Exploration, en route to transition point 1. Exploration is where the idea is first being presented by its proponents, and only tentatively tested by relevant parties outside of the proponents' intellectual camp. As such, few observations, a narrow range in opinion, and relatively high centrality of sources are expected. Moreover, recognition of competing ideas and ambivalence are also expected to be low, as a particular idea is being promoted. The shift from Exploration to Negotiation – transition point 1 – will occur when the debate itself shifts and the idea meets with its first critics. This is true for both good and bad ideas.

Figure 2.2: Debate Dynamics During the Life Course of an Idea



After transition point 1, the idea will be examined by various actors outside the intellectual camp in which it originated, so that validity is expected to be tumultuous during Negotiation, and the idea may oscillate in validity. This is the stage where new actors enter and participate in the debate, so that more observations, and a broader range of opinions are expected as well. This is where first references to a competing idea may surface, as well as a higher degree of ambivalence regarding the idea. Centrality may decline as some sources become peripheral to the debate. While an idea's validity during Negotiation may be tumultuous, it may nevertheless exhibit a slope of zero, as a stable trajectory may mask a divergence in opinion.

Table 2.1: Summary of Expected Trends for Idea Validity & Debate Dynamics

Validity & Debate Dynamic	Exploration		Negotiation		Post-Consensus	
	Slope	Mean	Slope	Mean	Slope	Mean
“Bad” Idea Validity (Dotted) – Figure 1	Zero/Negative	High	Zero/Negative	Moderate	Zero/Negative	Low
“Good” Idea Validity (Solid) – Figure 1	Zero/Negative	High	Zero/Positive	Low	Zero/Positive	High
Breadth/Obs. (Solid) – Figure 2	Zero/Positive	Low	Positive	High	Negative	Moderate
Competing Idea (Dash) – Figure 2	Zero	Low	Positive	Moderate	Positive	High
Ambivalence (Dash-Dot) – Figure 2	Zero	Low	Positive	Moderate	Negative	Low
Network Centrality (Dot) – Figure 2	Positive	Moderate	Positive	High	Negative	Moderate

Although the idea’s validity may bestride the ambivalence threshold during Negotiation, consensus is only obtained under the following conditions: (a) the idea is in Negotiation (i.e., consensus cannot be reached during Exploration); and (b) validity has stabilized for a certain period of time either above the ambivalence line (positive consensus) or beneath it (negative consensus). When consensus has been attained, transition point 2 has been reached, and the idea progresses from Negotiation to Post-Consensus. There are no hard and fast rules to determine how stable an idea needs to be, or how long it must remain stable for consensus to be attained – the quantitative data must be supplemented by qualitative assessments (Shwed and Bearman provide similar caveats in their method for identification of consensus in scientific fields, 2010: 833).

After transition point 2, the Bad Idea will continue to decline in validity during Post-Consensus. However, Bad Ideas will not necessarily exhibit a simple downward slope as intuition suggests. As Bad Ideas lose validity following a negative consensus, the opposition thereto begins to soften as well. For instance, how common are scientific articles deriding the evils of phrenology, eugenics or Mullets? Not very common. At best, if any reference is made to dead or dying ideas, it is a soft rejection made in an offhanded remark. In the aggregate, the loss of interest and vigor to oppose ideas is likely to manifest as a slight upward trending slope during Post-Consensus (validity will begin to regress toward ambivalence). For this reason, the slope during Post-Consensus may not remain consistently negative, especially when there are many observations for this stage. When an idea experiences a positive-consensus, a similar (albeit opposite in effect) regression towards ambivalence is expected.

The idea will present additional features during Post-Consensus. As consensus has been attained, fewer actors are expected to participate in the debate (effectively rendering transition point 1 an entry, and transition point 2 an exit, to and from the debate), lower ambivalence and centrality, and a narrower range in opinion. Moreover, reference to a competing idea may be very common if the competing idea won over. An idea may exhibit a third transition point during Post-Consensus, such as the formation of a new derivative idea (the downward sloping dashed line under “transition point 3” in Figure 1), or fresh critique brought on by new findings.

It is easy to imagine other possible stages in the life course of an idea, especially for ideas that have an unusually long-life course such as Farming, Newtonian Physics, or A-line dresses. The Framework does not address two plausible prospects: (i) that a fourth (or more) stage exists, in which future transition points may be met (including birth of newer ideas, or any other event); and (ii) under the Kuhnian concept of progression of scientific knowledge (Kuhn 1979), an idea

that has attained a positive-post-consensus status (and is alive and valid) may nevertheless be revisited, challenged, and eventually found to be invalid (e.g., Eugenics), i.e., consensus is not a stable state (Adams and Light 2015). In both instances (i) and (ii), the relevant timeframe for inquiry would extend for many decades, if not centuries, and would constitute a macro-level analysis. While this dynamic is intriguing and worthy of further inquiry, it is outside the scope of this project. Here, focus is on a mezzo-level time frame (20-40 years), limiting analysis to the first instance of birth, exploration, negotiation and consensus – in different social environments, rather than tracking an idea’s career (et, et. al. 2019) throughout its entire observable life course. A mezzo-level of inquiry was selected for two reasons. First, following Fleck’s insights raised supra, it is particularly interesting to find whether extra-scientific pressures are exerted immediately after an idea is adopted in a new social environment (how does the early life course of an idea differ between social environments?). Second, focus on a macro-level timeframe would miss a great deal of data on “young” ideas still progressing through their life course, that have nevertheless been adopted by a new social environment in the pre-consensus stages. This adoption may have important consequences when the adopting environment is using these “unproven” ideas to regulate the lives of numerous stakeholders.

An emphasis is placed on the life course of a “bad” idea, as there is good reason to believe that, in fact, most ideas are bad ones, and that only a minority of ideas are “good” ones that attain positive consensus and live out a long life course. This may be due to the “liability of newness” of novel ideas (Stinchcombe 1965) that have not yet garnered enough support and must compete with older and well-established ideas. Or, it may be due to certain invisible college effects (Price 1963) or the Mathew Effect (Merton 1973), whereby the validity of an idea (and therefore its life course) is dependent upon the identity and prestige of its creator (or an “author

function”, Foucault 1969)), so that the few elite creators located at the top of a narrow pyramid are more likely to create valid ideas. Therefore, it is important to study the life course of ideas in the stages immediately following birth, as this is where most ideas are censored, especially when they extend beyond the engendering social environment.

Data & Methods

The purpose of this work is to track the life course of an idea, PAS, in two separate social environments. To this end, mixed methodology is employed, qualitatively reviewing the sources in a studied social environment pursuant to a coding scheme, and quantitatively assessing the results obtained. The author identified and indexed every publication (articles, books, and chapters in books) that participated in the PAS debate in the social environment of social scientific scholarship, as well as every state court case on the appellate level that participated in the PAS debate. In other words, the complete universe of cases was examined for both social environments rather than a probability sample. For a complete list of network boundaries and rules of relevancy (which sources were excluded from the data), see [Appendix A](#).

Every source considered relevant to the debate was read and coded for multiple indicators, including validity and the debate dynamics indicators, as well as other control variables relevant to the social environment studied. The PAS Validity Score (herein: “**PVS**”) ranged from ‘-2’, full/explicit rejection of PAS as syndrome, to ‘+2’, full/explicit acceptance of PAS as syndrome. The intermediary scores ‘-1’ and ‘+1’ were given when PAS received a soft/implicit rejection or acceptance, respectively, and a source was coded as ‘0’ when it substantively engaged PAS, but remained ambivalent as to a position. A summary of the coding

guide differentiating between various PVS, and notes regarding the internal coding validation, appear in Appendix B.

In addition to coding for PVS, debate dynamics indicators and control variables, a citation network was manually constructed for both social environments, including cross-environment citations (e.g., a court case citing a scholarly article). Overall, 430 sources were identified, indexed, and coded in the social scientific social environment, and 229 cases in the state-appellate court system, representing the entire universe of PAS cases in each social environment rather than a sample thereof.

After all sources were coded, the values of PVS and various debate dynamics were plotted over time, for each social environment, with the aim of showing that the PAS trajectory follows the framework set out above in Figure 1, albeit PAS presents a different trajectory in each social environment. As such, trajectories are examined for differences in slope (trends shown by the data), and volume (mean values), paying special attention to the timing of each. Slopes and volumes are studied via three methods: (a) a visual examination of the trajectories exhibited; (b) spline regressions to locate significant breaks in trajectory slopes; and (c) one-way ANOVA to compare the mean values of different segments of the trajectories.

The above methods of inquiry are coupled with network analyses to obtain robust results, by replicating in part the approach utilized by Shwed and Bearman (2010): they hypothesize that high network modularity (many cliques, low connectedness thereamong) deters consensus, while low modularity (few cliques, high connectedness thereamong) encourages consensus. This insight is based, *inter alia*, on the findings of Hanney, et al., (2005) who find that citations in a

publication are typically positive citations (support the work cited) rather than negative citations (disagree with the work cited).¹¹

In lieu of Shwed and Bearman's moving time window,¹² a cumulative measure is utilized. This measure is more fit for the examination of PAS, as certain core sources – both in the scholarly literature and the court system – that were introduced into the debate early on, continued to be heavily cited even by recent sources. Additionally, the time frame examined is relatively short (32 years) compared to the time frames studied by Shwed and Bearman (well over 60 years in certain cases). The modularity score of each citation network will then be measured for each calendar year, and graphed over time. As Shwed and Bearman suggest (online supplement, 2010), the size of the network (number of nodes, or sources in this instance) is empirically related to the raw network modularity score. Therefore, an identical scaling technique is employed, adjusting for network size by dividing the raw network modularity score obtained for each year of analysis by the logged size of the network.

The two methods used to identify the timing of consensus (life course validity, modularity), approach the question of consensus formation in a theoretically different manner. Thus, proponents of the modularity approach find that consensus has been attained when most sources in the relevant network agree upon the same core sources/insights. The method proposed in this work takes a broader approach in that it examines the substantive view espoused by all sources relevant to a debate, to identify when the aggregate validity of an idea has fallen below the ambivalence threshold for a prolonged period of time. There are no bright-line rules to define

¹¹ This finding is applied to Case Law as well, such that judges are more likely to cite a case for support rather than cite a case to distinguish from.

¹² The moving time window parses various portions of the citation network as a function of the median time between citing paper and cited paper (Shwed and Bearman, 2010: 825-827).

the length of this period, but other indicators, such as the debate dynamics, shall provide objective indicia to make this assessment.

This project calls for the creation of two original data sets (and two corresponding citation networks): a data set comprised of social scientific publications as well as a data set comprised of state-appellate case law.¹³ The first step was to identify the potential universe of publications and appellate court cases relevant to each idea. The observations were found on the following databases: LexisNexis and Westlaw for location of case law, and LexisNexis and Westlaw (for publications in legal scholarship), the University of Chicago Library Catalog, and the Web of Science network for social scientific publications.¹⁴ Using multiple search engines for each of case law and social scientific publications reduced the probability of unobserved sources.

After sources were identified for each idea,¹⁵ the coding process began. Duplicate sources and observations that did not pass the network boundary/relevancy threshold were dropped. Snowballing was utilized, such that additional relevant sources identified during the coding process (not found in the initial search and index), were added to the list of sources (roughly 1/3 of the social scientific literature on the list was added via snowballing, whereas only 5 court cases were added via snowballing). The overall relevant sample includes 659 sources: 229 sources from state Appellate Courts, and 430 sources from academia.

¹³ The primary reason that only state appellate case law was considered for this study (as opposed to state courts of the first instance) is their availability. The lion's share of family law cases in lower courts are not published, and even if they are, they very rarely are available via legal search engines such as Lexis or Westlaw.

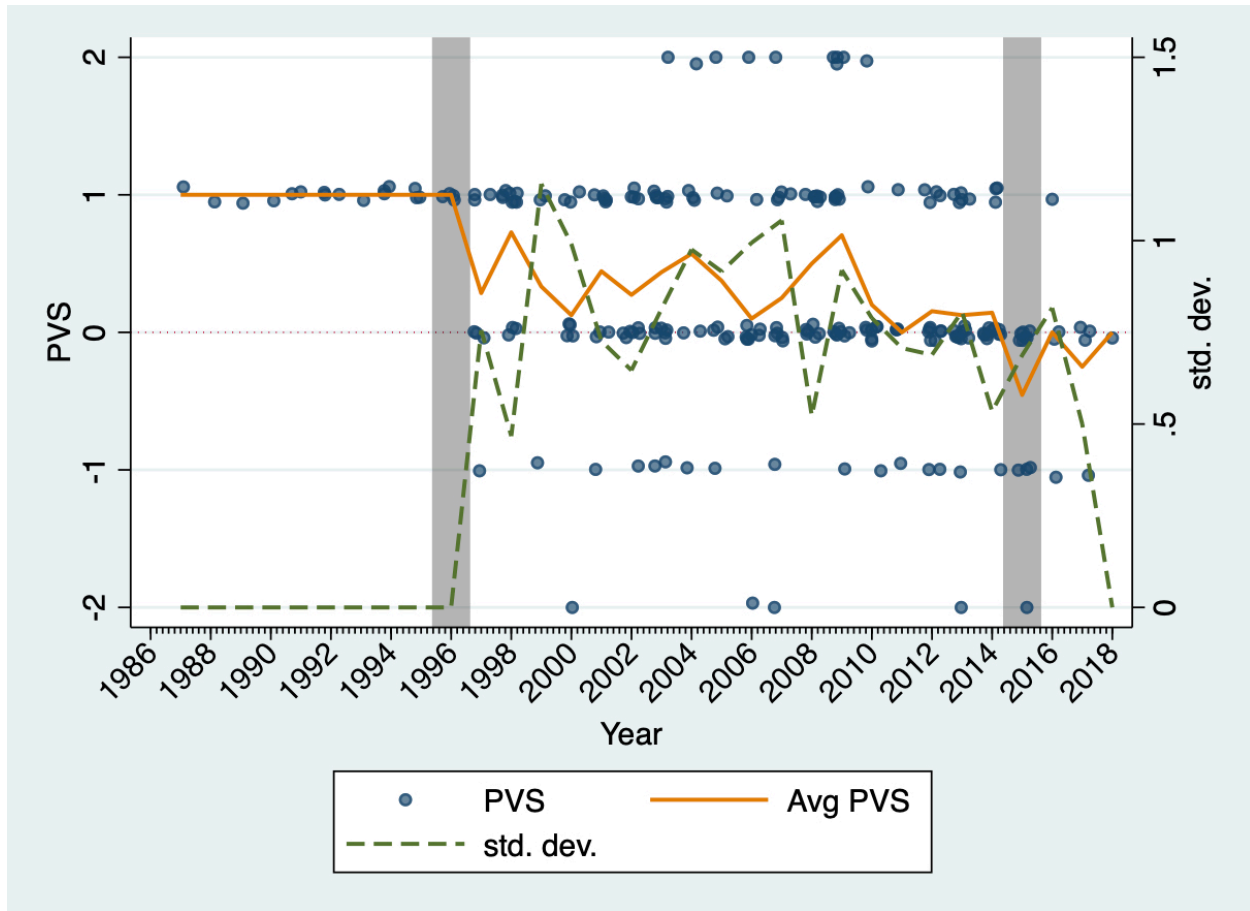
¹⁴ In this project, I include publications in legal journals in the social scientific dataset. This is for two reasons: (a) scholars from various social science fields publish in legal journals, and similarly, legal scholars publish in social scientific journals; and (b) these publications are germane to the development of an idea, especially once it has been adopted by the court system.

¹⁵ This identification process was conducted using search terms fields such as "this exact phrase" in various databases (search terms may vary among different search engines). This type of search yielded over-encompassing results, which were later culled for relevancy during the coding phase.

The following variables were created during the coding process: (1) date – the date a source was published; (2) PAS Validity score (**PVS**) – an ordered categorical variable requiring a qualitative determination of orientation towards PAS. Ranges from ‘-2’ to ‘+2’. (3) recpa – indicates whether the court explicitly recognized parental alienation as distinct from PAS. This is a binary variable. For a case to be coded as ‘1’ (PA recognized outside of PAS), the source had to make an explicit statement in this regard. (4) Network Measures: sources’ betweenness centrality; in-degree centrality (how many times a source was cited); out-degree centrality (number of citations made by a source). (5) type – (for social science only) indicates the type of publication: law review, peer-reviewed scientific journal, or non-peer-reviewed source). This is a categorical variable. (6) legalist – (for social science only) indicates whether at least one of the authors received formal legal training. This is a binary variable. (7) theory– (for social science only) indicates whether the source proposes a theoretical intervention in PAS. This is a binary variable. (8) empirical – (for social science only) indicates whether the source proffers new empirical evidence to the PAS debate. This is a binary variable.

Results

Figure 2.3: PAS Validity Scores for Case Law (1987 – 2018)



In this Figure, the solid line indicates the yearly average PVS for case law (Y axis), plotted over time (X axis). Each round marker corresponds to an observation from the case law sample ($n=229$). The dashed line represents the standard deviation among sources per yearly PVS average; it refers to the right-hand axis. The two vertical gray blocks indicate the time frames for a shift between the three stages in the life course of PAS in the case law social environment.

Figure 2.3 shows PAS following a clear trajectory in courts: there was a period of approval (high validity) until roughly **1996**, followed by a period of negotiation and intellectual turmoil, and finally, there was a decline in validity, so that it fell below the ambivalence threshold (around **2015**), and was, on aggregate – invalid in courts. The breadth of opinions regarding PAS (standard deviation) presents as expected. Figure 2.3 illustrates that Exploration

began in 1987 (when PAS was first introduced in appellate courts, in Coursey), and ended in transition point 1, around 1996. Negotiation then began, where the validity of PAS oscillated (breadth of opinion was high) until negative-consensus was attained (transition point 2) in roughly 2015, after which the PVS remained below or at the ambivalence threshold – Post-Consensus – where it remains in 2018. The timing of transition points 1 (~1996) and 2 (~2015) shall be revisited below.¹⁶

When examining PVS, it is possible that not all sources are equally impactful. Thus, according to the PVS trend presented above (solid line), all sources are weighted equally – but perhaps some particular sources were more central to the debate, and hence more influential on the state of PAS in the court system? To test this assumption, PVS are reassigned, weighting sources by their in-degree centrality, that is, the number of times a source was cited, as sources with higher in-degree centrality are likely to be more influential in the network. Figure 4 presents both methods of assessing PVS (yearly average and weighted average), showing that PAS follows a similar trajectory in both instances. While the weighted PVS scores present as more extreme (and more dispersed observations), they follow a similar trajectory and break at the same transition points (~1996 and ~2015).¹⁷

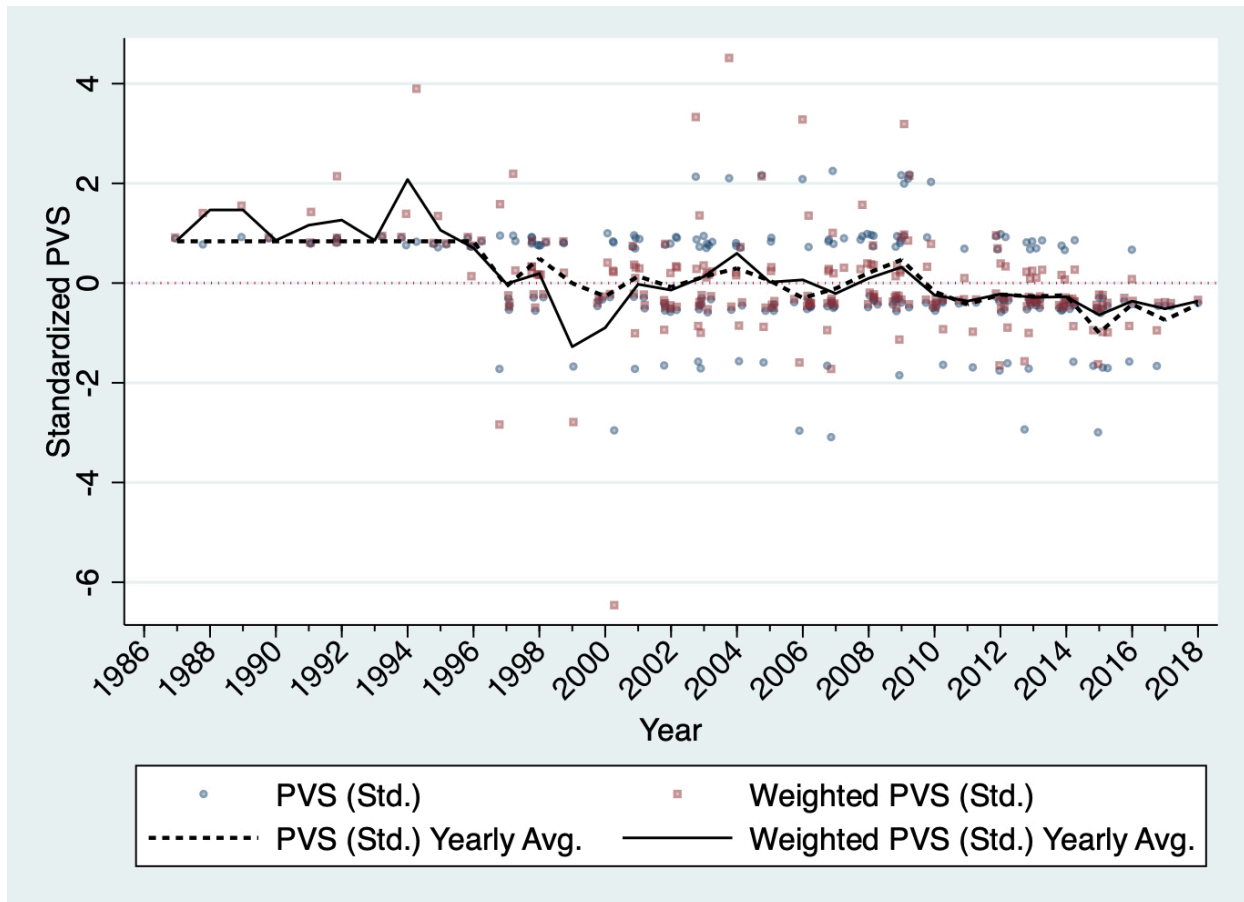
The timing of 1996 and 2015 is also borne out by spline regression and ANOVA, as reported in Tables 2 and 3. When knots are placed in the data in 1996 and 2015, the model as a

¹⁶ I conducted robustness analysis for each transition point for one year before and after each transition point identified (i.e., 1995, 1997, 2014, and 2016). Results are omitted for the sake of brevity but the main findings from these said analyses still suggest a shift in both PVS and debate dynamics, albeit less convincingly. Thus, 1996 and 2015 serve as the optimal years for transition points. Nevertheless, as is discussed below, this method does not allow for a precise identification of the timing of transition points.

¹⁷ Transition points are not discrete points in time, but rather a possible range, as shifts in PVS or debate dynamics are not instantaneous. Thus, while 1996 and 2015 are used as points of interest moving forward, it would be more precise to say that transition point 1 is likely taking place throughout the year 1996, rather than on a specific date. Indeed, Abbott (2001: 243-245) explains why turning points are empirically hard to pin-point temporally, due to, *inter alia*, the fact that instantaneous change is rarely observed in the social world.

whole is significant ($F=8.15$, $p\text{-value} < 0.001$), and Negotiation exhibits a negative slope ($\beta=-0.033$, $t\text{-score}=-3.52$). The slopes exhibited by Exploration and Post-Consensus are not significantly different from zero ($t\text{-scores} -1.38$ and -0.6 , respectively), as expected. Additionally, ANOVA and Bonferroni pairwise comparisons between the three groups, suggest that the mean PVS of each group are significantly different ($F=15.14$, $p\text{-value}<0.001$), and different from each other in a pairwise comparison ($p\text{-value}$ for differences among group means < 0.001). The mean PVS for exploration = 1.0, for negotiation = 0.333, and for post-consensus = -0.3, as expected.

Figure 2.4: PVS vs. Weighted PVS for Case Law (1987 – 2018)



This figure presents both PVS and Weighted PVS yearly averages across time. Both have been standardized for ease of comparison, so that the qualitative meaning of the PVS scores does not remain fixed after standardization.

Figure 2.5 presents the results for debate dynamics as they pertain to case law. Panels A-D provide support for the timing of transition points 1 and 2 in years 1996 and 2015, respectively. Panel A (Observations) demonstrates that prior to 1996 (Exploration), the absolute number of observations is low, exhibiting a moderate incline. During Negotiation, the number of observations continues to increase (positive slope), until negative consensus has been attained (2015). During Post-Consensus, observations decrease steadily. These findings are supported by the spline and ANOVA results (see Tables 2&3). Thus, Panel A suggests that PAS garnered most interest during Negotiation, and less interest during the tail ends of its life course in courts.

Panel B demonstrates that prior to 1996, during Exploration, recognition of parental alienation as a phenomenon separate from PAS was low (slope not significantly different from zero). During Negotiation, recognition increases, and hits a high point around 2011. After 2015, during Post-Consensus stage, recognition peaks further, and remains very high. Panel B generally suggests that recognition of parental alienation is negatively associated with PVS – it does indeed compete with PAS – especially after consensus is attained, as the level of recognition is extremely high thereafter.

In Panel C (Ambivalence), Exploration and Negotiation are clearly distinguishable, Post-Consensus less so. Prior to 1996, during Exploration, there are no zero scores (no ambivalence towards PAS), and a slope of zero. During Negotiation, judges increasingly express ambivalence towards PAS, a trend that stabilizes around the time of consensus (slope for Post-Consensus is zero, while mean number of zero scores remains high). Panel C generally suggests that ambivalence towards PAS rose during negotiation, and remained high post-consensus.

Panel D provides that earlier PAS cases are more central to the state-appellate court system citation network. This result is expected, as *stare decisis* (the principle of precedent)

places a heavier emphasis on earlier cases where the PAS debate first arose. The data exhibit a stable, high level of centrality during Exploration, followed by a declining slope and moderate mean during Negotiation, and finally a stable, low level of centrality Post-Consensus. Support can be found in the statistical tests: the slopes for Exploration and Post-Consensus are not significantly different from zero, while the slope for Negotiation is significantly negative. More, the mean level of centrality for Exploration is higher than the mean level of centrality for stages Negotiation and Post-Consensus.

Figure 2.5: Debate Dynamics – PAS in Case Law (1987 - 2018)

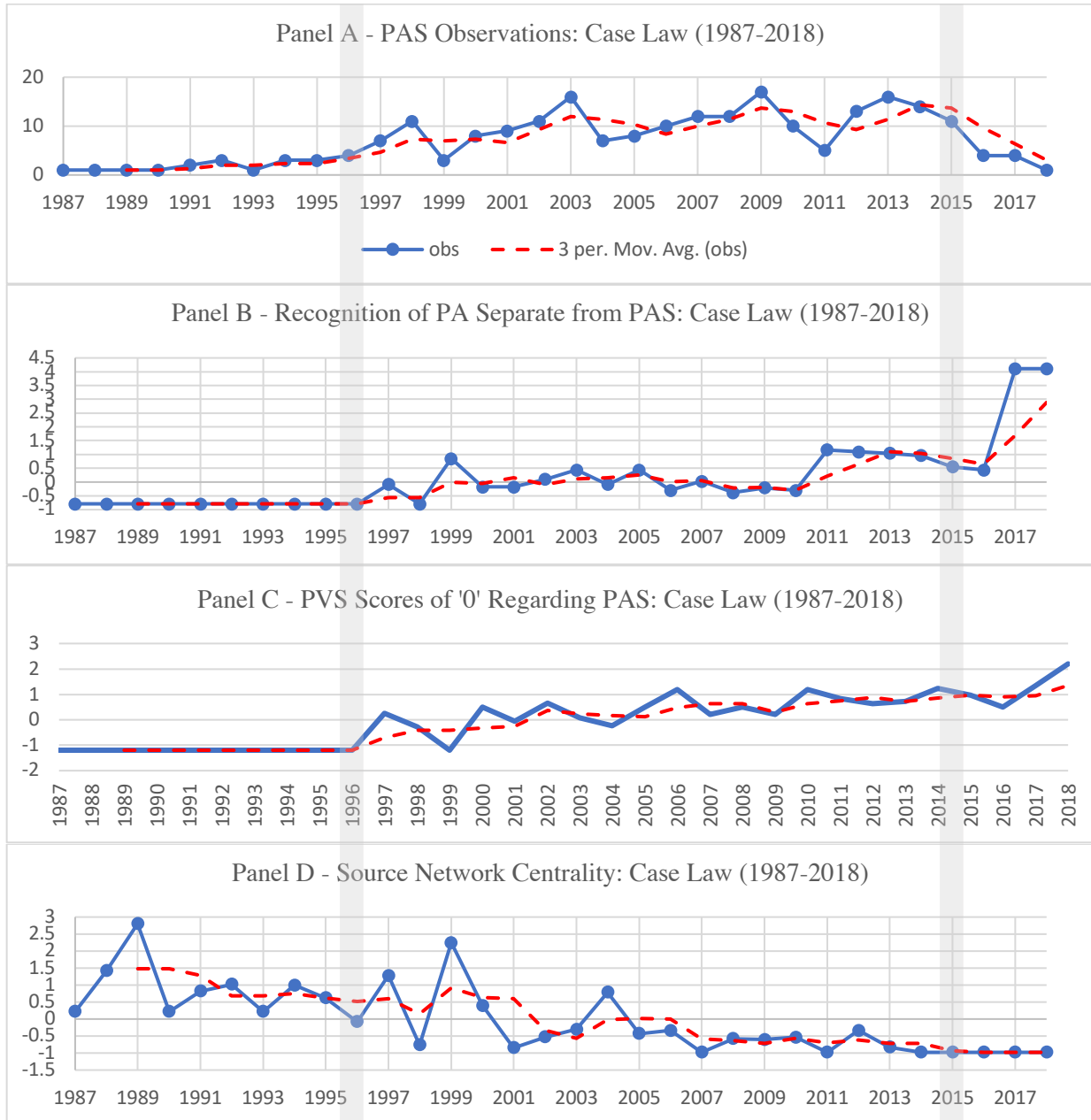


Figure 2.5 presents four of the five debate dynamics (breadth illustrated in Figure 3) for all case law sources. The solid line indicates yearly average, and the dashed line indicates a 3-year moving average. The two solid vertical gray lines cut the data at the two proposed transition points – 1996 and 2015. Results for Panels B-D are standardized, and results for Panel A (observations) present raw numbers.

Table 2.2: Results of Spline Regression for PVS & Debate Dynamics: Case Law (1987-2018)

Variable Tested	Stage in Life Course	Coef.	Std. Err.	t/F	p-value ^a	[95% Conf. Int.]	
PVS				8.15	>0.001***		
	Ex.	-0.062	0.045	-1.38	0.169	-0.151	0.027
	Ngtn.	-0.033	0.001	-3.52	0.001***	-0.051	-0.014
	PC	-0.089	0.15	-0.6	0.549	-0.383	0.204
Breadth				14.77	>0.001***		
	Ex.	0.082	0.222	3.67	0.001**	0.036	0.127
	Ngtn.	0.021	0.009	2.31	0.029*	0.002	0.04
	PC	-0.263	0.085	-3.08	0.005**	-0.437	-0.089
Obs.				19.62	>0.001***		
	Ex.	0.732	0.252	2.9	0.007**	0.215	1.25
	Ngtn.	0.389	0.103	3.76	0.001***	0.177	0.601
	PC	-4.696	0.969	-4.85	>0.001***	-6.68	-2.711
Recognize PA				10.11	>0.001***		
	Ex.	0.025	0.056	0.44	0.661	-0.086	0.136
	Ngtn.	0.033	0.012	2.85	0.005**	0.01	0.056
	PC	0.626	0.186	3.37	0.001***	0.26	0.992
Zero Scores				9.11	>0.001***		
	Ex.	0.091	0.056	1.61	0.11	-0.02	0.202
	Ngtn.	0.043	0.011	3.69	>0.001***	0.02	0.065
	PC	0.08	0.187	0.43	0.669	-0.288	0.448
NW Centrality				6.93	>0.001***		
	Ex.	-0.065	0.057	-1.13	0.26	-0.178	0.048
	Ngtn.	-0.041	0.012	-3.49	0.001***	-0.064	-0.018
	PC	-0.004	0.189	-0.02	0.985	-0.377	0.37

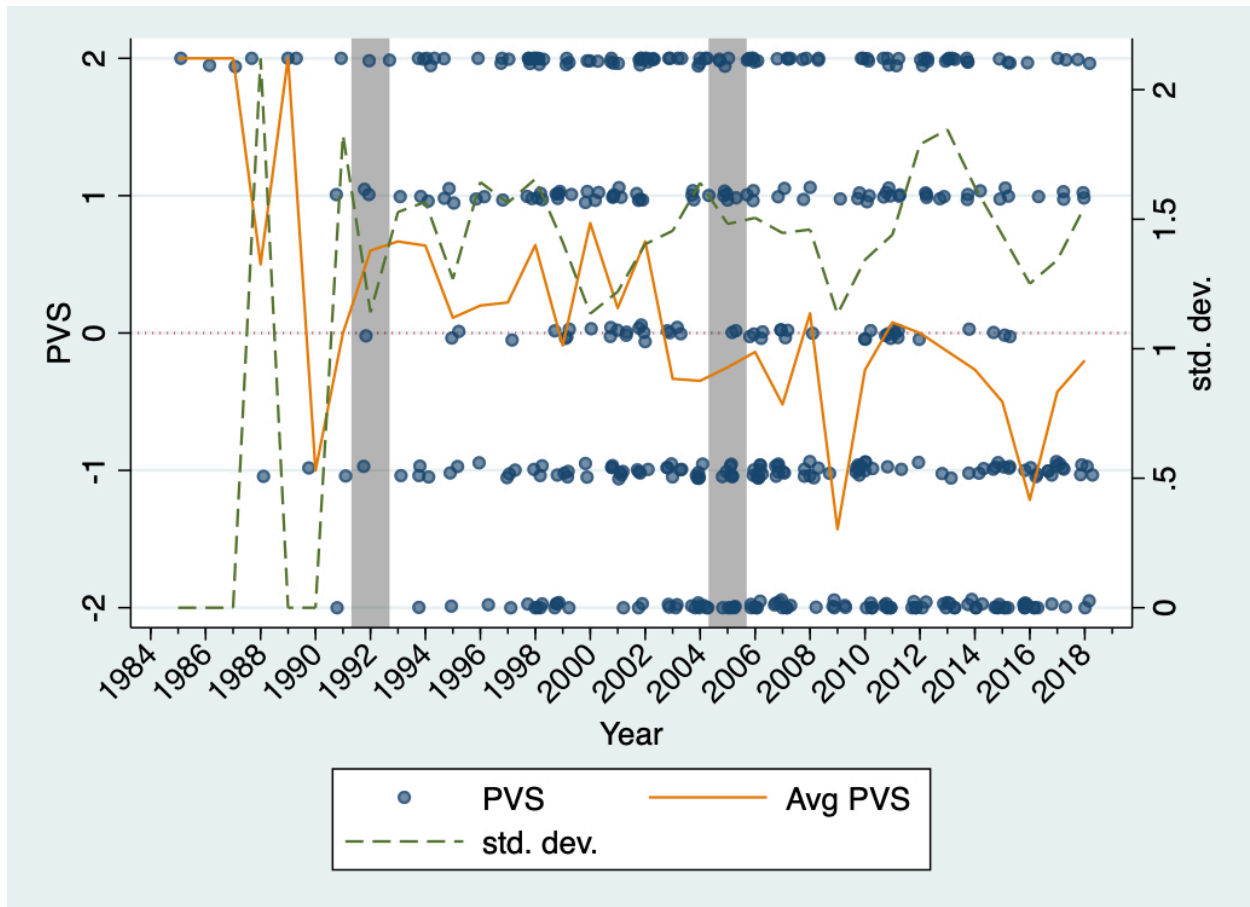
^a * p<0.05, ** p<0.01, *** p<0.001; n=229 for each test conducted above, but for Breadth and Observations, for which data were aggregated by year, n=32.

Table 2.3: ANOVA and Bonferroni Pairwise Comparisons: Case Law (1987-2018)

Variable Tested	Stage in Life Course	Mean Value	Obs.	Std. Dev.	F	p-value ^a	Ngtn.- Ex. (p-value)	PC- Ex. (p-value)	PC-Ngtn. (p-value)
PVS					15.14	>0.001***			
	Ex.	1.0	20	0			-0.667	-1.3	-6.333
	Ngtn.	0.333	189	0.792			(0.001)***	(>0.001)***	(0.001)***
	PC	-0.3	20	0.657					
Breadth					59.04	>0.001***			
	Ex.	0	10	0			0.804	0.501	-0.303
	Ngtn.	0.804	18	0.193			(>0.001)***	(>0.001)***	(0.02)*
	PC	0.501	4	0.358					
Obs.					22.11	>0.001***			
	Ex.	2	10	1.15			8.5	3	-5.5
	Ngtn.	10.5	18	3.85			(>0.001)***	(0.41)	(0.016)*
	PC	5	4	4.24					
Recognize PA					6.51	0.002**			
	Ex.	-0.508	20	0			0.499	1.11	0.611
	Ngtn.	-.01	188	0.993			(0.093)#	(0.001)***	(0.025)*
	PC	0.601	20	1.26					
Zero Scores					11.11	>0.001***			
	Ex.	-0.918	20	0			0.975	1.302	0.327
	Ngtn.	0.057	189	1			(>0.001)***	(>0.001)***	(0.445)
	PC	0.383	20	0.98					
NW Centrality					5.5	0.004**			
	Ex.	0.613	20	0.538			-0.638	-0.997	-0.36
	Ngtn.	-0.025	189	1.06			(0.019)*	(0.004)**	(0.36)
	PC	-0.384	20	0					

^a * p<0.05, ** p<0.01, *** p<0.001.

Figure 2.6: PAS Validity Scores for Social Sciences (1987 – 2018)



In this figure, the solid line indicates the yearly average PVS for social sciences (Y axis), plotted over time (X axis). Each round marker corresponds to an observation from the social sciences sample ($n=430$). The dashed line represents the standard deviation among sources per yearly PVS average; it refers to the right-hand axis. The two vertical gray blocks indicate the time frames for a shift between the three stages in the life course of PAS in the social sciences' social environment.

Figure 2.6 exhibits the life course of PAS in social scientific literature. At first there was a period of declining approval (high validity) until roughly **1992**, followed by a period of negotiation, and finally, there was a decline in validity, so that it fell below the ambivalence threshold, remaining beneath it (or close thereto), and was, on aggregate – invalid in the social scientific literature. Though the PVS dips below ambivalence in around 2003, the year **2005**

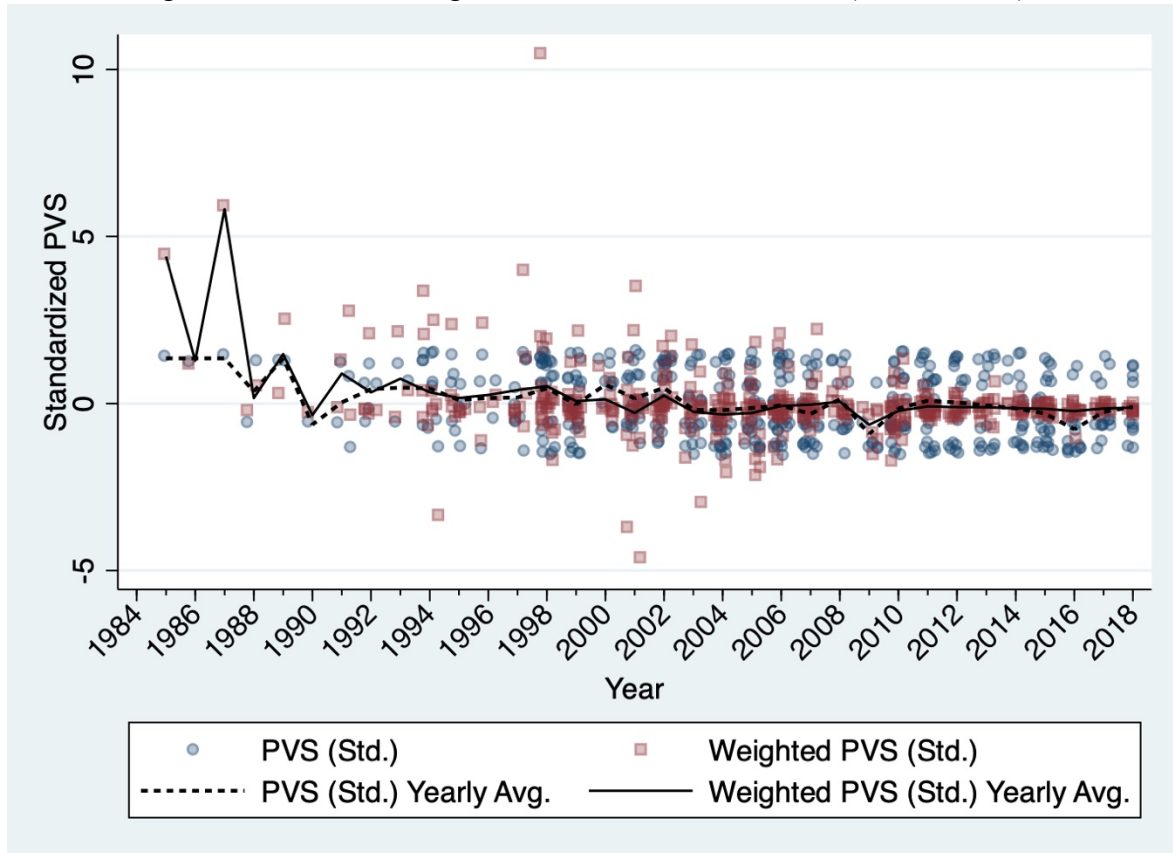
serves better as the point of hypothesized closure, as it represents a stable period for which PVS was below zero (much like PVS was low and stable prior to 2015 for case law).

Figure 2.6 reveals two surprising and interrelated findings. First, the breadth of opinion does not present as hypothesized. That is, even after closure, and despite a low/negative mean PVS of -0.309 (significantly lower than the mean PVS in the other two stages), the breadth of opinion remains high, such that the PAS debate continued to produce a noticeable range in opinion. Second, the broad range of opinions can be seen in the marked oscillation of PVS – Post-Consensus. These findings suggest that while the mean PVS is negative and low after 2005 (so that PAS is invalid in the aggregate), it did not go out without a fight. Indeed, PAS exhibited death throes sometime around 2011-13; this is most likely the data capturing the attempts of PAS proponents to fight for the inclusion of PAS in the most recent DSM (DSM-V, 2013), a battle which they eventually lost. This may also indicate the existence of a plurality consensus (Collins, 2000), such that a minority of scholars on the periphery may have formed a consensus competing with the consensus formed by the core, the mainstream scholars.

The timing of 1992 and 2005 is also borne out by spline regression and ANOVA. When knots are placed in the data in 1992 and 2005, the model as a whole is significant ($F=13.7$, $p\text{-value} < 0.001$), with Exploration exhibiting a negative slope ($\beta=-0.231$, $t\text{-score}=-3.37$). The slopes of Negotiation and Post-Consensus are not significantly different from zero ($t\text{-scores} -1.15$ and -1.11 , respectively). Additionally, ANOVA and Bonferroni pairwise comparisons between the three groups, suggest that the means PVS of each group are significantly different ($F=8.32$, $p\text{-value}<0.001$), as the mean PVS for Post-Consensus (-0.309) is significantly lower than the mean PVS for Negotiation (0.17) and Exploration (0.75).

Figure 2.7 presents both methods of assessing PVS (yearly average and weighted average), showing that PAS follows a similar trajectory in both instances. While the weighted PVS scores present as more extreme (and more dispersed observations), they follow a similar trajectory and break at the same transition points (~1992 and ~2005).

Figure 2.7: PVS vs. Weighted PVS for Social Sciences (1985 – 2018)



This figure presents both PVS and Weighted PVS yearly averages across time. Both have been standardized for ease of comparison, so that the qualitative meaning of the PVS scores does not remain fixed after standardization.

Figure 2.8 presents the results for the debate dynamics as they pertain to the social scientific literature on PAS. Panels A-D provide support for the timing of transition points 1 and 2 in years 1992 and 2005. In Panel A (Observations), prior to 1992, during Exploration, the number of observations (i.e., number of publications regarding PAS) is low, and exhibits a moderate incline. During Negotiation, the number of observations increases, and peaks around

2006 – just after a negative consensus has been attained. After 2005, during Post-Consensus, observations decrease steadily. Panel B indicates that recognition levels were high and declining during Exploration, low and inclining during Negotiation, and high and stable during Post-Consensus. Spline and ANOVA tests support these findings: the slope for Exploration is significantly negative, the slope for Negotiation is significantly positive, and the slope for Post-Consensus is not significantly different from zero; additionally, the mean level of recognition for Post-Consensus is significantly higher than the mean level of recognition in Exploration and Negotiation. Again, the existence of a competing idea that serves as an alternative to PAS is a powerful indicator, and that recognition remains high and stable after closure.

Panel C shows that during Exploration, ambivalence levels were low, during negotiation they began rising, and that post-consensus, they declined. Spline regressions show that the slope during Exploration is not significantly different from zero (which is to be expected), and that the Post-Consensus slope is significantly negative. There are no significant differences in a pairwise comparison between the mean levels of all three stages, however the mean level of stage 1 is significantly lower than the mean level of stages 2+3, combined ($t=2.132$, $p\text{-value}=0.025$). Panel C thus suggests that the greatest level of ambivalence is presented during Negotiation.

In Panel D, centrality is low and stable during Exploration, then it slopes upward during Negotiation – peaking around 2005 when negative consensus is attained, and during Post-Consensus, it exhibits a decline. This pattern is supported by the statistical tests: the slope for Exploration is not significantly different from zero, while the slope for Negotiation is significantly positive, and the slope for Post-Consensus is significantly negative. Moreover, the mean level of centrality is significantly higher for Negotiation and Post-Consensus than the mean level of centrality for Exploration.

Figure 2.8: Debate Dynamics – PAS in Social Sciences (1985 - 2018)

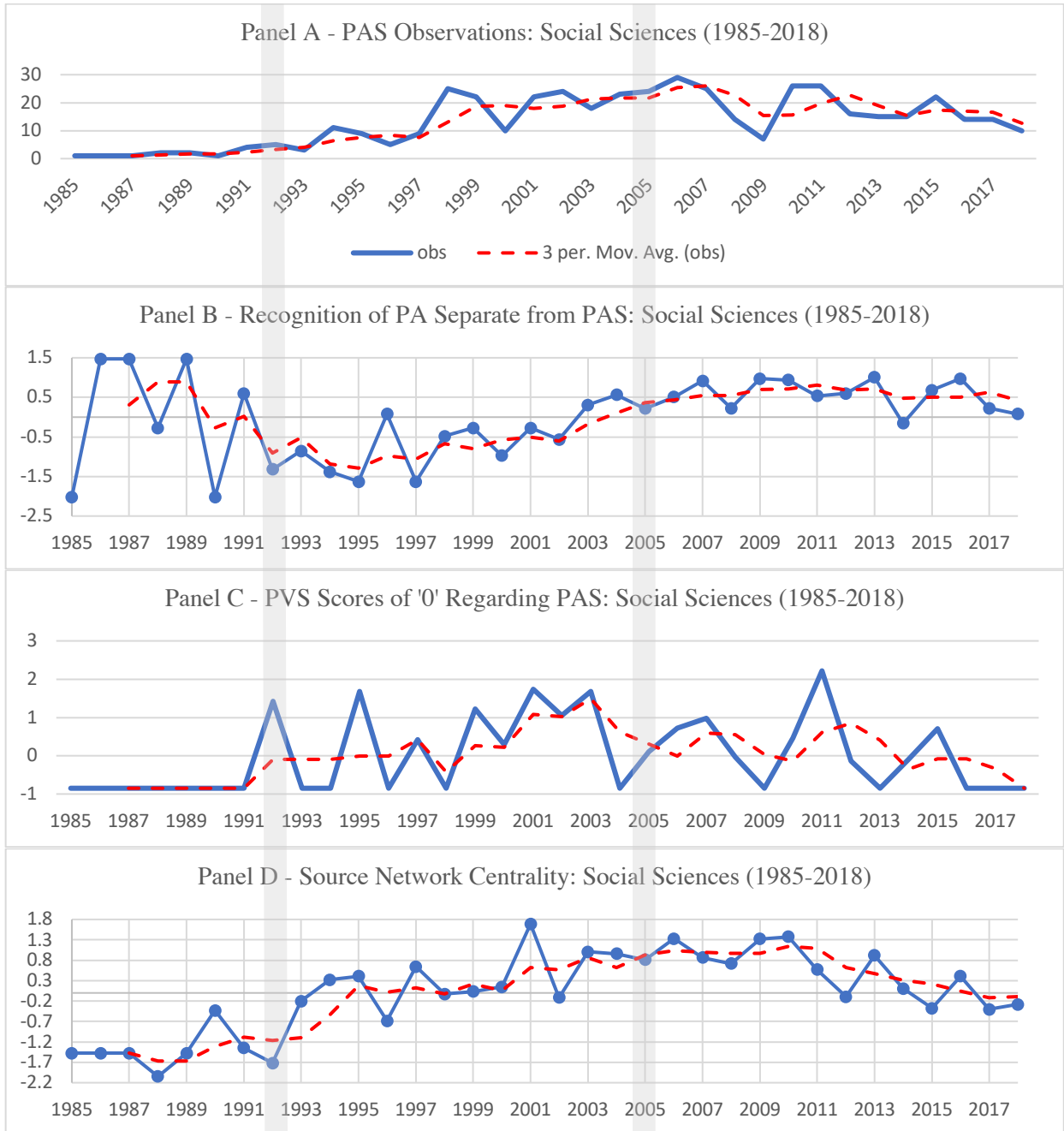


Figure 8 presents four of the five debate dynamics (breadth illustrated in Figure 6) for all social scientific sources. The solid line indicates yearly average, and the dashed line indicates a 3-year moving average. The two solid vertical gray lines cut the data at the two proposed transitions points – 1992 and 2005. Results for Panels B-D are standardized, and results for Panel A (observations) present raw numbers.

Table 2.4: Results of Spline Regression for PVS & Debate Dynamics: Social Science (1985-2018)

Variable Tested	Stage in Life Course	Coef.	Std. Err.	t/F	p-value ^a	[95% Conf. Int.]	
PVS				13.7	>0.001***		
	Ex.	-0.231	0.069	-3.37	0.002**	-0.372	-0.091
	Ngtn.	-0.033	0.029	-1.15	0.26	-0.092	0.026
	PC	-0.035	0.032	-1.11	0.278	-0.099	0.03
Breadth				10.12	>0.001***		
	Ex.	0.206	0.51	4.05	>0.001***	0.102	0.309
	Ngtn.	0.005	0.021	0.24	0.816	-0.038	0.048
	PC	0.003	0.023	0.11	0.915	-0.045	0.05
Obs.				25.65	>0.001***		
	Ex.	0.631	0.602	1.05	0.303	-0.598	1.86
	Ngtn.	1.564	0.251	6.23	>0.001***	1.051	2.077
	PC	-0.961	0.275	-3.48	0.002**	-1.524	-0.398
Recognize PA				18.3	>0.001***		
	Ex.	-0.179	0.08	-2.22	0.027*	-0.337	-0.02
	Ngtn.	0.09	0.015	6.01	>0.001***	0.06	0.12
	PC	0.006	0.012	0.43	0.666	-0.02	0.03
Zero Scores				1.5	0.213		
	Ex.	0.056	0.084	0.66	0.510	-0.11	0.223
	Ngtn.	0.017	0.016	1.1	0.274	-0.014	0.049
	PC	-0.025	0.013	-1.86	0.063#	-0.052	0.001
NW Centrality				11.64	>0.001***		
	Ex.	0.037	0.163	0.23	0.819	-0.284	0.359
	Ngtn.	0.082	0.016	5.13	>0.001***	0.05	0.113
	PC	-0.063	0.013	-4.78	>0.000***	-0.089	-0.037

^a * p<0.05, ** p<0.01, *** p<0.001, n=430 for each test conducted above, but for Breadth and Observations, where data were aggregated by year, n=34.

Table 2.5: ANOVA and Bonferroni Pairwise Comparisons: Social Science (1985-2018)

Variable Tested	Stage in Life Course	Mean Value	Obs.	Std. Dev.	F	p-value ^a	Ngtn.- Ex. (p-value)	PC- Ex. (p-value)	PC-Ngtn. (p-value)
PVS					8.32	>0.001***			
	Ex.	0.765	17	1.44			-0.594	-1.073	-0.480
	Ngtn.	0.17	205	1.48			(0.344)	(0.013) *	(0.002) **
	PC	-0.309	233	1.5					
Breadth					9.78	>0.001***			
	Ex.	0.636	8	0.918			0.823	0.839	0.015
	Ngtn.	1.46	13	0.167			(0.001)**	(0.001)**	(0.999)
	PC	1.474	13	0.198					
Obs.					15.36	>0.001***	13.64	15.79	2.153
	Ex.	2.125	8	1.55			(>0.000)***	(>0.000)***	(0.999)
	Ngtn.	15.76	13	8.07					
	PC	19.92	13	6.88					
Recognize PA					19.44	>0.000***			
	Ex.	-0.302	17	1.06			0.015	0.577	0.561
	Ngtn.	-0.287	205	1.03			(0.999)	(0.052)#	(>0.001)***
	PC	0.274	233	0.89					
Zero Scores					0.25	0.777			
	Ex.	-0.152	17	0.788			0.173	0.144	-0.03
	Ngtn.	0.022	205	1.03			(0.999)	(0.999)	(0.999)
	PC	-0.008	233	0.99					
NW Centrality					2.49	0.084#			
	Ex.	-0.694	10	0.586			0.702	0.717	0.015
	Ngtn.	0.008	187	0.984			(0.092)#	(0.079)#	(0.999)
	PC	0.023	233	1.02					

^a * p<0.05, ** p<0.01, *** p<0.001.

Table 2.6: Summary of PAS Life Course in Case Law & the Social Sciences

Debate Dynamic: slope/mean	Case Law			Social Sciences		
	Exploration 1987-1996	Negotiation 1996-2015	Post-Con. 2015--	Exploration 1985-1992	Negotiation 1992-2005	Post-Con. 2005--
PVS	Zero/High (Y) ^a	Negative/Moderate (Y)	Negative/Low (Y)	Negative/High (Y)	Zero/Moderate (Y)	Zero/Low (Y)
Breadth	Zero/Low (Y)	Positive/High (Y)	Negative/Low (P)	Positive/Low (Y)	Zero/High (P)	Zero/High (N)
Observations	Positive/Low (Y)	Positive/High (Y)	Negative/Moderate (Y)	Zero/Low (P)	Positive/High (Y)	Negative/High (P)
Recognize PA	Zero/Low (Y)	Positive/Moderate (Y)	Positive/High (Y)	Negative/Low (P)	Positive/Moderate (Y)	Zero/High (P)
Ambivalence	Zero/Low (Y)	Positive/Moderate (Y)	Zero/Moderate (N)	Zero/Low (Y)	Zero/Moderate (P)	Negative/Moderate (P)
Centrality	Zero/High (P)	Negative/Moderate (N)	Zero/Low (N)	Zero/Low (N)	Positive/Moderate (P)	Negative/Moderate (Y)
Duration	9 years	19 years	4+ years	7 years	13 years	14+ years

^a Letters in parenthesis indicate whether observed values bear out the hypotheses set out supra (Y); do not bear out the hypotheses (N); or bear out only one of slope or mean (P).

Analysis of the debate dynamics coupled with PVS provide a number of key insights regarding the life course of PAS in courts and in academia (a summary of findings can be found in Table 2.6). First, data show that in both social environments there is a noticeable, and statistically significant shift in PVS and debate dynamics when PAS transitions from Exploration to Negotiation, and then to Post-Consensus following the attainment of negative consensus in 2015 and 2005, respectively. Second, results demonstrate that the life course of PAS is very different in the two social environments. While the same overall trend is exhibited (as both life courses eventually build towards a negative consensus), certain crucial features of

the life course are different: (a) academia exhibits shorter durations for exploration and negotiation; (b) academia attained negative consensus prior to the courts; (c) the patterns exhibited for Ambivalence and Centrality in each of the social environments are uniquely different; (d) the role parental alienation plays as a viable alternative to PAS; and (e) the range of opinions expressed is broader in academia, and remains so post closure. Most importantly, not only was PAS adopted by case law prior to closure in the social sciences, but it was actually imported into the legal system while still in the exploratory stage in academia. This is an extreme form of Premature Transfer. Figure 9 presents the results of community detection modularity algorithms conducted for cumulative time windows in the citation networks of case law and social science scholarship. Shwed and Bearman suggest that consensus is attained when the data exhibit a marked declining slope in modularity, that brings the scaled modularity into the range of 0.1 (this value is a soft threshold, see: 2010:833).

In Panel B, modularity was low and stable in the social sciences, up until 1992 (reaffirming transition point 1), where it shoots up to a high level – this is where opposing camps began to form during negotiation. Over time, modularity declines as the various scholarly cliques began to exhibit a higher degree of connectedness (citing more common sources). Thus, consensus is obtained around 2007-08, prior to which there was a marked drop in modularity that brought the scaled Q statistic down to about 0.12.

Figure 2.9: Results from Modularity Analysis of Citation Networks for PAS

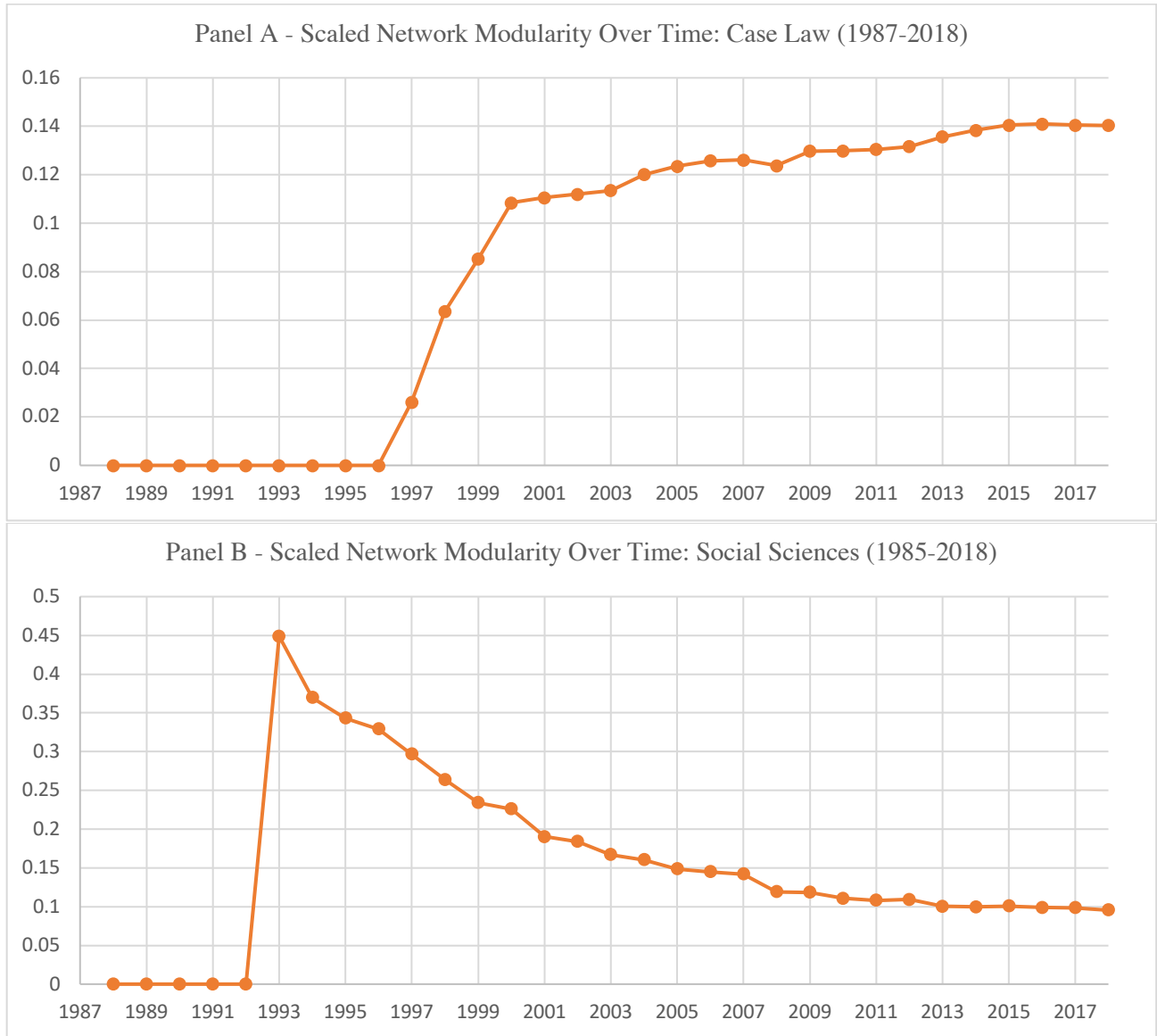


Figure 2.9 presents results of modularity analysis, where the markers indicate the scaled modularity, Q statistic, (raw modularity score divided by logged network size) in the network analyzed, for the time leading up to that year.

Panel A presents an interesting case, as it appears that no consensus has been attained in case law; however, these results must be interpreted in light of the organizational features of the legal system. That is, modularity will always be systematically higher in the state-appellate court system as each state has its own body of Family Law, and each jurisdiction is imbued with

authority that is independent of the other states. This is not to say that state courts do not cite out-of-state decisions, but rather to emphasize that they are less likely to do so, raising the inherent degree of modularity observed within the system (conversely, modularity within the citation network of one single jurisdiction is expected to be inherently low).

As Panel A shows, the scaled modularity is low and stable until 1996 (reaffirming transition point 1), where it begins to rise until it hits an inflection point around the year 2000. This is likely the result of one particular influential case decided in NY (*People v. Fortin*, 706 N.Y.S.2d 611 (2000)) that was heavily cited by judges on each side of the debate. Regardless, the inflection point is not one that suggests consensus, as the scaled modularity score continues to rise thereafter. The first consensus is seen during 2015, when the modularity score halts its incline, and begins a slight decline. Even though the scaled modularity is still relatively high in 2015 (scaled $Q=0.14$), considering the features of the legal system, coupled with the softness of the 0.1 threshold suggests that 0.14 is a good indicator of consensus (while modularity is lower in previous years, scaled modularity continues to rise – indicating that the network is in less agreement). These results reaffirm transition point 2.

Readers would be justified in questioning the timing of transition point 2 (but not transition point 1) pursuant to the modularity analysis. Arguably, consensus seems to be attained in the academia only as late as 2011 (when scaled modularity hits the soft 0.1 threshold), and consensus in courts has not yet been reached. Even in espousing this view, it is still evident that (a) each of the social environments exhibits a disparate PAS life course; and (b) the court system engaged in Premature Transfer.

Discussion

Using an analytical framework which draws upon insights from the Sociology of Knowledge, the Sociology of Ideas, and foundational concepts in Life Course Theory, it is possible to track the various stages in the life course of an idea, including whether and when consensus has been attained, in addition to the valence of consensus. Additionally, this method provides analytical tools with which to compare the life course of an idea across various social environments to investigate the possibility of mis-aligned closure.

In applying this framework to the case of Parental Alienation Syndrome – which exhibited life courses both in the social scientific literature, as well as in the courts – findings indicate that the life courses exhibited did differ significantly, and that PAS entered the legal system not only prior to closure in the relevant social scientific community, but even prior to the Negotiation period. Without applying the analytical tools set out above, there is no way of empirically ascertaining whether PAS entered the legal system prior to closure, as there is no qualitative “land mark” in the life course to use as an objective reference point. The proffered framework is therefore especially appealing in instances where the timelines are less clear-cut, or where courts (or any other social environment) are contemplating the transfer of an idea from a different social environment – a relatively frequent occurrence in the legal world.

The framework does away with guess work and conflicting reports (of which there were many in the PAS debate) regarding the state of an idea or debate, and provides an objective measure with which to assess the stage an idea is currently occupying in its life course. While subjective qualitative assessments can be helpful and accurate, they should be heeded in tandem with objective quantitative tools to yield the most accurate results.

There have been negative results to PAS's premature transfer into the legal system. PAS entered the legal system while it was still in the midst of Exploration in academia. Keeping in mind that such issues typically reach state-appellate courts with a certain delay, it may be that PAS entered family courts of first instance (where the lion's share of litigation actually takes place) very shortly after PAS was set out by Gardner – when he himself was still shaping and fine-tuning the idea (Compare: Gardner 1985, with Gardner 1987, and Gardner 1998). PAS then began its own period of Exploration in courts, on the backdrop of the scholarly Exploration. Put differently, when judges first confronted PAS in the mid-late 1980s, the overall mean PVS was 1.07 (on a scale of -2 to +2) in the social sciences – well over the ambivalence threshold, and an objectively positive approach thereto. Even if judges had the expertise to accurately evaluate the scientific external validity of PAS at the time (a questionable assumption at best, see: Emery, Otto, and O'Donohue 2005), they would be doing so based on a faulty premise, early in the life course of PAS.

Additionally, as the results demonstrate, once the idea has transferred to a different social environment, it takes on a different life course of its own. Even in the case of PAS, where social sciences and case law are related to a degree (social scientific publications cite case law roughly 16% of the time, while case law cites academic publications roughly 14% of the time), the trajectories exhibited by an idea can greatly vary. Thus, negative closure was reached in the legal system roughly 10 years following closure in the social sciences. In certain instances, a high degree of dependence between the social environments can produce adverse results and perpetuate misconceptions. For instance, when a court cites a publication which views PAS positively, this case can later be used to support the validity of PAS in the social sciences – and indeed this very result was observed (see: Gardner 2002).

Ostensibly, a high degree of dependence between social environments can serve in the opposite as well: each social environment can serve to correct the path of an idea's life course when it veers in the wrong direction – an example of this would be judges citing social science publications specifically warning the court about the invalidity of PAS (See: Palazzolo v. Mire, 10 So.3d 748 (2009), citing Bala, et al. 2007; Hoult 2006; Blank and Ney 2006; Johnston 2005; Johnston 2003; Kelly and Johnston 2001). Whether this 'course correction' works properly (to ensure "good" results rather than to perpetuate "bad" ones), is largely dependent upon the updating procedure and/or brokerage mechanism between the two social environments.

Considering the timelines, and volume of litigation that has taken place in the last decade and a half, many cases were decided on the premise of bad science. 137 cases were decided in state-appellate courts after negative-consensus was already attained by academia in 2005, 119 of which did not reject PAS. Considering the lower court cases decided in the same time frame, the number of cases is most likely in the thousands.¹⁸ It is also important to remember that every such case has serious consequences for multiple stakeholders, namely, children, parents, and their extended family and social networks, and typically involves a family already in a state of crisis during a high-conflict divorce (Stahl 2001; Kelly and Johnston 2001).

To make matters worse, states are independent jurisdictions and may function as separate social environments (or sub-environments) such that PAS is in the midst of Negotiation in a number of states (e.g., Ohio, Illinois, Pennsylvania), where negative consensus has not yet been attained (see Appendix C). The U.S. legal system is designed to create legal heterogeneity

¹⁸ The "Court Statistics Project" estimates that approximately 5 million domestic relations cases were filed with lower courts in 2016. For comparison, approximately 257,000 cases, *of all types*, were filed with appellate courts. Thus a 1:20 ratio between lower level and appellate courts would be conservative, resulting in well over 2,500 cases tried on the basis of faulty science. These data are available at: <http://www.courtstatistics.org/NCSC-Analysis/National-Overview.aspx> (last visited Nov 27, 2019).

among the 50 states, so that eventually the best laws will surface and spread throughout the rest of the nation (for instance – ‘no-fault divorce’ that originated in California in the late 1960s; Grossman 2011). It is surprising, however, that in this instance – where the subject of inquiry is not law – but rather hard science that can be proven or undermined empirically, inter-state variability is still observed. There is no good justification to support the heterogeneity among states when it comes to science. This finding should be troubling to legalists and policy-makers alike, as it implies that some jurisdictions continue to utilize bad science to make decisions that bear greatly on people’s lives. Moreover, it also implies that the legal system is not equipped to properly deal with such instances, that there is an inherent institutional failure with respect to the censorship of (bad) scientific knowledge. This is not to suggest that the legal system will not, or should not, allow the entrance of “bad science” under any circumstances. The legal system cannot completely avoid “bad science”, but it ought to be better at rejecting it when the relevant scientific community signals (via negative-consensus) that it is invalid.

But Premature Transfer is not always negative. There may be two (or more) reasons to encourage it. First, an idea should transfer to new social environments when they are an appropriate venue for Negotiation. Clearly, courts are not the appropriate venue to adjudicate the validity of a scientific idea. However, the diffusion of legal doctrine across states, even prematurely, would enable vigorous Negotiation, and ultimately, better results. Second, even for an idea that is destined to fail, premature transfer to multiple social environments will lower the probability that a false-positive-consensus will be attained. In this case premature transfer serves as a robustness check for consensus, though different social environments may be mis-aligned in this respect. PAS subscribes to neither of these caveats.

So, why has PAS proven itself to be exceptionally resilient in courts, despite the deluge of unrelenting critique voiced by multifarious scholars, and why might invalid ideas generally endure outside their originating environment? The answer lies, at least in part, in the ability of one social environment to sustain the same idea independent of its life course in a disparate social environment – or at the very least, sustain the life course long enough.

Collins (2000) studied ideas which have endured rejection in a social environment. He found that such rejected ideas can survive within a periphery that is subject to the informal control of a mainstream core (2000: 841-42). However, once these controls break down – and the core no longer regulates the knowledge produced/used – formal mechanisms will ensure that the rejected idea will survive no longer. Noticeably, this finding was made within the field of gravitational waves, such that a single social environment supported two competing consensuses. Courts, however, are distinct from social science in that controls – formal and informal – are lacking as they pertain to knowledge production. And, absent such control, courts (or particular jurisdictions) can sustain a competing consensus. This is a further validation of Fleck’s insight, as well as the “localist” tenant of the New Sociology of Ideas. It also suggests that the potential for premature transfer, as well as other mis-alignments in idea life course are more likely to arise when two social environments interact, yet exhibit a high degree independence.

One explanation for PAS’s unnaturally prolonged life course relates to the abovementioned formal control mechanism, or in this case the legal standard regulating the admissibility of evidence. The U.S. is currently split with respect to the standard of admissibility of novel scientific evidence, as some states apply the Frye standard, while others apply the Daubert Standard (or some derivative thereof). This project presents an ideal natural experiment to examine whether the choice of standard produces any significantly different outcomes, where

the natural hypothesis would be that PAS should experience worse outcomes (lower PVS, quicker demise) in Daubert states as the latter standard is thought to be more stringent (Lilly, Capra, and Saltzburg 2012; Edwards and Elliot 2007). This would make for a good avenue for future research, as results may suggest that the legal standard regulating the application of extra-legal knowledge in courts is mis-applied, and/or that there are extra-legal forces in play that bear on the regulation of this knowledge.

One such extra-legal force influencing the entrance of social science into courts relates to the actual mechanism by which the two social environments interact, addressed above as the process of ‘course correction’. If judges and attorneys are more likely to cite Law Reviews or legalists (due to homophily, and the reduction in search costs involved), it may be that legal scholars serve as the brokers between the “hard” social scientists (e.g., psychologists, sociologists, and social workers) and the legal system (attorneys and judges), such that they regulate the manner in which the two social environments interact by gatekeeping the information. This too is an avenue worth pursuing in future research, as this structural feature may have far reaching implications for the relationship between law and society, as well as how social environments generally interact.

The proffered framework presents two limitations. First, there are no bright line rules in applying the framework or contemplating consensus. For this reason, a strong qualitative component is crucial for successful application – as was undertaken in this paper. While the entire universe of cases was used here, this framework can be applied using a sample of cases, given that there are enough observations. Furthermore, the theoretical model attempts to remain abstract enough so as to capture the three stages in an idea’s life course, while also leaving room for debate dynamics unique to particular idea or debate. The analytical tools described above can

be applied to a wide range of debates and their debate dynamics. Nevertheless, the framework offers no bright-line rules regarding consensus or life course stages.

A second limitation pertains to the definition of social environments and ideas/debates. Just as states may constitute sub-environments, so can thought collectives, disciplines or schools within academia. In the case of PAS, the boundaries of the relevant community and the debate were clear, but this may not always be the case, so that application of the framework to too broad a debate or social environment, may mask important dynamics. Moreover, the framework becomes harder to apply as other complications arise: when an idea is inherently linked to derivative ideas or competing ones, or when the debate includes more than two camps. Thus, the framework is not equipped to track competition between groups such as Scientific/Intellectual Movements (Frickel and Gross 2005) or professions (Abbott 1988) unless a contentious issue can be narrowly defined and clearly delimited.

The concluding comment addresses the interdependence of social environments. The social environments contemplated above do not exist in isolation; both actively “shaped” the idea, so that events in one social environment (say, negative-consensus) influenced the idea’s life course in the other social environment, to varying degrees. Such interdependencies may serve as time-varying confounders. For instance, it can be argued that the persistence of PAS in courts delayed closure in the social sciences (as scholars supporting PAS cited its use in courts). While this possibility was contemplated conceptually, it was not addressed methodologically. This is because the existence of interdependence (or lack thereof) does nothing to hinder the overall argument. That is, should the two social environments interact in a meaningful way vis-à-vis the life course of an idea, but nevertheless each life course proves to be independent and resilient to change – as was the case with PAS – the interdependence only serves to strengthen the

conclusion: despite being interrelated, different social environments still exhibit different life courses for the same idea.

APPENDIX A: NETWORK BOUNDARIES & RULES OF RELEVANCE

Table 2.7: Network Boundaries

#	Type of Source Dropped	Social Environment Observed	Reason for Exclusion
1	Opinion letter to editor or editorial comments.	Academia	Do not engage in an academic debate (no citations or references, no data).
2	No references or citations are included.	Academia/Courts	No substantive engagement with PAS.
3	No discussion of PAS.	Academia/Courts	No substantive engagement with PAS.
4	Off-handed discussion of PAS only as an example.	Academia/Courts	No substantive engagement with PAS.
5	Not a publication in a written format (no movies, news/media stories, etc.).	None	These sources were not part of the Social Scientific social environment – typically publications by journalists.
6	Professional guide books, manuals or gov't reports.	None	Outside both social environments (e.g., ABA guidelines for attorneys).
7	Bibliographies (annotated or otherwise).	Academia/Courts	No substantive engagement with PAS.
8	Theses (doctoral or masters).	Academia	Difficult to obtain, and typically aligned with position of advisor.
9	Published in foreign language.	Academia/Courts	Comprised a small portion of the sample, and did not pertain to the American PAS debate.
10	Book Reviews.	Academia	No substantive engagement with PAS; focus on the book rather than the debate.
11	Source is a narrative or memoir borne of personal experience.	None	No substantive engagement with PAS.
12	Encyclopedias or compendiums of any sort.	Academia/Courts	No substantive engagement with PAS.

APPENDIX B: SUMMARY OF PVS CODING GUIDE

PAS Validity Score	Social Environment	
	Social Science	Law
+2	Explicit about support for PAS	Explicit about support for PAS
	Engages with DSM debate	Engages with DSM debate
	Replies directly to critique	PAS weighs in deciding dispute
	Carries normative message	PAS debate in Ratio Decidendi
	Includes theoretical or empirical intervention	
+1	Implicit about support for PAS	Implicit about support for PAS
	Does not engage with DSM debate (or does so indirectly)	Does not engage with DSM debate (or does so indirectly)
	Does not reply directly to critique	PAS does not weigh in deciding dispute
	Does not carry normative message	PAS debate in Obiter Dicta
	Does not include theoretical or empirical intervention	
0	Ambiguous about support for PAS	Ambiguous about support for PAS
	Does not carry normative message	PAS does not weigh in deciding dispute
	Does not include theoretical or empirical intervention	PAS debate in Obiter Dicta
-1	Implicit about opposition to PAS	Implicit about opposition to PAS
	Engages with DSM debate (or does so indirectly)	Engages with DSM debate (or does so indirectly)
	Does not reply directly to PAS proponents	PAS does not weigh in deciding dispute
	Does not carry normative message	PAS debate in Obiter Dicta
	Does not include theoretical or empirical intervention	
-2	Explicit about opposition to PAS	Explicit about opposition to PAS
	Engages with DSM debate	Engages with DSM debate
	Replies directly to PAS proponents	PAS weighs in deciding dispute
	Carries normative message	PAS debate in Ratio Decidendi
	Includes theoretical or empirical intervention	

The above coding guide was constructed after conducting a pilot using a sub-sample of the PAS debate, as well as a sub-sample of a different debate regarding the validity of the theory of “psychological parent” (Goldstein, Freud, and Solnit 1973).

APPENDIX C: INTER-STATE VARIABILITY OF PAS

Figure 2.10: PAS Validity Scores, by State

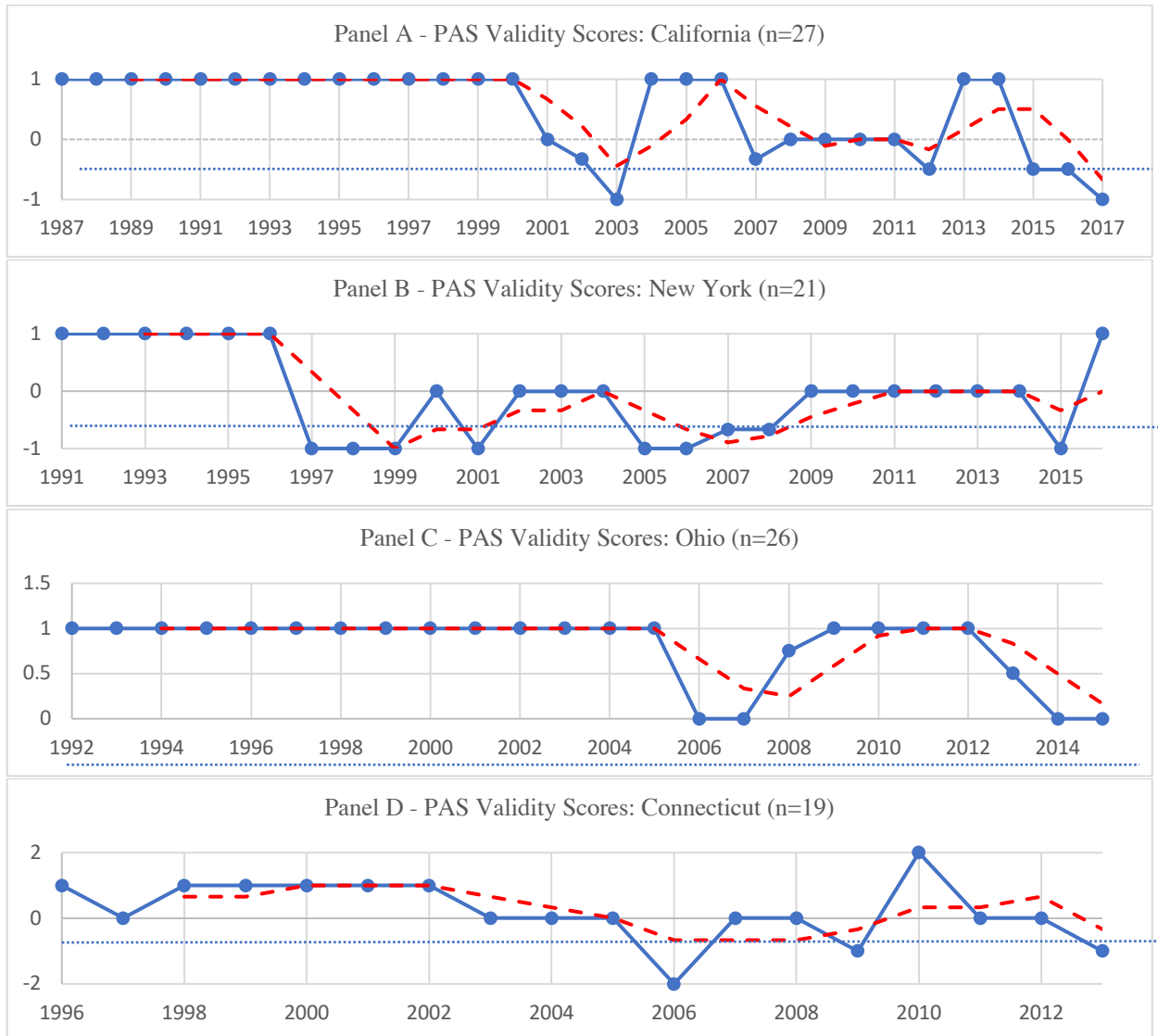


Figure 2.10 exhibits the four ‘highest-contributing’ states to the sample. Results show that each state exhibits a different life course for PAS (solid line tracks yearly average of PVS, dashed line is a 3-year moving average). However, as observations are few, these results should be viewed only as exploratory and suggestive. Thus, it appears as though CA, and NY have attained negative consensus (stable PVS beneath or around the ambivalence line) – although it should be troubling that the most recent decision made in a NY court was affirming of PAS (Hoyt v. Davis, 145 A.D.3d 1353 (2016)). On the other hand, OH and CT present a PAS life course that is in the midst of Negotiation: there is a clear Exploration stage, where PVS is high and PAS is valid, followed by an up-and-down swing in PVS, which is currently located around the ambivalence line.

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CHAPTER 3: EXTRA-LEGAL KNOWLEDGE IN STATE COURTS

Abstract: drawing upon an original dataset of 5,132 State Appellate and Supreme Court cases in the field of Family Law (Best Interest of the Child, Nuptial Agreements, and Psychotherapist Patient Privilege), this chapter studies the use of Social Science citations, as well as the testimony proffered by expert witnesses, in court (together defined as Extra-Legal Knowledge). Results support four primary findings: (1) Uncertainty – proxied by complexity, legal standard vs. rule, doctrinal fluidity, and tribunal level – invites more use of Extra-Legal Knowledge; (2) Salient cases are more welcoming of Extra-Legal Knowledge; (3) Social Scientific citations (Legal Scholarship included) compete with the use of expert testimony, as they are negatively associated; and (4) Different jurisdictions utilize Extra-Legal Knowledge in disparate manners that are statistically distinguishable, both in the frequency of use, and in the type of source accessed.

Introduction

This chapter follows in the tradition of Law & Society scholars, focusing on the sub-field of interactions between Social Sciences and Law. It examines the role Social Science plays in courts by way of citations and expert testimony. In this sense, the “use” of Social Science is equated with citations thereto by judges, while fully appreciating that this assumption is far from perfect (Petherbridge and Schwartz 2012), and that it may mask many other strategic motivators driving judges (Rublin 2011). Furthermore, as is the practice in prior research, social science is understood broadly, to encompass both legal scholarship as well as social disciplines such as sociology, economics, psychology, social work, and criminology (Acker 1990), unless specifically stated otherwise.

This project interrogates insights borne of previous publications, focusing on various aspects of the interaction between Social Science and courts via citations, with the aim of creating a holistic framework to better explain when and why Social Science is cited in court, how it is used by courts, and the consequences of said use. This holistic framework builds upon current knowledge in the field, adding nuance to extant insight, and at times, adding new features to the framework.

A large sample is gathered from State Supreme and Appellate Courts ($n=5,132$) to test old and new hypotheses formulated on the basis of existing knowledge. Four primary groups of hypotheses are advanced. The first suggests that Social Science is expected to be cited at higher levels under conditions of uncertainty in the legal system. Uncertainty is proxied via the type of statute discussed in court (rule vs. standard), the ‘newness’ of that statute in the legal system (is it actively being shaped, or is it dormant) and the frequency with which judges habitually draw upon social science to aid in interpretation and disposition of the statute.

The second group of hypotheses examines the observed outcomes of cases including Social Science citations (herein referred to alternatively as “SSC”). No causality is implied or explored in the following analysis, but rather a co-incidence, or co-location of observations. Three outcomes are contemplated (change in status quo, dissenting opinion, and concurring opinion), and expected to positively associate with Social Science citations, suggesting a link between the use of Social Science and legal change.

The third group of hypotheses focuses on outcomes related to features of the state legal system and the diffusion of knowledge therein. In other words, these hypotheses examine how often cases which cite social science are cited themselves, both in- and outside the relevant state or jurisdiction,¹ and how the reigning rules of evidence and the use of expert witnesses interacts with the use of Social Science.

Finally, a fourth group of hypotheses examines the spatial diffusion and citing practices among the lower 48 states. There is good reason to believe that the application and interpretation of law will be more similar among neighboring states than it would be among geographically distant states (Tobler 1970; Strang and Tuma 1993; Soule and Zylan 1997). Thus, it is plausible to hypothesize that neighboring states will exhibit similar citing practices compared to more distant states, and that such citing practices can be observed on regional levels such that geographic clusters with disparate citing practices can be observed.

Three primary contributions are made here. First, the process of Social Science citation in courts is viewed holistically, with the understanding that the various stages in the process are interdependent. Second, data and analyses here break from tradition and explore the use of Social Science outside of SCOTUS, which has attracted the lion’s share of previous empirical work in

¹ The terms ‘state’ and ‘jurisdiction’ are used interchangeably throughout the text.

the subfield. This is crucial, as law is shaped outside the highest court of the land on a daily basis, yet much of these dynamics remain unobserved. Third, the type of Social Science cited is differentiated, such that outcomes of each type can be explored. Previous work has engaged in such differentiations – a crude break between traditional legal materials and classic social sciences – but no publications, to the extent of the author’s knowledge, have explored the two types in tandem to compare and contrast their use. This exploration reveals new dynamics and insight into the manner in which law is shaped in state courts, and the diffusion of knowledge, both legal and extra-legal, in the legal system.

Background

Law is inextricably linked with the Social Sciences, which are in turn, inextricably linked with the Law. One way to understand this relationship is via mutual interaction: Law and Social Science are two mutually constitutive systems, each bearing on the other simultaneously (Calavita 2016), though there are many other manners in which scholars have formulated the relationship between the two (Feldman 2009). Indeed, a great deal of ink has been lavished on this question (Howarth 2004). What is less clear however, is how these two systems interact, that is, what are the causal pathways crisscrossing both spheres of knowledge, and what precise effect the conveyance of one packet of knowledge from one field has on the other field (Mertz 2008).

In this paper, I build on existing research to take an additional step towards understanding how the Law interacts with the Social Sciences. More particularly, I seek to examine the path leading from social scientific research to the courtroom, i.e., instances in which judges seek out social scientific data to support their opinion. The primary goal of this inquiry is to shed light on the question: when, and why are judges more likely to refer to social scientific

evidence? The answer to this question may prove to be important, as it may allow us to better understand the ties between Law and the Social Sciences, as well as answer further questions such as how social science is utilized by judges, and what effect this importation may have.

This inquiry is further bolstered by the fact that the relationship between the two contemplated spheres of knowledge is by no means in its infancy; certainly, there is no novelty in citing social scientific evidence in case law. While it is hard to pin-point the exact date when the two began to interact,² we may consider Justice Holmes' influential essay, "The Path of the Law" (Holmes, 1897), as an important event in this respect. Holmes explicitly recognizes the need for law to appreciate the social realm, using statistical methods and economics as analytical tools (Holmes, 1897: pp. 11-13). Thus, at the very least, the interplay between Law and Social Sciences is roughly 120 years old.

Moreover, the use of social scientific research by judges has not only a relatively long history, but a contentious history as well. For instance, Social Science was used as early as 1908, in *Muller v. Oregon*.³ In an unusual brief for the plaintiffs prepared by Josephine Goldmark and argued in the Supreme Court of the United States (herein: "SCOTUS") by Louis D. Brandeis, only 2 of roughly 100 pages concerned legal arguments; the lion's share of the pages cited social scientific data regarding the social outcomes (e.g., health and education) of over-worked women (Freidman, 2005: 506-07). The court's opinion, written by Justice Brewer, takes notice of these data, and uses them to shape the argument – that women are a special case, and therefore merit certain legal protections not afforded to men beforehand.⁴ Other early cases referring to social

² And while this is a fascinating question in its own right, tied to the evolution of the legal system and the creation and development of social sciences in the 18th century, it is beyond the scope of this work.

³ 208 U.S. 412.

⁴ "That woman's physical structure and the performance of maternal functions place her at a disadvantage in the struggle for subsistence is obvious. This is especially true when the burdens of motherhood are upon her. Even when they are not, by abundant testimony of the medical fraternity, continuance for a long time on her feet at work, repeating this from day to day, tends to injurious effects upon the body, and, as healthy mothers are essential to

scientific research include Gratz,⁵ Frye,⁶ and of course, Brown.⁷ But the use of such social scientific data to support legal arguments and judicial decisions did not always go over smoothly.

In the early years of the 20th century, the ivory tower of academia was bustling with different opinions and views on the question of Law and Social Science. It is unnecessary to bludgeon the reader with the history of Sociological Jurisprudence (Pound, 1943; Lyman, 2002), Critical Legal Studies (Kennedy and Klare, 1984),⁸ Feminist Critical Theories (Rhode, 1990), and Legal Realism (Hart, 1961), all of which had something to say about the relationship between the Law and the Social Science. For the purposes of this work, it is sufficient to appreciate that various socio-legal theories have contemplated this question, and that in the “shadow” of such seething academic discourse, judges became inclined to cite social scientific research in their opinions (Rustad and Koenig, 1993).

When judges do in fact cite social scientific research, they do so in somewhat predictable ways. Thus, there has been previous research examining the role of SSC in case law. For instance, utilizing Kenneth Culp Davis’s (1942) original differentiation between “legislative” and “adjudicative” facts, Monahan and Walker (1991; 1988) explore the applicability of different types of social scientific evidence to different types of facts (“social authority” and “social fact”, respectively), and trace out the three primary functions of SSC, as they see them: (1) make law; (2) determine facts; and (3) provide context. Rublin (2011) examines a number of high-profile

vigorous offspring, the physical wellbeing of woman becomes an object of public interest and care in order to preserve the strength and vigor of the race.”, opinion by J. Brewer, *Muller v. Oregon*, 208 U.S. 412, at 421.

⁵ *FTC v. Gratz*, 253 U.S. 421 (1920) (Justice Brandeis, in dissent, cites social scientific research pertaining to monopolies in an antitrust case, in FN4).

⁶ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923) (discussing the probative value of a “systolic blood pressure” test, and the standard by which scientific evidence (social and otherwise) should be admitted into the courtroom).

⁷ *Brown v. Board of Education of Topeka*, 347 U.S. 483 (the opinion of the unanimous court, written by Justice Warren, included reference to six social scientific publications on the social and psychological effects of segregation).

⁸ This is a highly encompassing bibliography of CLS studies composed by Kennedy and Klare.

SCOTUS cases, and identifies two important axes bearing upon the influence of SSC on law-making: legal variance among jurisdictions and the degree to which an issue is settled in the social sciences. Rustad and Koenig (1993) also examine various SCOTUS cases to show that SSC are cherry picked out of *Amici Curiae* in a biased manner which brings “junk science” to the doorstep of the highest court in the land. John Minor Wisdom (1975) examines the role SSC played in the desegregation of schools and busing since *Brown*, arguing that SSC can be beneficial to judges, but must be used with caution. Other similar projects have been undertaken in the fields of Law, Sociology, and Political Science.

However, their insight and contribution notwithstanding, these scholarly endeavors present certain voids that this project seeks to fill. In most published works, the unit of analysis is SCOTUS case law, and the sample of cases upon which conclusions are based, is typically small.⁹ It would be imprudent of any student of the Law to make too strong an inference from the machinations of SCOTUS to lower level courts, both in the state and federal judiciaries. More, if we (as students of the law) truly believe that Social Sciences in general, and SSC in particular, play any role in shaping law (as is suggested by, *inter alia*, Monahan and Walker (1991)), SCOTUS is not the optimal venue to study, as its ability to effect wide-spread social change is limited (Rosenberg, 2008; Horowitz, 1977).

Therefore, this project offers two advantages, derived from the research design and methods utilized: first, the data shall include a relatively large-N sample of State Appellate and Supreme Courts. This provides a view into what is happening “in the trenches” of the judiciary,

⁹ For an encompassing and incredibly detailed account of various projects studying courts’ citation patterns, see: Sirico (2000: FN1).

where the predominant volume of litigation actually transpires.¹⁰ Second, this work engages in quantitative analysis and provides empirical evidence to test the hypotheses set out below.

Analytical Framework

When discussing the use of social science in court, it is helpful to imagine four stages that follow chronologically:

- In Stage A, there is a step-0, whereby certain factors influence whether or not Social Science will make it in to the judges' ruling;
- In Stage B, is the actual use of Social Science by judges;
- In Stage C, are the outcomes relevant to the particular case deliberated upon; and
- In Stage D, are the outcomes relevant to the legal system (or sub-segments thereof).

Note that while there is a chronological order, progressing from (a) – (d), causality is not unilinear in this respect, i.e., factors in each of these stages are not independent from each other. In particular, we will see that there is a strong theoretical link between stages (b) and (c), such that when a judge contemplates the use of Social Science, she may be doing so with the intention of rendering a particular type of opinion (rather than deciding to dissent based on the results of the social scientific analysis conducted).

Table 3.1 briefly illustrates acquired knowledge in the field, though nowhere have these insights been incorporated into a four-stage framework. Stage A includes the factors regulating

¹⁰ For instance, the mean annual case load of a state appellate court system in 2016 was approx. 8,700 (which means the national average annual case load in state appellate court systems is roughly 435,000), whereas the Federal Appellate court system, in 2017, had a case load of approx. 60,000 cases (1/7 of the state system). Data taken from: Federal Judicial Caseload Statistics 2017, available at: <http://www.uscourts.gov/caseload-statistics-2017-charts-federal-judicial-caseload-statistics-2017> (last visited 16 June, 2021); and National Council of State Courts, Court Statistics Project, 2016 Overview – Appellate Courts, available at: <http://www.uscourts.gov/caseload-statistics-2017-charts-federal-judicial-caseload-statistics-2017> (last visited 16 June, 2021).

the gateway between Social Science and courts. Included here are factors pertaining to uncertainty of law (e.g., is there a circuit break on a legal matter), as well as uncertainty of science (has the relevant scientific community obtained closure with respect to the issue at hand?).¹¹ The running hypothesis (Rublin 2011), is that greater uncertainty of law invites more Social Science.

There are structural factors as well – those influences that are linked to the building in which judgement is rendered, and the people rendering it. For instance, the rules of evidence can be more or less accepting of the use of Social Science, and – based on how they are read by judges – can even create certain norms regarding the desirability of Social Science in court (Robertson and Broadhurst 2019). More, the features of the adversarial system create unique (though sometimes perverse) incentives to use social science in courts as sword or shield (Mertz 2008), despite the difficulties associated with such use (Suggs 1979; Levine 1984; Katz 2011). For instance, *Amici Curiae* are an important gateway for Social Science facilitated by the adversarial system, though they may not always have the desired effect (Rustad and Koenig 1993). Lastly, the hierarchical rank of a tribunal in the judicial system is thought to influence the entrance of social science, so that positioning closer to the pinnacle of the judicial pyramid is associated with greater use of social science (Acker 1990).

Particular legal fields may be more inviting of Social Science than others. Thus, sub-fields such as Family Law (Robertson and Broadhurst 2019; Rathus 2012), Criminal Law (Donohue and Wolfers 2006; Acker 1990), and Mental Health Law (Mosher and Berman 2015) are more naturally inviting of social science, due to their habitual engagement with Extra-Legal matters.

¹¹ Chapter 2 illustrates that it is exceptionally difficult to determine whether consensus (be it positive or negative) has been obtained in the scientific community with respect to a particular issue; moreover, even if consensus has been attained, it takes time for courts to update, so that a previous erroneous consensus – utilized by courts – is still used.

Table 3.1: Social Science goes to Court - Paths and Outcomes

Gateway Predictors	1	Unsettled Social Science (Rublin 2011)	
	2	Widespread movements across jurisdictions (Rublin 2011)	
	3	Case Complexity (Petherbridge & Schwartz 2012)	
	4	Resource availability: caseloads; type of tribunal (Acker 1990)	
	5	Adversarial system incentives (Robertson & Broadhurst 2019; Rustad and Koenig 1993)	
	6	Rules of Evidence: Citation Frequency function of <i>Frye</i> or <i>Daubert</i> standard	
	7	Uncertainty: --Legal uncertainty (Doctrine fluid? Standard or Rule?) --Scientific uncertainty (consensus/closure obtained?)	
	8	Area-specific contextual factors: -- Close link to Science (e.g. Family Law) (Rathus 2018; Rathus 2012) -- Norms RE instruction of Jury and Experts (Monahan and Walker 1988)	
	9	Issue Adjudicated: -- Constitutional questions (Acker 1990) -- Public opinion (Rublin 2011)	
Intra-case Functions (Monahan and Walker 1988)	1	Make law	Differentiated by Legislative and Adjudicative facts (Davis, 1942).
	2	Determine facts	
	3	Provide context	Combination of both fact types creating a “Social Framework” (Monahan & Walker 1991)
Intra-case Outcomes	1	Dissent (Rosenblum 1978; Petherbridge & Schwartz 2012; Blake 2019)	
	2	Concurrence	
	3	Change in Status Quo (Petherbridge & Schwartz 2012; Blake 2019)	
	4	Legal vs. Scientific Sources: --Soc. Sci. citation as alternative to expert --Legal sources used most frequently	
Inter-case Outcomes	1	Legal Change (Rublin 2011; Petherbridge & Schwartz 2012)	
	2	Policy Change (Radelet and Borg 2000)	
	3	Changes to the legal profession (Metz 2000; Wilkins 1999)	
	4	Diffusion within Legal System: -- Cases citing Soc. Sci. are cited more by other courts and secondary sources, as well as in- and outside the adjudicating jurisdiction	
	5	Citation Patterns: --Spatially homogenous clusters of jurisdictions exhibiting disparate modes of Extra-Legal use (Citations + Expert Testimony)	

*Rubrics in gray represent original contribution to the framework. Propositions in **bold** represent hypotheses to be tested in this work.

Generally, the yardstick for friendliness towards social science is the degree of engagement a sub-field has with empirical evidence, a trend that has risen across the law as a whole in recent years (Monahan and Walker 2011). Furthermore, the use of expert testimony and the manner in which jury instructions are furnished in a particular field may also encourage or temper the use of social science in court (Monahan and Walker 1988).

Finally, the particular issue being adjudicated may be more or less inviting of social science. Thus, constitutional issues tend to encourage social scientific citations, as do issues that elicit strong public opinion (Rublin 2011), such as the Death Penalty (Baldus 1994). Furthermore, the type of issue adjudicated (e.g., constitutionality of a statute vs. constitutionality of governmental action) may bear on the frequency and functionality of social scientific citation (Acker 1990).

Stage B includes the primary functions of Social Science, upon their entry into court. Monahan and Walker (1991; 1988) theorize how Social Science is used in court, and suggest three such functions: (1) to make law; (2) to determine facts; and (3) to provide context. They differentiate between these functions by employing the analytical break between adjudicative facts and legislative facts set out by Davis in 1942. Thus, when making law via social science, judges are primarily concerned with legislative facts; when determining facts, judges address adjudicative facts; and when they seek out social science to provide context, they are making use of both types of facts, thereby creating a general social framework within which the holding shall be embedded.¹² While there are other uses and functions for social science in court,¹³ Monahan

¹² Note that in setting out such a social framework, judges are forced to constantly match social categories of ties, to pre-determined legal categories of ties so that when egregious mismatches occur – precedent is created and/or law changes (Zelizer 2005; 2000). Indeed, with regards to Family Law, various legal scholars have observed a certain ‘lag’ between family life and Family Law (Grossman and Friedman 2011; Zelizer 2005; Davis 1962).

¹³ For a compelling case of how courts use social science in LGBT litigation, *see*: Falk 1994.

and Walker's framework remains the most general and widely accepted in academia today (Grunwald 2013), despite not having changed much in over two decades (compare: Monahan 1986 with Monahan and Walker 2010).

In regards to Stage C, there has been work to suggest that the observed outcomes of a case may co-locate¹⁴ with citations, but the theory underlying it is wanting (Acker 1990).¹⁵ Such studies have found, *inter alia*, that citations are relatively consistent across time, are used at a frequency of roughly 30%, and that they co-locate with dissenting and overruling opinions. However, much of this work has been confined to the examination of the use of Law Review Journals in SCOTUS opinions (Siciro and Margulies 1986; Petherbridge and Schwartz 2012; Sirico 2000), or simply to SCOTUS (Acker 1990) leaving open questions regarding Social Science in general, and its use in the legal system outside of SCOTUS.

A great deal of ink has been lavished on Stage D and the greater institutional and systemic effects of the interaction of Law, courts, and Social Science. Important work has been undertaken to show that a more careful engagement with Social Science can and should ultimately change policy (Wisdom 1975; Radelet and Borg 2000), reshape the legal profession (Metz 2000), and even the manner in which law and social science interact on the disciplinary level (Cahn 1955; Nelken 2001). Of course, one of the most natural outcomes to explore is the potential for legal change brought about by use of Social Science in courts. Indeed, Rublin (2011) links the gateway predictors of uncertainty (in law and science) directly to changes in the law, such that a unique setting in which there is legal uncertainty coupled with scientific

¹⁴ The term "co-locate" is carefully chosen to avoid an insinuation of causality. Here, in particular, there is greater susceptibility to reverse causality in the sense that what is actually driving the use (via various functions) of Social Science is the judge's view on how best to dispose of a case, and not the other way around, as is implied by the chronological order of the stages.

¹⁵ Moreover, empirical work in this vein has been limited almost exclusively to SCOTUS.

certainty serves as fertile ground for legal change. When the situation is reversed – legal certainty coupled with scientific uncertainty – the law is unlikely to change. Rublin leaves open the question of what fate will befall law in the intermediate cases. Table 3.2 reproduces Rublin’s hypothesis.

Table 3.2: Rublin's Uncertainty Hypothesis

	Entrenched Social Science	Unsettled Social Science
Widespread Movement Across Jurisdictions	Law Likely to be Changed	?
Non-Widespread Movement	?	Law Unlikely to be Changed

Source: Rublin (2011: 213).

Hypotheses

This paper builds on the work of many of the aforementioned scholars, and seeks to both add and complicate their hypotheses and findings. In particular, this work pays special attention to Stages A, C and D, that is, when social science goes to court and to what end. Accordingly, analysis will be split into three segments: the first segment examines the role of new potential gateway predictors and complicates Rublin’s hypothesis regarding the role of uncertainty; the second segment focuses on observed intra-case outcomes; and the third segment examines the inter-case level of analysis, i.e., outcomes observed for the legal system as a whole. Below, I elaborate on each segment, providing the necessary theoretical background to formulate hypotheses.

HYPOTHESIS I-A: UNCERTAINTY IN LAW

As Rublin (2011) suggests, uncertainty in Law, such as a circuit break, can be more inviting of social science citations. This finding has been confirmed empirically, as Petherbridge and Schwartz (2012) find that SCOTUS tends to cite more often when there is disagreement among lower courts. However, this finding is limited to SCOTUS, and to the use of Law Reviews – not social science in general. Moreover, this intuition is harder to apply when examining lower courts, such as state appellate courts, which typically are not asked to settle among disparate opinions arising from trial court disputes, but rather seek to adjudicate a specific appeal therefrom. Additionally, while uncertainty in law is observed when jurisdictions hold differing opinions, there are other instances of uncertainty that can be observed.

One such uncertainty arises when courts interpret law (Snyder 1959). However, as this is quite a common occurrence in courts, this does not imply a constant high level of uncertainty; rather, there are particular instances in which the interpretation of law is more susceptible to uncertainty, and hence more inviting of Social Science citations. Three such instances, or axes, are identified to proxy for varying degrees of uncertainty: statute type (rule vs. standard), statute status (active vs. dormant), and degree of interaction with social science (high vs. low). Each is discussed in turn.

As applied to the inquiry at hand, the dichotomy of rules vs. standards is relevant insofar as each type of statute associates with disparate costs. Thus, rules are costlier on the front end (when drafting the law), whereas standards are costlier on the back end – when it is being interpreted (Kaplow 1992; Kaplow 2015). Germane to the analysis conducted here is the asymmetry in costs linked to the back end: when standards need be interpreted in court, more uncertainty is involved and more information is required (Craswell and Calfee 1986). The degree

to which standards associate with uncertainty and back end costs is variable, though the asymmetry in costs is always present when compared to rules (Kaplow 1992). This insight, coupled with the amplified use of Social Science under general uncertainty set out *supra*, suggests that courts are more likely to cite social science when interpreting a standard than when interpreting a rule.

Statutes have baggage: a history of legislative record, case law and legal development. The size and volume of this baggage may be a function of time (i.e., time since enactment), but also a function of litigation frequency (i.e., how often it is interpreted). Thus, statutes with less baggage (more recent and/or litigated less frequently) provide fewer resources for judges to draw upon when engaging in interpretation. Moreover, while a law may remain in a continual state of flux, its rate of change (and thus the size of its baggage) may peak at some point in time.¹⁶ Placed on a spectrum, laws may be located anywhere from **dormant** (ample baggage, low rate of change) to **active** (scant baggage, high rate of change).¹⁷ As judges draw upon said baggage in interpreting a statute (as well as on their experience on the bench), less baggage may invite more social scientific citations. In other words, young laws that are still forming (and hence, exhibiting greater uncertainty) are more likely to elicit social science citations compared to old laws that are quite stable.

Finally, both the type of statute and its status are tempered by the degree to which it interacts, indeed – calls upon – Social Science in its construction. As aforementioned, not all laws (or legal fields) are equivalent in this respect, and some are more inviting of social science

¹⁶ However, this process is not unilinear (laws can exhibit varying rates of change over time), nor is it irreversible (old laws with much baggage can nevertheless be changed).

¹⁷ Not only statutes have baggage, cases do as well (procedural history). The baggage a case brings with it to court has been shown to significantly associate with certain outcomes (delay in disposition, *see*: Berlemann and Christmann 2019), but to the extent of the author's knowledge, citations as outcomes have not been explicitly studied.

(Robertson and Broadhurst 2019; Mosher and Berman 2015; Rathus 2012; Acker 1990; Diamond 1989). Put differently, some statutes are inextricably linked to social facts and the vagaries of human life (Galatzer-Levy, Kraus, and Galatzer-Levy 2009). Again, there is a good deal of variance in the degree to which statutes call upon society for construction (examples are provided below), but important here is that statutes exhibiting a stronger, more direct link with social life shall be more inviting of social science citations.

The aforementioned three axes are by no means mutually exclusive. In fact, they are quite compatible in the sense that they combine to form an ordered rank with respect to the hypothesized likelihood of social science citations:

Table 3.3: Hypothesis 1-A - Uncertainty Rank

Rank #	Type	Status	Link to Social Life	Likelihood of SS citation
1	Standard	Active	High	High
2	Rule	Active		
3	Standard	Dormant		Moderate
4	Rule	Dormant		
5	Standard	Active	Low	Low
6	Rule	Active		
7	Standard	Dormant		Very Low
8	Rule	Dormant		

The above ranking values link to social life over type, and type over status. This is an empirical question – one that will be tested in this work. Thus, analysis below will examine whether such a ranking system can be observed in state courts, and whether there is a statistically significant difference between the various ranks. I note here that while the type of statute is a

straightforward binary measure, the question of whether a law is active or dormant must be qualitatively determined (see *infra*).¹⁸ The link to social life is harder still to measure. Therefore, analysis here focuses only on the top four contemplated ranks, where statutes exhibit a clear a direct link with social life (effectively excluding this aspect from the hypotheses). Examination of laws with a weaker link to social life may serve as a future avenue for research to verify this aspect of the hypothesis.

HYPOTHESIS I-B: RESOURCE AVAILABILITY

It takes time and effort to cite a source. Even if sources originate in lower courts' holdings or litigants' briefs (or Amici), they must still be examined and discussed, or discarded in the event that they do not merit a mention (Grunwald 2013). In other instances, it may be that judges are aided by their staff in locating and interpreting various citations, though time spent by judges' staff exhibit shadow costs as well (Acker 1990). These costs can also be thought of as information costs (Kaplow 2015), where social science citations are more taxing than legal citations, due to the divergence in expertise held by judges (Shuman and Sales 1999; Sanders, Diamond and Vidmar 2002). In other words, social science citations require resources, so that the two are hypothesized to associate positively: when a judge or court has fewer resources, we might expect fewer citations to social science.

Moreover, as cases progress through the hierarchical stages of the legal system, they tend to accumulate resources; even resource-poor litigants are likely to have institutional backing that will allow for the meticulous examination of all aspects of the case (Sheehan, Mishler and

¹⁸ The boundaries between the various types of cases ranked in Table 3 may be hard to discern, and furthermore, it may be difficult to hypothesize outcomes regarding citation at the margins – for instance, do active rules invite more citations than dormant standards? Again, this is a falsifiable question this project seeks to shed empirical light on.

Songer, 1992). Such backing (and resources) facilitates encompassing briefs and Amici that include citations to social science (Songer and Sheehan, 1993), which may signal to the judge that there are crucial social (extra-legal) facts relevant to the case. This in turn may encourage the judge to use citations mentioned in the brief, or search for citations of her own. Thus, as citations are not the sole product of independent research conducted by the judge and her staff (Sirico and Margulies 1986), the resources brought to bear by litigants also play a role in the use of social science citations (Suggs 1979; Levine 1984). Consequently, courts with greater resources, adjudicating cases involving litigants with more resources, are more likely to cite social scientific evidence. Resources are operationalized in this work via judicial caseload and tribunal level.

HYPOTHESIS II: INTRA-CASE OUTCOMES

This segment of the analysis, pertaining to Stage C of the framework, focuses on the co-location of social science citations and particular outcomes of the case, namely, whether the case broke from status quo, and whether a dissenting or concurring opinion was entered.

Outcomes are then studied as they relate to different kinds of citations: traditional legal and classic social scientific (the manner in which these two groups are differentiated is detailed below). Previous work has explicitly examined the roles of legal scholarship cited in court (Siciro and Margulies 1986; Petherbridge and Schwartz 2012; Sirico 2000), others have examined the use of all general social science citations (Falk 1994; Rublin 2011; Robertson and Broadhurst 2019), and others still examined the role of non-legal, empirical social science used in court (Acker 1990), but a clear differentiation and comparison of the two groups has not yet been conducted (or applied to state courts).

Nevertheless, these aforementioned works provide a great deal of insight and context with which to theorize expected intra-case outcomes as they pertain to social scientific citations. First, Rosenblum (1978, cited in Acker 1990) suggests that dissenting judges are more likely to cite social science, as this would allow them to provide empirical evidence to support their deviation from the majority's opinion (Acker 1990: 7). Acker was skeptical of this hypothesis, arguing that the type of opinion written was not related to the use of social science, though his data demonstrated that citations were positively associated with "badly fragmented" SCOTUS courts (Acker 1990: 8-9). As applied to legal scholarship alone, Petherbridge and Schwartz showed that more minority votes associated with more citations (2012: 1010-11). Their data also indicate that SCOTUS was much more likely (a 117.1% increase in odds) to cite legal scholarship when overruling prior precedent (2012: 1013), and when resolving circuit breaks (2012: 1015).

Thus, previous works suggest that citations co-locate with all three of dissent, concurrence, and change in status quo, or that more generally, citations are used when cases are difficult to decide, when they are complex. In hypothesizing the outcomes of cases in state courts, there is good reason to believe that these findings hold true, so that citations are expected to co-locate with all three outcomes. This is due to the underlying principle of uncertainty outlined above.¹⁹ While SCOTUS is unique in many of its characteristics (Rosenberg, 2008;

¹⁹ This also implies the following: when social science is cited, this may signal the existence of complex case, or in other words, Stages A and C are highly associated so that various gateway predictors (uncertainty, structural factors, area-specific factors, issue-specific factors and resources) co-locate with a higher frequency of the three contemplated outcomes, and social science citations merely serve as an indicator therefore. Yet another way to understand this relationship between the stages in the framework, would be to think of each of Stages A, B, and C as three variables, where all three are correlated, so that the presence of one would indicate the presence of another, even with no data on the third: if we observe a highly complex case involving an active standard pertaining to an important issue in a court with many resources, we may hypothesize that this case will, on average, result in a higher prevalence of all three outcomes. If this is the case, then there seems to be little sense in counting and studying citations. However, as is demonstrated *infra*, this is not true for a number of reasons, such as: (1) we have partial information (at best) about gateway predictors; (2) the correlation among the three stages is less-than perfect; (3) this

Horowitz, 1977), it nevertheless operates in the same legal system, driven by similar structural and legal forces as lower courts and state courts. In other words, gateway predictors and the intra-case functions of social science are not significantly different in SCOTUS compared to other courts, though this is an empirical question that will receive attention in this segment of analysis.

In hypothesizing about outcomes particular to the type of citation (traditional legal or classical social scientific), there are fewer empirical findings to build on. First, due to the homophilic tendencies of individuals' citing patterns (Evans 2007; Shwed and Bearman 2010),²⁰ it is generally expected that courts will cite more traditional legal materials than social scientific works. Support for this proposition can be found in the work of Sirico (2000) who suggests that elite members of SCOTUS tend to cite the elite journals of the schools they attended (2000: 1011). This proposition is important for two reasons: (a) if traditional legal sources are cited more often, and these sources are themselves becoming more interdisciplinary (Mertz 2008), this would suggest that Law Reviews and similar sources broker information between Social Science and courts; and (b), it suggests that if citations co-locate with complex cases and changing law, this feature of Social Science must be illuminated to social scientists so that the process of translation can be optimized (Metz 2000; Nelken 2001; Sanders, Diamond and Vidmar 2002).

Second, due to the higher search costs associated with classical social science compared to traditional legal sources, it may be that the former serves as an alternative to expert testimony

would be tantamount to saying that complex cases shape law, with no further inquiry about why, when, and most importantly, how law changes (with the aid of social science).

²⁰ Homophily is the natural inclination of individuals to associate and interact with other individuals that are similar to them (in ethnicity, religion, education, profession, age, etc.). Applied to citations, this means that individuals are more likely to cite sources that are closer to them in relevant aspects. For instance, scholars from a certain sub-field are more likely to cite a source in their sub-field rather than a source outside it, even when holding all else constant. One driving factor for this citation pattern is that homophily enables the lowering of searching costs (McPherson, Smith-Lovin, and Cook 2001).

presented in court, whereas the former does not. In this respect, both modes of scholarship potentially offer judges extra-legal knowledge (Rathus 2018), but classical social science perhaps more so, if only for the particular analytical space it occupies, located further away from the legal arena compared to legal scholarship. Given that most experts testifying in court (testimony that becomes part of the procedural history, and can later be considered by judges in higher appellate tribunals) hail from the various disciplines of the classical social sciences, (Sanders 2018; Huntington 2018), the knowledge and intervention offered is closer in substance to classical social scientific analysis rather than legal analysis or interpretation, familiarity with the law notwithstanding. Therefore, it may be the case that there is in fact a negative association between the use of classical social science citations and expert testimony, but no such association observed with respect to traditional legal materials. Again, this is an empirical question that bears inquiry.

Finally, the insights above are helpful in generating hypotheses pertaining to the volume of citation, and the type of citation (classical social science vs. traditional legal) observed in state supreme courts compared to state appellate courts. Given greater uncertainty and complexity (Rublin 2011; Petherbridge and Schwartz 2012), as well as the availability of resources (Sheehan, Mishler and Songer 1992; Songer and Sheehan 1993) higher courts are more likely to exhibit a higher volume of citations generally, as well as a higher volume of classical social science in particular, compared to lower courts, holding all else constant.

HYPOTHESIS III: INTER-CASE OUTCOMES

This segment of the analysis focuses on Stage D, that is, certain outcomes and influences that ring throughout the legal system writ-large. Two primary aspects are interrogated here: first,

whether cases exhibiting SSC occupy a position within the greater legal citation network that is significantly different from cases making no SSC citations. In this respect, a number of different measures are explored: (a) whether cases with SSC are cited more by other judges; (b) whether cases with SSC are cited more by secondary sources; (c) whether cases with SSC are cited more outside the adjudicating jurisdiction; and (d) whether cases with SSC cite more judges outside their own jurisdiction. If citations to social science co-locate with each of dissent, concurrence and a change in status quo, it may be that these cases will be cited more often in the legal system, given their unique attributes and contribution to the development of case law.

The four aforementioned measures provide an empirical view of how extra-legal knowledge (introduced via SSC) diffuses throughout the legal knowledge network. Should the data support each of the four said propositions, this may serve as evidence that extra-legal knowledge – when introduced into the legal system – diffuses deeper and wider compared to traditional legal knowledge. A wide penetration is supported by greater volumes of citation, such that cases including SSC are themselves cited more, thus occupying a more prominent role in the knowledge network. A deeper penetration is supported by more frequent citations made outside the adjudicating jurisdiction, such that the knowledge produced is disseminated to more nodes, and more distant nodes (both geographically, and analytically) in the knowledge network. A deeper penetration coupled with a wider penetration would suggest that extra-legal knowledge plays a prominent role in the knowledge network, and that cases citing SSC have a disproportionate effect on the legal system.

The final empirical element to this investigation implicates the spatial distribution of citing practices, as well as potential patterns that can be observed in the manner that jurisdictions

introduce extra-legal knowledge into their cases.²¹ The notion that social processes exhibit spatial patterns and spatial autocorrelation has been well examined in social scientific literature (Abbott 1997; Tobler 1970). Recent empirical studies cover topics such as access to healthcare (Nascimento, et al 2021; Mello-Sampayo 2020), violent crime (Hipp et al 2021; Santaularia, Larson and Uggen 2021); and urban dynamics of same-sex couples (Spring and Charleston 2021; Pagliacci 2019; Blank and Rosen-Zvi 2012). In all such studies, the law plays an implicit or explicit role in implicating the various spatial patterns examined by researchers. However, spatial patterns as they relate to the decisions of Family Court Judges have not been explored in depth. Nevertheless, many of the same insights, i.e., that social processes manifest in time and space exhibiting, at times, predictable patterns (Anselin and Ray, eds. 2010), ought to remain relevant. Put differently, the data should reveal significant rates of spatial autocorrelation with respect to citation patterns, such that neighboring jurisdictions (employing queen contiguity weights of both first and second order) are expected to exhibit statistically similar citation practices compared to distant jurisdictions, which are expected to exhibit statistically distinct citation practices.

Citation practices, as contemplated in this study, refer to the penetration of SSC (width and depth) into the knowledge network as discussed supra, but also to the relationship between SSC and expert testimony in the courtroom. Two competing hypotheses can be generated in this respect, one complimentary, the other competing. Thus, a complimentary view would suggest that SSC and expert testimony are positively associated, while a competing approach would

²¹ Spatial analysis was conducted using the open source software Geoda (Anselin, Ibnu and Kho 2006).

predict a negative association between the two, such that expert testimony will be associated with fewer SSC.²²

Furthermore, given the unique differentiation between traditional legal citations and classical social science citations, the data may reveal certain ‘modes’ states employ when introducing extra-legal knowledge, i.e., groups (or clusters) of jurisdictions may habitually rely on a specific combination of legal citations, scientific citations and expert testimony. For instance, State X may regularly resort to a high volume of expert testimony, an intermediate volume of legal citations, and a low volume of scientific citations. Additionally, this mode observed by State X may be statistically similar to its neighboring states, such that spatial autocorrelation may be observed, and geographic clusters espousing similar modes of extra-legal knowledge introduction into the court system can be identified. Given the oft-observed spatial

²² It is important to note that judges, as well as litigating parties, cannot simply refer to (or rely upon) any and all information available to them – the legal system has a well-developed mechanism to determine what information/evidence ought to be admitted into the courtroom. These are the rules of evidence (though they too, are legal standards). These rules, very broadly, serve to exclude evidence that (a) has too low a probative value (efficiency); and (b) was not collected pursuant to the prescribed manner (fairness) (Edwards and Elliot, 2007; Lilly, Capra, and Saltzburg, 2012). Thus, for evidence to be admitted, social scientific or otherwise, it must pass a certain legal threshold. In the U.S. today, there are two separate legal standards for the admission of evidence via expert testimony: the Frye standard (*Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923)), and the Daubert standard (*Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1994)), both of which interpret §702 of the Federal Rules of Evidence. The primary difference between these two standards is the threshold for acceptance of novel scientific issues. Thus, the Frye standard is tailored to be more flexible, and includes a general acceptance test, whereby even evidence found using novel techniques – so long as they have “*general acceptance in the scientific community*” (*Frye*, 567) – may be admitted into court. The Daubert standard is more restrictive and requires evidence to be derived only from a scientific process that is methodologically sound (a judge must make a preliminary finding to this end) (Lilly, Capra, and Saltzburg, 2012: 356-358). In either case, when social scientific publications are cited by judges, they must ostensibly pass the legal threshold for introduction of scientific evidence. Most of the lower 48 states and the District of Columbia espouse either of Frye or Daubert (at times allowing for small modifications thereto), though a small group of states can be considered ‘maverick’ states applying a unique legal standard. There is some disagreement among legal scholars and practitioners as to the exact identity of these states (*compare*: Jensen 2003, Parry 2004, Faigman 2013, and Hilbert 2019), but for the purposes of this article, that data are gathered according to the designation made by the “Expert Institute” an evidence based organization that arbitrates between experts and the legal system (see: <https://www.expertinstitute.com/about/our-story/>, last visited May 10, 2021), which identifies 40 Daubert states, 7 Frye states (CA, FL, WA, IL, NJ, NY, and PA), and 3 Maverick states (NV, ND, and VA).

pattern of social processes and interaction, it is expected the such clusters will be identified (Abbott 2001; Abbott 1997).

SUMMARY OF HYPOTHESES:

Hypothesis I-A (Uncertainty):

Hypothesis 1-A.1: SSC are expected to positively associate with the complexity of a case.

Hypothesis 1-A.2: Higher volumes of SSC are expected for observations (cases) involving legal standards and active legal rules (compared to cases involving dormant legal rules).

Hypothesis I-B (Resource Dependency):

Hypothesis 1-B.1: Higher volumes of SSC are expected for observations of state supreme court cases (compared to observations of appellate court cases).

Hypothesis 1-B.2: Lower volumes of SSC are expected for observations in jurisdictions with high judicial caseloads (compared to observations in jurisdictions with lower caseloads).

Hypothesis II (Case-specific Outcomes):

Hypothesis II.1: Observations including SSC are more likely to include each of (1) change in status quo; (2) dissenting opinion; and (3) concurring opinion (compared to observations not including SSC).

Hypothesis II.2: The mean level of traditional legal citations shall be higher than the mean level of classic social scientific cases, across all observations.

Hypothesis II.3: Observations including traditional legal citations will be less likely to co-locate with a change in status quo (compared to observations citing classic social science), and more likely to co-locate with dissenting and concurring opinions.

Hypothesis III (System-wide Outcomes):

Hypothesis III.1: Observations including SSC shall be (1) cited more by future courts; (2) cited more by secondary sources; (3) cited more outside the originating jurisdiction; and (4) cite more outside the originating jurisdiction (compared to observations not including SSC).

Hypothesis III.2: Observations including SSC will be positively associated with introduction of expert testimony (complimentary hypothesis).

Hypothesis III.3: Observations including SSC will be negatively associated with introduction of expert testimony (competing hypothesis).

Hypothesis III.4: Citation practices shall NOT be spatially random in distribution, such that spatial clusters exhibiting unique modes of extra-legal knowledge can be identified.

Interlude: Best Interest of the Child, Psychotherapist-Patient-Privilege, and Nuptial Agreements

The legal standard of Best Interest of the Child (herein: “**BI**”) has been around since the mid 19th century and has seen a great deal of change over time (Mason, 2012). What began as a legal standard empowering the judge with complete discretion, became, in the mid 20th century, a set of factors that need be considered and explained by a judge when a BI determination is undertaken (Grossman & Friedman, 2011). Despite the many factors added over the years (varying greatly by state), BI remained extremely vague and hard to predict, so much so, that it has been dubbed an “indeterminable” standard (Mnookin, 1975). This is very problematic, as BI is both broad in its subject matter application (e.g., child custody, adoption, visitation rights, abandonment, abuse and neglect, TANF, and many more), and highly influential (the greatest stakeholder being the child).

This uncertainty has invited the social sciences to play a central role in shaping and interpreting BI, both via adjudicative facts (through the use of expert witnesses in the field of mental health) and legislative facts (though the adoption of various psycho-social theories by the law, for instance, by setting a legal presumption that Joint Custody promotes BI) (Mason, 2012; Grossman & Friedman, 2011). While this standard continues to change, it has not seen dramatic change in some time (though some change is bound to occur in connection with Same-Sex Marriage and procreation via artificial means) (Mason, 2012). Data from the “Family Law in the 50 States” Project, managed by Family Law Quarterly (see Figure 1 below) provide context for the rate of legal change in Child Custody and Child support Law across all 50 states. While BI is still in flux, the rate of change has slowed, as judges have built a very large arsenal of precedent (which includes social scientific insights and citations) upon which to draw. Thus, BI is much closer to the dormant end of the spectrum.

Psychotherapist-Patient-Privilege (herein: “**PPP**”) is a relatively new legal rule, officially set out by SCOTUS in *Jaffee v. Redmond* (1996).²³ Prior to *Jaffee*, any privilege relating to a physician-patient relationship was minimal at best, and the notion of a psychotherapist-patient privilege was virtually unheard of (Mosher and Berman, 2015; Paruch 2009). There was no comparing the well-established legal rule of attorney client privilege to the relationship between a litigant and her therapist. However, in a well-crafted, insightful opinion written by Justice Stevens, SCOTUS held (7-2, Scalia and Rehnquist dissenting) that the PPP must be recognized; any other holding would defeat the underlying goals of psychotherapy, which include complete truthfulness and openness on behalf of the patient (Jaffee, at 17; Remley et al 1997; Josephson 1998).

²³ 518 U.S. 1.

Shortly after Jaffee, every state adopted some version of the PPP set out by SCOTUS (Mosher and Berman, 2015; Paruch 2009; Poulin, 1998). Different states have different allowances as to when they may impede upon the PPP, and under what circumstances. This too is a legal matter highly amenable to the involvement of social science, for the PPP covers many extra-legal questions such as therapist-patient dynamics, the effects of therapy, and ethical boundaries to name a few (Mosher and Berman, 2015; Boumil et al 2012). To the great chagrin of state and federal courts, SCOTUS, despite its bold holding, remained silent on important questions such as competing interests and pragmatic application of PPP. Moreover, Congress has done nothing to signal its approval or dissatisfaction with Jaffee and has not made any steps towards further regulation of PPP (Paruch 2009). As a result, the legal rule of PPP is still very much in flux and is being developed in disparate manners in various jurisdictions (Boulin et al 2012; Poulin, 1998). The legal fluidity of PPP renders state-level Jaffee cases as fruitful breeding grounds for social science citations and doctrinal change, especially when considering that the Jaffee rule has not had sufficient time to form and coalesce with state law.²⁴ It is important to note that despite the fact that PPP is still progressing through its legal life course, it is still a legal rule and not a standard. In other words, the determination of PPP is essentially binary – it is protected or it is not. Different jurisdictions may have different rules dictating when PPP is not applicable, but in all cases, it remains a rule rather than a standard.

A second legal rule examined in this study is the enforcement of nuptial agreements (herein: “NAs”), originally created as a mechanism to protect the rights and property of a woman and her

²⁴ While 22 years may seem like a long enough time for a legal rule to fully develop and mature, this is actually a function of visibility and frequency – if a rule is challenged more often in court, there is greater opportunity for legal development; however, in the case of PCP, these cases are quite rare. In the 49 jurisdictions examined for this study, litigation pertaining to PPP was observed on average once every 4 years.

family prior to marriage under a system of coverture.²⁵ Today, there are three types of NAs: (1) agreements entered into prior to marriage (prenuptials); (2) during marriage (postnuptials); and (3) after/during divorce (separation/dissolution/settlement agreements) (Grossman and Friedman 2011). Though courts used to rarely honor these agreements in court, they have now become common and enforceable (Grossman and Friedman 2011). This may be part of the larger family law trend of “customizing” marriage – and divorce (Hasday 2014; Grossman and Friedman 2011).

All states agree on the legality of these contracts, but there are different ways of treating them, for instance whether they are to be governed by the traditional laws of contract. Some states consider these agreements as “regular” contracts – so that freedom of contract is very strong, and there is a high standard to argue coercion (Grossman and Friedman 2011). In 1983, the Uniform Premarital Agreement Act set out conditions under which a prenuptial agreement is unenforceable: (1) executed involuntarily; OR (2) unconscionable. Over half the states have adopted the UPAA, but it still sets a high standard, and it is hard to invalidate a prenuptial agreement in court (Grossman and Friedman 2011). Other states emphasize the “fairness” of a prenuptial agreement, checking for procedural and substantive elements of fairness (Grossman and Friedman 2011). Postnuptial agreements are also likely to be enforced, but require a high evidentiary showing that they were signed under fair circumstances (from fear of skewed

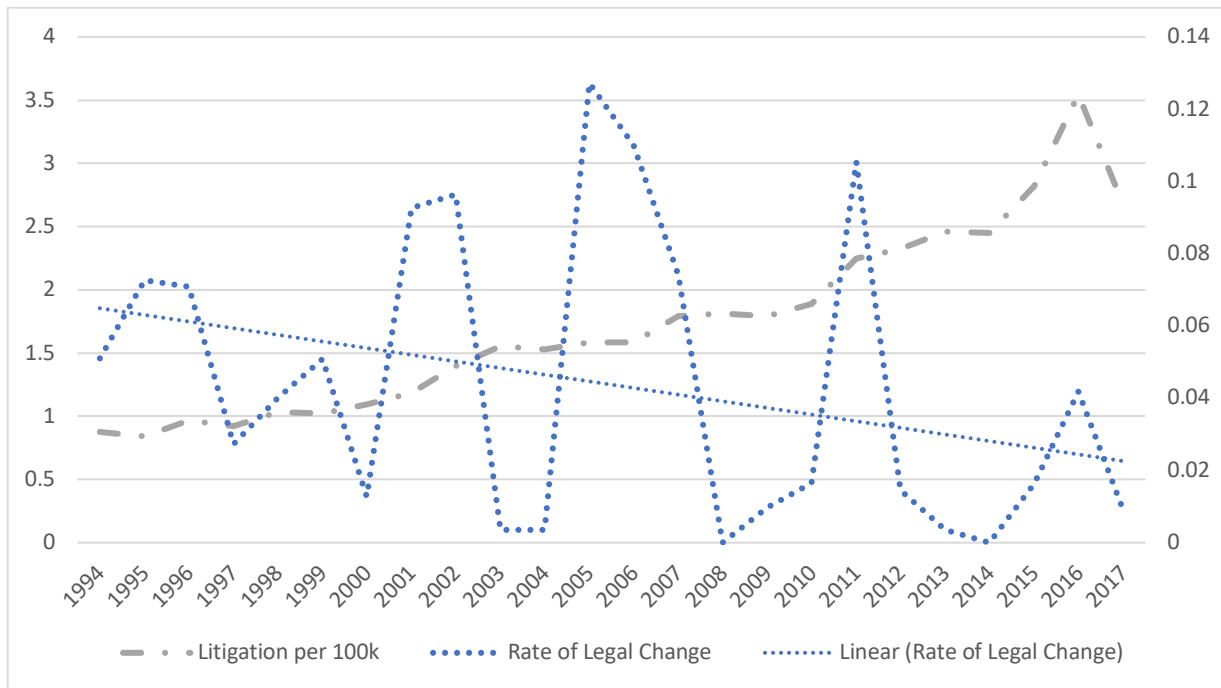
²⁵ Under Coverture, the union of man and wife through marriage created one legal entity (Cott 2002). This meant that a wife had no legal standing, could therefore not own property or sign a contract (including an employment contract), and was subject to a legal regime eerily similar to that of master and slave, as wife (and children) were the property of husband (Hartog 2002). Coverture was limited to the life-span of a husband – when he died, the widow was released (in which case ante-nuptial agreements proved crucial in securing resources for a widow in cases where the late husband had not done so) (Hartog 2002). During the 19th century, coverture began to erode as it was inefficient (e.g., preventing women from dealing with real estate when husbands were absent during the tumultuous expansion westward, Grossman and Friedman 2011), and was clearly unpalatable to various groups as an affront to women’s rights (Cott 2002). Despite slow and gradual changes to coverture (Friedman 2004; Basch 1999), it was never really abolished as a fundamental philosophy (or policy) of Family Law until the 1970s with the rise of no-fault divorce and the “silent revolution” (Hasday 2014; Waite and Gallagher 2000; Jacob 1988).

bargaining positions during a conflictual marriage) (Grossman and Friedman 2011). Dissolution agreements are the most likely to be enforced as they convey bargaining partners' will (usually accompanied by lawyers), and they obviate the need for a costly trial. Judges still need to review the agreement to ensure that it is not unconscionable, but they are typically approved. NAs are now the rule rather than the exception (Grossman and Friedman 2011). Much like PPP, the question regarding enforceability of a NA (or relevant subsections therein) is inherently a binary determination governed by a legal rule; unlike PPP however, the law on NAs has not shifted dramatically in recent years, so that it has been doctrinally 'stable', i.e., dormant, for the past three decades (Grossman and Friedman 2011; Thompson 2015; Shakargy 2021; Wasil 2021; Antognini 2021), though fundamental changes may be lurking beneath the surface due to complex issues such as IVF (Shakargy 2020; Provencher 2020). This view is undergirded by empirical evidence as well: similar to the findings in Figure 1, laws implicating NAs (Alimony, Grounds for Divorce, Property Division, Third Party Visitation, and Parentage) have exhibited a slowing rate of legal change, from a rate of roughly 0.08 – that is, 8% of laws changed – in 1994, to a rate of 0.02 or 2% of laws changed in 2017.

Taken together, BI, PPP, and NAs provide excellent case studies for this inquiry, as they differ and converge in a particular way that make them appealing. First, all three legal issues, as stated above, have an intimate tie to social sciences. This means that both involve many extra-legal questions that need be resolved by the judge when deciding a case, in the legal sub-field of Family Law, which is itself already inherently linked to the social world and the use of social science (Robertson and Broadhurst 2019; Rathus 2012; Acker 1990; Mosher and Berman 2015; Mnookin 1979; Grossman and Friedman 2011). Second, each of BI, PPP, and NAs appear frequently enough in state courts, in all jurisdictions, so that a large-N sample can be drawn for

each. Third, BI, PPP, and NAs apply to a broad range of legal matters and arise in both Private Law (e.g., Family Law), and Public Law (e.g., Criminal Law) contexts. Finally, the three contemplated legal issues reveal a very high level of adjudicative heterogeneity both within, and among jurisdictions, so that they present an alluring empirical setting to investigate. Where BI, PPP, and NAs differ, is in two features identified above, namely legal standard vs. rule, and active vs. dormant status. While these designations or features are by no means a binary categorization, this brief interlude provides context to identify the most appropriate designation for each: (a) BI best fits the designation of dormant standard; (b) PPP best fits the designation of active rule; and (c) NAs best fit the designation of dormant rule.

Figure 3.1: Legal Change, Child Custody and Child Support, 1994 to 2017



In figure 3.1, the bold dotted line indicates the national rate of legal change in provisions relating to child custody and child support (proportion of provisions that have changed (1 or 0) per year, for all states), and the dotted line exhibits a linear fit to these data. Both dotted lines refer to the right axis.

These data show that the rate of change declined from roughly 7% of provisions changed in 1994, to just over 2% changed in 2017). The grey dash-dotted line indicates the number of custody and/or child support cases litigated in State Supreme and Appellate courts, per 100,000 people. This line refers to the left axis. Data for legal change and volume of litigation are taken from the ‘Family Law in the 50 States’ project published in Family Law Quarterly, and Lexis Nexis, respectively.

Data & Methods

SAMPLE DESIGN

The data (n=5,132) aim to capture a sample of State Appellate and Supreme court cases, in each of the lower 48 states and the District of Columbia, representative of BI, PPP and NA litigation. A detailed explanation of how cases are located and selected can be found in Appendix A. The sample is unevenly balanced, as BI litigation is much more frequent than PPP and NA litigation. Furthermore, the size and litigiousness of jurisdictions varied greatly, such that the number of observations per jurisdiction is highly varied as well. Due to the high-frequency of BI litigation, roughly 30% of cases identified as relevant were coded for this sample (n=4,026), with smaller jurisdictions (e.g., NH, DE, RI) being over sampled at roughly 50%. Both PPP and NA litigation were much less frequent, so that 100% of cases identified as relevant were coded for this sample (n=308, and n=798, respectively). A summary of descriptive statistics can be found in Table 3.4 below. All data were obtained using the Westlaw legal archive.

In coding the cases, three distinct groups of variables were examined: (a) the dependent variables (citations and use of expert testimony); (b) predictor variables; and (c) control variables (both time-variant and invariant). The dependent variables sought after were SSC and expert

testimony. SSC were coded as count data for any citation, which were then coded as either a traditional legal citation, and classic social science citations. Expert testimony was coded in a binary fashion. The predictor and control variables were collected based on both the theory presented above, and a pilot study conducted for this research (n=788).²⁶ The data collected for the dependent and independent variables are all objective measures, but for two qualitative aspects elaborated upon below.

The coding process included two qualitative assessments regarding the relevancy of the case, and the use of expert testimony. The search terms used were intentionally broad (see Appendix A for a complete and replicable description of the search process), so as to cast the widest net possible for each of the three legal issues studied. Consequently, the search also yielded a great many results that were not relevant to the sample. Relevant in this respect dictated that the legal issue examined was germane to the final holding; this relevancy mechanism was employed to ensure a closer nexus between the legal issue and any citations made in the adjudication thereof. For instance, a small portion of PPP cases arose in the context of lengthy homicide cases, in which the question of psychotherapist privilege was entirely ancillary and subordinate to the legal questions discussed; in such instances, it was much harder to attribute a citation of any kind to the legal issue explored. Conversely, citations made in cases focusing primarily on the question of psychotherapist privilege, can be attributed to PPP with a

²⁶ An important insight gleaned from the pilot study was the importance of reported vs. unreported cases. The former typically being more complex, with elaborated opinions compared to the latter, in which typically only a very brief order is entered. As this research seeks to explore the knowledge network of state courts, and dynamics relevant to the entry of extra-legal knowledge into the legal system, the sample focuses only on reported cases, which are much more likely to include a written opinion by the Judge, even if a very short one. Moreover, the ratio of reported to unreported cases varies wildly by jurisdiction (anywhere from 10% to 100%), so that what may be considered to be unreported in jurisdiction X may nevertheless be reported in jurisdiction Y, thereby greatly diminishing the potential bias of this sample design.

greater degree of certainty, as can the remaining features of the case (e.g., disposition, complexity, etc.).

The second qualitative assessment conducted during the coding process examined whether testimony had been furnished to the court by an expert witness, and if this testimony was used by the judge in her opinion. As the objective is to locate and identify instances where extra-legal knowledge is introduced into courts, the data look beyond the inclusion of expert testimony in the case record, to examine whether the judge specifically assessed and addressed such testimony in her deliberation, whether it was used in the affirmative or the negative.²⁷ Both the aforementioned qualitative assessments required a deep reading of the case. The relevancy of an observation was viewed with an exacting standard, while the use of expert testimony in the opinion was viewed with a laxer standard. Thus, instances in which relevancy was borderline were dropped from the sample, whereas vaguer use of expert testimony was included in the sample and designated as a case including expert testimony. In all, such cases were infrequent, representing less than 2% of the sample (n~90).²⁸

Due to the highly variant citation formats of SSC in cases, SSC had to be located “manually” by reading through the case in its entirety. Basic text parsing programs were used to aid in locating recurring cues for citations (such as “L.rev.”, “L.Q.”, “ed.”, “Cts.”, or “Am.”), and while these cues were highly successful in locating SSC (able to identify roughly 70% of SSC), they were only complimentary to a complete reading of the case. This method is similar to that employed in similar research conducted in the past (Sirico 2000; Petherbridge and Schwartz

²⁷ As applied to BI litigation, expert testimony typically included the opinion of a mental health expert on how particular family dynamics influence the best interest of the child; as applied to PPP litigation, expert testimony related to the question of whether a therapist-patient relationship was indeed formed; and as applied to NA litigation, expert testimony regarded the psychological state of parties to the agreement, or the opinion of forensic accountants on the finances and assets of the litigating parties.

²⁸ Robustness checks conducted included, *inter alia*, analysis sans borderline cases, and revealed no statistical difference in results.

2012). It is far from perfect, but unbiased. More, it is important to appreciate that this method underestimates SSC, so that findings presented here are conservative.

The time frame of the sample is tailored to the independent variables identified above. Data were collected from 1994 (the year after Daubert was handed down) to August 2020. For PPP litigation, data were collected only from 1997 (as Jaffe was handed down in 1996). Cases are nested in time, in jurisdictions, to create a three-tiered longitudinal dataset.

Differentiation between traditional legal citation and classic social scientific citations was undertaken as follows. The first group includes citations to materials more closely related to the sphere of courts and litigation. This group is comprised of citations to law reviews, specialized legal journals, legal encyclopedias, textbooks, and hornbooks. While it may be unpalatable to dub such sources as extra-legal (and an affront to many of their talented authors), they constitute a body of knowledge external to the court, and bear no binding force on the judge, so that are considered here – as they were by previous researchers (Acker 1990) – to be Extra-Legal. The second group includes citations to Social Science that is not necessarily oriented toward the legal sphere. This group is comprised of citations to peer-reviewed journals, books, chapters in books and other texts (e.g., reports composed by the US Census Bureau or the World Bank). In doing so, I replicate Acker’s standard for differentiating between the two groups.²⁹ Pursuant to this standard of differentiation, the few cases which fall into both groups (peer-reviewed specialty empirical legal journals) were coded as social scientific materials.

²⁹ “‘Social science research evidence’ was defined as information derived from the traditional *methods* of science—through systematic observation and objective measurement, allowing for replication and empirical verification and within the *subject* purview of the social sciences, the study of behavioral events relevant to individuals and social relations, including psychology, sociology, psychiatry, economics, political science and criminal justice, but not history. [...] This definition [...] is useful because it distinguishes reliance upon empirical information, derived from scientific study, from logical reasoning, case precedent, textual interpretation, historical analysis, and other traditional sources of legal authority.” (emphasis in the original, Acker 1990: 3-4).

Table 3.4: Descriptive Statistics

Variable*	Obs.	Mean	Std. Dev.	Min	Max
<u>Time-Invariant Variables</u>					
Best Interest of the Child	4,026	--	--	--	--
Psychotherapist Patient Privilege	308	--	--	--	--
Nuptial Agreements	798	--	--	--	--
Frye	5,132	.258	.438	0	1
Daubert	5,132	.67	.565	0	1
Maverick	5,132	.049	.216	0	1
Jurisdiction Size (Logged Population)	5,132	8.688	1.012	6.306	10.526
Political Orientation	5,132	3.738	3.253	0	8
Community Property	5,132	.186	.389	0	1
Caseload	5,132	7.42	.497	5.778	8.429
<u>Case-specific Variables</u>					
Pages	5,132	14.49	9.735	1	122
Legal Authorities Cited	5,132	16.065	14.123	0	199
Westlaw Headnotes	5,132	10.742	7.788	0	83
Case Complexity	5,132	41.297	28.32	4	322
Supreme Court	5,132	.282	.45	0	1
<u>Case Outcomes</u>					
Change in Status Quo	5,132	.457	.498	0	1
Dissent	5,132	.122	.327	0	1
Concurrence	5,132	.112	.315	0	1
<u>Citations</u>					
Total Number of Citations	5,132	.43	1.379	0	26
Any Citations	5,132	.186	.389	0	1
Soc. Sci. Citations	5,132	.102	.581	0	14
Any Soc. Sci. Cit.	5,132	.059	.222	0	1
Legal Citations	5,132	.328	1.016	0	16
Any Legal Cit.	5,132	.169	.375	0	1
<u>Expert Testimony</u>					
Expert	5,132	.168	.374	0	1
<u>Case In- and Out-Citations</u>					
Citing Outside Jurisdiction (out-cite)	5,132	2.537	6.888	0	171
Cited Outside Jurisdiction (in-cite)	5,132	1.358	4.346	0	95
Cited by Judges (in-cite)	5,132	33.736	127.29	0	4755
Cited by Secondary Sources (in-cite)	5,132	12.362	18.936	0	398

* For a complete description of each variable, see Appendix B.

Citations were coded only if they fell into one of these two groups, so that other materials such as dictionaries, governmental reports, judicial guidelines, int'l treaties, fictional sources, news articles, amicus briefs, or congressional reports, were not coded as SSC. While some of the above do subscribe to the definition of Extra-Legal knowledge, they were excluded as they clearly provide little value and insight to the deposition of a case (for instance, Family Judges are very fond of Tolstoy's observation on the similarities of happy families and the dissimilarities of unhappy families, in "Anna Karenina"). Other sources cannot be said to be extra-legal, if they originate in the legal system or the court system. Thus, judicial guidelines or legislative history are all well-established judicial tools. Additionally, various principles (or drafts thereof) generated by the ALI, as well as the Restatements, were not considered as SSC. The concern raised with these sources was their proximity to the court system and their status as quasi-legal documents. Finally, though Amici Curiae ought to be thought of as extra-legal knowledge, the pilot study revealed that a reliable account of their existence in the case record could not be verified. A complete list of excluded materials can be found in Appendix A.

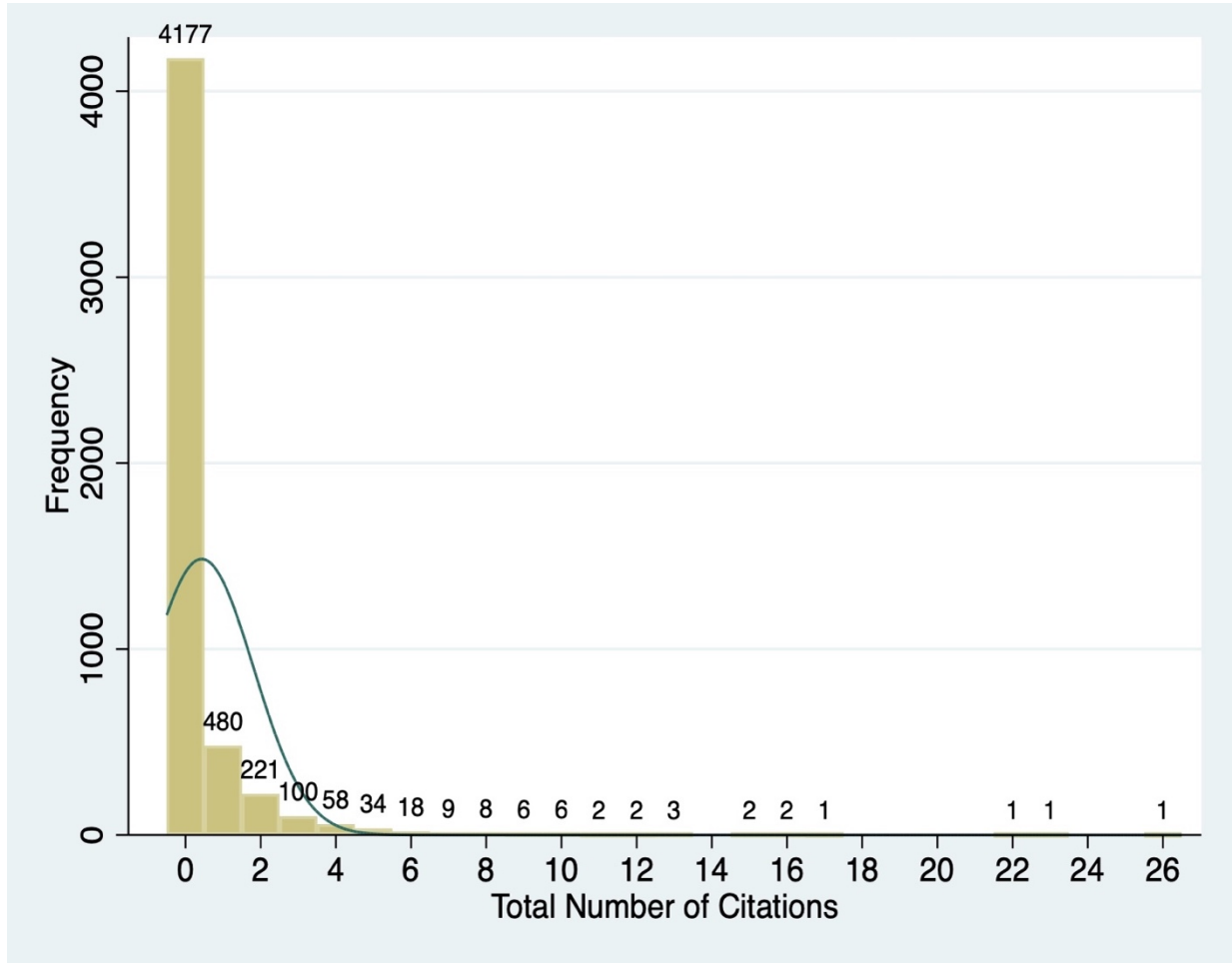
METHODS

To test the hypotheses set out above, four primary methods are used, each to slightly different ends, but overlapping to a degree that will ensure robust empirical evidence. First, longitudinal analysis shall be employed, utilizing a negative binomial function. As can be seen below in Figure 3.2, the distribution of SSC is heavily right skewed exhibiting many "0" observations (only 18.6% of observations had any SSC), which is often the case for count data, such as the data collected for the dependent variables studied here. Moreover, the standard deviation is much greater than the mean for the dependent variable of total citations (mean=0.43,

std. dev.=1.38). Together this suggests that a negative binomial distribution is most appropriate for analysis.³⁰ Similar studies in the field have employed regressions based on a negative binomial distribution as well (Berlemann and Christmann 2020). Additionally, as negative binomial is ideal for count data that is over dispersed (as is the case with SSC), analysis may provide a more nuanced understanding of the relationship between SSC and the contemplated predictors. In other words, if SSC serve as a signal for the influence of extra-legal knowledge, and it is already quite difficult to measure how much or whether SSC associated with particular outcomes (Rublin 2011; Petherbridge and Schwartz 2012), more signal (i.e., more SSC) serves as a stronger proxy for extra-legal knowledge. Thus, estimation of predictors extends to observations with more SSC, such that a continuous relationship between signal strength and outcomes can be studied, and observations sporting weak vs. strong signals can be distinguished.

³⁰ While these count data exhibit a particularly high frequency of “0” observations, these data are nevertheless not appropriate for ‘Zero Inflated Negative Binomial’ regression, as this method is underpinned by the assumption that the “0” observations can be differentiated into two distinct categories, where one category (typically the largest category) is comprised of observations that had a probability of one (or extremely high probability) of yielding a “0” observation. For instance, if respondents are asked how many times they have visited the doctor in the past year, many of the observations will yield a “0” response; however, of these “0” observations, a portion would include respondents who have no medical insurance and are therefore very unlikely to have visited a doctor under any circumstance (compared to other “0” observations, who simply were not sick). As applied to the data explored here, no such distinction can be made, such that every case examined theoretically had an equal underlying probability of yielding a “0” observation – this is another reason that the sample includes only reported cases. A ‘Zero-Truncated’ is wholly inappropriate as well, for it models data in which a “0” observation cannot occur.

Figure 3.2: Distribution of Total SSC (n=5,132)



The data exhibit a great deal of inter- and intra-state heterogeneity in citation patterns, adjudication outcomes, and stylistic differences. Figure 3.2 illustrates the rich variance among states’ use of SSC over the 26 years sampled; each line represents a different state, and it is quite evident from the colorful blur that there is both inter-state variance, and intra-state variance over time. Other indicators vary as well; for instance, footnotes are a unique literary tool used by judges and scholars alike (Balkin 1989), in very dissimilar manners and styles (Becker 1996), though they often become depositories of SSC (Acker 1990).³¹ This can also be observed for

³¹ The data show that while the mean number of footnotes per observation is 5.64, the standard deviation is almost twice that, 10.52, indicating a wild and varied dispersion among states (e.g., DE, DC, and MA exhibit 32.19, 18.95,

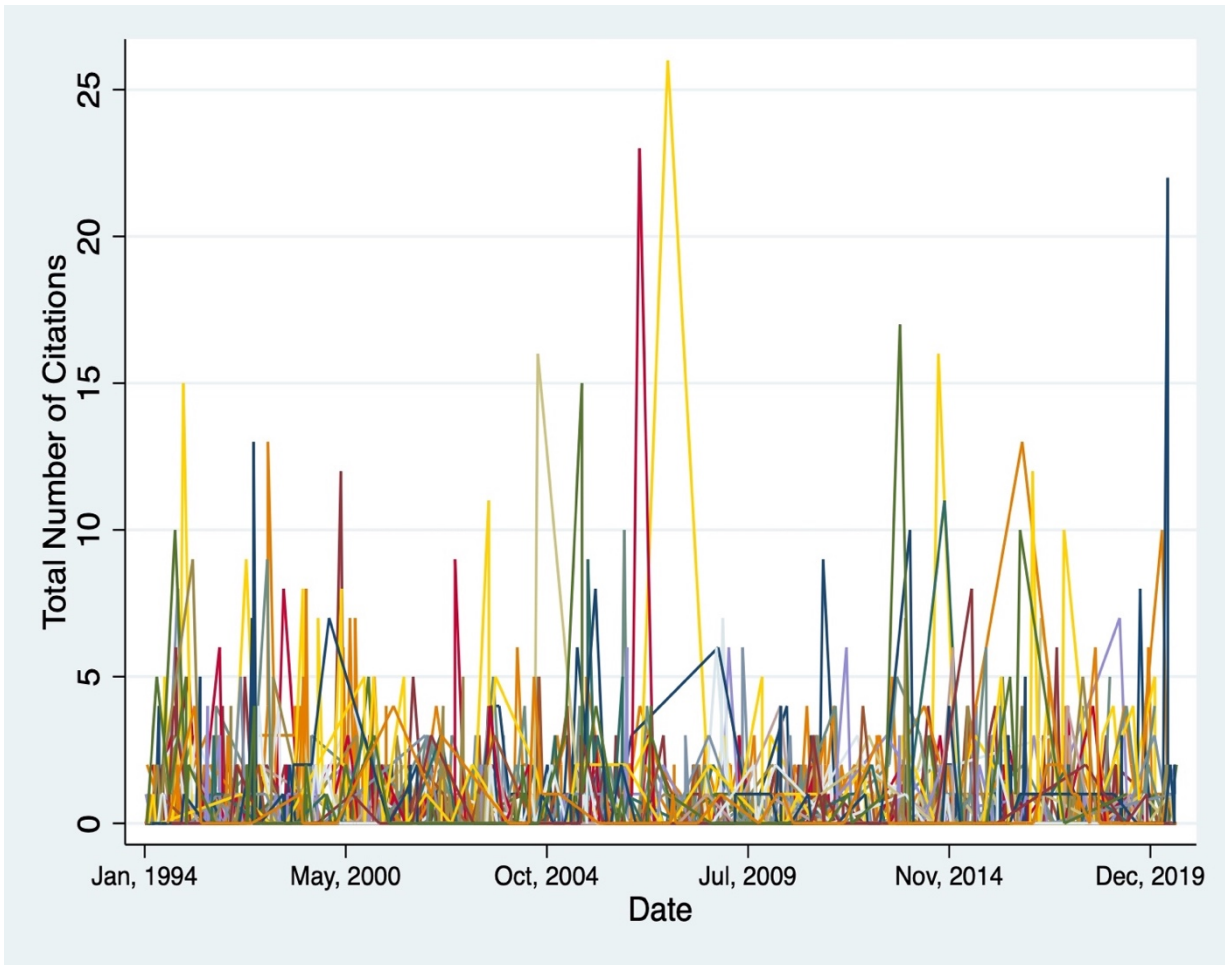
variables such as case outcomes (e.g., judges in some states, on average, dissent at a higher rate), organizational constraints (e.g., some states exhibit higher judicial caseloads), and the average features of the case adjudicated (e.g., the average complexity of cases - a combination of pages, legal authorities cited, and Westlaw headnotes – varies wildly among states; e.g., compare OR’s mean case complexity, 27.59, to the mean case complexity in MD, 74.75).

To accommodate for inter-state heterogeneity in citation patterns, adjudication outcomes, and stylistic differences, I employ a Random-Effects Negative Binomial regression (Naznin et al 2016), coupled with a group-mean centering of continuous independent variables (Bell, Jones and Fairbrother 2018). This model allows for inclusion and estimation of time-invariant predictors (see Descriptive Statistics), modeling a constant over-dispersion of the dependent variable count data (citations) though this dispersion varies randomly between states (where the inverse of $1 + \text{dispersion}$ exhibits a Beta(r, s) distribution). Additionally, stylistic and other differences relating to drafting opinions, citing, and complexity of litigation, on average, are group-mean centered, such that these variables are standardized on the basis of each state’s sample mean (rather than the entire sample mean). Thus, group mean centering places dissimilar states on a comparable scale so as to eschew potential biases built-in to the data due to features such as state size, style, and other unobservable factors.³²

and 14.68 footnotes per case, respectively, while ND, NH, and KS all exhibit fewer than 1 footnote per case on average), and judges (e.g., the number of footnotes used by Utah jags ranges from 0 to 255, for a mean of 12.13 footnotes per case, and a standard deviation of 31.84). While footnotes are not modeled in the analyses, they are nevertheless given here as an example for the marked variance in styles between and within jurisdictions.

³² For instance, observations in larger states (e.g., TX, CA, NY) may exhibit a higher absolute number of both in- and out-citations, as the supply thereof is much larger than it is in smaller states (DE, RI, SD). By group-mean centering, the data reflect a more equivalent status of observations (for instance, a highly cited case in CA may include 100 in-citations, whereas a highly cited case in RI may include 10 in-citations). Thus, group-mean centering adjusts not only for state size, but also for stylistic differences and practices within a jurisdiction.

Figure 3.3: Total Number of Citations, Per state, By Year



Second, logistic regression is employed to examine the relationship between expert testimony and SSC as they relate to the introduction of extra-legal knowledge into courts. As the variable used here to capture expert testimony is a binary measure of whether or not it entered judges' opinions, a Random-Effects Logistic Regression (RELR) is appropriate (Larsen et al 2000). Similar to the RENB employed to explore SSC, the RELR will include the same predictors, a random effects component to model state individual effects (allowed to vary by state, assuming a normal distribution with mean=0, and group-mean centering where necessary). As the dependent variable (expert testimony) is binary rather than count data, there is no over-dispersion, as was observed for SSC.

Third, Spatially Constrained Hierarchical Cluster Analysis and Spatial Autocorrelation are tested. As the data are distributed across the lower 48 states and the district of Columbia, they are geographically contiguous, so that spatial patterns and clusters can be detected (Anselin and Ray, eds. 2010). This part of the analysis explores two different, by empirically related aspects. First, whether certain states introduce extra-legal knowledge via traditional legal citations, classical social science citations, and expert testimony in predictable patterns. In other words, do different states balance between the three aforementioned sources in disparate manners? Second, should states join to form clusters in which a similar balance between the three sources is found to be empirically distinct, this analysis examines whether the clusters found are spatially homogeneous, i.e., form geographic patterns with respect to the introduction of extra-legal knowledge. Due to the nature of the inquiry and the unit of observation (states), the most appropriate type of weight is a queen contiguity weight; analysis incorporates both first- and second-order queen contiguity weights.

MODEL SPECIFICATION

The Random-Effects Negative Binomial regression (RENB) model utilized for analysis is specified as:

$$E(SSC_{ijt}) = \exp(\beta_0 + \beta_1 X_{ijt} + \beta_2 X_{ij} + \alpha_i + \varepsilon_{ijt})$$

Where $E(SSC_{it})$ is the predicted number of social science citations (broadly defined to include both traditional legal citations, as well as classical social scientific citations, as set out supra), for observation i , in jurisdiction j , at time t , reported as Incidence-Rate Ratios (IRR); β_0 is the constant term (note the absence of the sub-script, indicating that the constant term is not allowed

to vary individually for each state); X_{ijt} represents the time-varying independent variables for observation i , in jurisdiction j , at time t ; X_{ij} represents the time-unvarying independent variables for observation i in jurisdiction j ; β_1 indicates the vector estimation of the time-varying predictors; β_2 indicates the vector estimation of the time-unvarying predictors; α_i represents the un-observed individual random effect for jurisdiction i ; and ε_{ijt} is the residual error term. The over-dispersion ($\exp(\alpha_i)$) follows a gamma distribution (mean=1, var= α_i), so that α_i represents the over-dispersion parameter, which is allowed to vary in the RENB model between jurisdictions (Yirga 2020; Nanzin et al, 2016), with the assumption that the inverse of $(1+\alpha_i)$ follows a Beta (r, s) distribution. Due to state heterogeneity combined with the structure of the data (panel data), fixed and random effects models were tested with respect to state variation in the primary dependent variable (SSC). Following a Hausman test ($\chi^2(16)= 11.57, p > \chi^2=0.77$), inter-state variation was found to be significant, so that a random effects model was more appropriate than a fixed effects model.

The Random-Effects Logistic Regression (RELR) model utilized for analysis is specified

as:

$$\begin{aligned} \text{Prob}(\text{Expert}_{ijt}=1|\pi_{ijt}) &= \phi_{ijt}, \\ \log[\phi_{ijt}/(1 - \phi_{ijt})] &= \eta_{ijt}, \\ \eta_{ijt} &= \pi_0 + \pi_1 X_{ijt} + \pi_2 X_{ij} + \alpha_i + \varepsilon_{ijt} \end{aligned}$$

Where η_{ijt} is the probability that a judge will use an expert's testimony to argue her opinion, for observation i , in jurisdiction j , at time t , reported as Odds Ratios (OR); π_0 is the constant term (note the absence of the sub-script, indicating that the constant term is not allowed to vary individually for each state); X_{ijt} represents the time-varying independent variables for

observation i , in jurisdiction j , at time t ; X_{ij} represents the time-unvarying independent variables for observation i , in jurisdiction j ; π_1 indicates the vector estimation of the time-varying predictors; π_2 indicates the vector estimation of the time-unvarying predictors; α_i represents the un-observed individual random effect for jurisdiction i ; and ε_{it} is the residual error term. The Odds Ratio is a random variable (not a fixed estimate), normally distributed with mean=0 and var=1.

Hierarchical Cluster Analysis (HCA) is different from regression analysis, and ultimately relies on the notion that social events and processes are distributed in space (Abbott 1997), but not randomly (Abbott 2001; Ragin 1987). In more concrete terms, HCA scours a dataset to search for similarities among the features or attributes within groups of observations (Garip 2012). As applied to this project, HCA is employed to determine whether the manner in which each state utilizes extra-legal sources (scientific citations, legal citations, and experts) is similar or dissimilar to other states, such that clusters, or groups of states – utilizing a similar balance of extra-legal sources – can be identified. Any particular balance of extra-legal sources can be thought of as a different ‘mode’ of knowledge processing. Thus, similarity of modes within a cluster will be high, while dissimilarity of modes between clusters will be high as well.

Local Spatial Autocorrelation is specified as:

$$I_i = (z_i / m_2) \sum_j w_{ij} z_j,$$

$$m_2 = \sum_i z_i^2,$$

$$I_i = (1/m_2) z_i \sum_j w_{ij} z_j$$

Where I_i represents the test statistic ‘Moran’s I ’ for local observation i , where the unit of analysis is the state level; $z_i \sum_j$ indicates the deviation from the mean of observations for all jurisdictions; w_{ij} indicates the weight selected for observation i in jurisdiction j ; and z_j indicates the deviation

from the mean for jurisdiction j . In other words, this computation tests whether a variable is correlated with itself in space. Thus, this computation determines how much a jurisdiction's variable deviates from the mean of its neighbors (which are determined by weight selection), to reveal whether neighboring jurisdictions exhibit similar means compared to the relevant surrounding jurisdictions, and whether this similarity is significant (i.e., more likely to be non-random than not).

Finally, by coupling HCA and spatial autocorrelation, analysis can further uncover whether clusters of modes – if identified – exhibit statistically significant spatial patterns, i.e., whether we can reject the null hypothesis of spatial randomness, as it pertains to modes of knowledge and not simply to particular variables as tested with Local Spatial Autocorrelation.

Results

Table 3.5: RENB Regression Results – Total Citations, Traditional Legal Citations, and Classical Social Scientific Citations

Variable	Total SSC IRR (z-Score)	Trad. Legal IRR (z-Score)	Class. SS IRR (z-Score)
<u>Time-Invariant</u>			
Frye (1=yes)	1.16 (.70)	1.117 (0.42)	.86 (-.53)
Maverick (1=yes)	1.148 (0.48)	1.388 (.92)	.524 (-1.52)
Logged Caseload	.647 (-3.56)***	.616 (-3.32)***	.969 (-.19)
Political Orientation	1.094 (4.19)***	1.086 (3.27)***	1.171 (5.43)***
Community Property (1=yes)	2.260 (5.06)***	2.738 (4.85)***	1.121 (.51)
Logged Population Size	.989 (-.14)	.986 (-.33)	.783 (-2.15)*
<u>Time-Varying</u>			
Date	.9999 (-.96)	.9999 (-1.14)	.9999 (-.95)
Supreme Court (1=yes)	1.37 (3.63)***	1.327 (3.06)***	1.347 (1.77)†
Expert (1=yes)	.748 (-3.42)***	.75 (-3.2)***	.809 (-1.29)
Change in Status Quo (1=yes)	1.34 (4.55)***	1.315 (4.07)***	1.494 (2.98)**
Dissent (1=yes)	1.738 (7.16)***	1.681 (6.34)***	1.99 (4.75)***
Concurrence (1=yes)	1.435 (4.53)***	1.408 (4.06)***	1.316 (1.75)†
Case Complexity ^a	1.315 (11.25)***	1.323 (10.97)***	1.319 (5.54)***
Citing Outside Jurisdiction ^{a, b}	1.252 (8.25)***	1.253 (7.80)***	1.285 (4.77)***
Cited Outside Jurisdiction ^{a, b}	1.131 (3.39)***	1.136 (3.33)***	1.116 (1.58)
Cited by Future Judges ^{a, c}	1.073 (3.05)**	1.069 (2.67)**	1.085 (1.83)†
Cited by Secondary Sources ^{a, c}	1.098 (3.56)***	1.097 (3.28)***	1.152 (2.98)**
Type of Law (BI=ref. group)			
NA	1.121 (1.06)	1.379 (2.97)**	.268 (-3.63)***

Table 3.5: RENB Regression Results (Continued)

PPP	1.464 (3.33)***	1.413 (2.81)**	1.324 (1.13)
<u>Interactions</u>			
Citing Outside Jurisdiction ^{a, b}			
NA	.982 (-.031)	.959 (-.69)	1.347 (2.44)*
PPP	.965 (-.47)	.98 (-.24)	.96 (-.27)
Cited Outside Jurisdiction ^{a, b}			
NA	.937 (-1.04)	.924 (-1.24)	.84 (-.95)
PPP	1.05 (.71)	1.038 (.44)	1.236 (1.54)
Cited by Future Judges ^{a, c}			
NA	1.0 (0.04)	1.058 (.49)	.527 (-1.58)
PPP	.924 (-.99)	.967 (-.42)	.743 (-.146)
Cited by Secondary Sources ^{a, c}			
NA	1.061 (0.97)	1.04 (.61)	1.243 (1.59)
PPP	.968 (-.60)	.94 (-1.03)	1.0 (.07)
Obs.	5,132	5,132	5,132
Wald χ^2 (p-value)	1,629.4 (>.000)	1,402.53 (>.000)	542.88 (>.000)
Log Likelihood	-	-2,876.82	-1,161.568
LR Test vs. Pooled (p-value)	3,278.631 203.81 (>.000)	209.0 (>.000)	20.67 (>.000)
Number of Groups	49	49	49
r	4.124	4.439	5.214
s	4.643	3.177	6.15

† p<0.1, * p<0.05,** p<0.01,*** p<0.001

^a Group-Mean Standardized

^b This variable was adjusted for total number of citations to reflect a ratio: the number of in- or out-citations made outside the jurisdiction, divided by the total number of citations. Example: if a case was cited outside the jurisdiction 10 times, and cited in toto 50 times by future judges, the ratio is 10/50=1/5 or 0.2 This ratio was used to adjust for a citation inflation observed in larger jurisdictions.

^c This variable was adjusted for time to reflect number of citations per year. This adjustment was made to avoid inflated citation numbers attributed to older cases (which potentially have a greater opportunity to be cited).

The results presented will follow the structure of the hypotheses set out above. First, as is evident in Table 3.5, the uncertainty imbedded within an observation associates significantly with more SSC. This is supported by the strong evidence showing that case complexity (one of the two proxies for uncertainty) is positively associated with all citation types, as well as with the use of expert testimony. Thus, a 1-unit increase in case complexity corresponds to an increased probability of SSC, by a factor of 1.3. As complexity is group-mean centered, a 1-unit increase equals 1 standard deviation, which is equivalent to approx. 28.3 additional pages, Westlaw headnotes or legal authorities cited, or any combination thereof equaling 28.3. Thus, an additional 10 pages added to a case corresponds roughly to an increase in the incidence of SSC of 10%. The IRRs for traditional legal and classical scientific citations are similar, 1.32 and 1.31, respectively. Similarly, results in Table 3.7 show that for a 1-unit increase in case complexity, the odds that an expert's opinion will be used by a judge increase by a factor of 1.54.

Table 3.6 provides further evidence linking uncertainty to SSC, illustrating how each of the legal issues makes use of extra-legal knowledge. The first glaring result is how much more inviting PPP – designated above as an active rule – is of citations of any kind. The mean level of SSC equals almost 1 SSC per case, which is significantly higher than the mean levels for BI and NAs. Indeed, PPP also exhibits significantly higher levels of both traditional legal and classical scientific citations, compared to BI and NAs. This finding suggests that an active legal rule, where doctrine is still being shaped, requires more extra-legal input. The difference between BI and NA is not as clear-cut. The total number of SSC are not significantly different for BI and NAs, however, when broken down into the legal and scientific categories, the data show that both differences in mean levels are significant. Thus, NAs invite more Traditional Legal Citations, while BI exhibits more purely scientific citations.

Table 3.6: Means Comparison – Total Citations, Traditional Legal Citations, and Classical Social Scientific Citations

Variable	BI	NA	PPP	Diff:*	Diff:*	Diff:*
	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	BI – NA (t-statistic)	BI – PPP (t-statistic)	NA – PPP (t-statistic)
SSC	.396 (1.366)	.401 (1.126)	.951 (1.377)	-.031 (-.882)	-.555 (-4.956)***	-.550 (-4.707)***
Trad. Legal	.292 (.978)	.363 (.99)	.708 (1.442)	-.071 (-1.854)*	-.415 (-5.056)***	-.344 (-3.9140)***
Class. SS	.104 (.573)	.037 (.298)	.244 (1.038)	.066 (4.766)***	-.14 (-2.334)***	-.205 (-3.428)***
Expert	.194 (.396)	.061 (.24)	.094 (.293)	.133 (12.618)***	.10 (5.637)***	-.033 (-1.75)*
Obs.	4,026	798	308	--	--	--

† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

* Conducted using two-sample t-test with unequal variance for each of BI, NA and PPP paired together to test differences in each of the outcomes described above.

This might be explained by the subject matter, where NAs – similar (or identical) to contracts (Hasday 2014; Grossman and Friedman 2011) – call upon sources that are closer to the legal system (though still external, not binding), whereas BI involves many considerations that are inherently tied to the vagaries of family life (Mnookin 1975), requiring a different type of expertise.³³ Thus, the results support Hypothesis I-A regarding the uncertainty of a case: utilizing

³³ It is here that a reader may question whether this difference in subject matter does not take precedence over the contemplated proxy for uncertainty, i.e., active or dormant status. This is a fine and justified question that will receive more attention below in the discussion section, but suffice it to say that the data employed in this project are not sufficient to determine which of the effects is greater. In other words, these analyses are unable to hold constant the subject matter of the legal issue and isolate the effects of active or dormant status. To do so, many more legal issues will need to be added to the dataset, which is a good avenue for future research.

the complexity of a case and the status of the legal issue being adjudicated (how well formed is doctrine) as proxies for the level of uncertainty embedded in a case, the data show that, all else held equal, the level of uncertainty is positively and significantly associated with the level of extra-legal knowledge introduced.

Table 3.7: RELR Results for Expert

Variable	Expert OR (z-Score)
<u>Time-Invariant</u>	
Frye (1=yes)	1.166 (0.51)
Maverick (1=yes)	.599 (-1.37)
Logged Caseload	.886 (-0.73)
Political Orientation	1.042 (1.46)
Community Property (1=yes)	1.654 (2.34)*
Logged Population Size	.837 (-1.81)†
<u>Time-Varying</u>	
Date	.9999 (-0.68)
Supreme Court (1=yes)	.798 (-1.77)†
Class SS	.851 (-3.0)***
Trad. Legal	.853 (-3.06)***
Change in Status Quo (1=yes)	.745 (-3.51)***
Dissent (1=yes)	1.048 (0.38)
Concurrence (1=yes)	.884 (-0.93)
Case Complexity ^a	1.538 (8.97)***
Citing Outside Jurisdiction ^{a, b}	.922 (-1.69)†
Cited Outside Jurisdiction ^{a, b}	1.085

Table 3.7: RELR Result for Expert (Continued)

Cited by Future Judges ^{a, c}	(1.77)† 1.254 (6.28)***
Cited by Secondary Sources ^{a, c}	.945 (-1.14)
Type of Law (BI=ref. group)	
NA	.283 (-7.73)***
PPP	.343 (-4.96)***
Obs.	5,132
Wald χ^2 (p-value)	259.48 (>.000)
Log Likelihood	-2108.944
LR Test of rho=0 (p-value)	64.35 (>.000)
Number of Groups	49
sigma_u	.481
rho	.066

† p<0.1, * p<0.05,** p<0.01,*** p<0.001

^a Group-Mean Standardized

^b This variable was adjusted for total number of citations to reflect a ratio: the number of in- or out-citations made outside the jurisdiction, divided by the total number of citations. Example: if a case was cited outside the jurisdiction 10 times, and cited in toto 50 times by future judges, the ratio is 10/50=1/5 or 0.2. If a case cited 5 cases outside the jurisdiction, and cited 20 cases in toto, the ratio is 5/20=1/4 or 0.25. This ratio was used to adjust for a citation inflation observed in larger jurisdictions.

^c This variable was adjusted for time to reflect number of citations per year. Thus, if a 2015 case was cited 10 times, the adjusted figure would be: 10/(2020-2015)=2, meaning this case was cited 2.0 times per year. This adjustment was made to avoid inflated citation numbers attributed to older cases (which potentially have a greater opportunity to be cited).

The results also provide evidence to support Hypothesis I-B, resource dependency. The highest tribunal in a state (a dummy variable identified as Supreme Court) typically has more resources when adjudicating a case (Sheehan, Mishler and Songer 1992; Songer and Sheehan, 1993), and therefore it was hypothesized (I-B.1) that such observations shall exhibit a significantly higher level of SSC. The IRR for the Supreme Court Dummy indicates that cases adjudicated in the highest tribunal will invite more SSC by a factor of 1.37 (similar factor for traditional legal and classic scientific citations), meaning that the ascension of a case to the

highest tribunal is associated with approx. 1/3 more SSC, compared to lower level appellate courts, holding all else equal.

Additionally, the caseload judges experience associates negatively with SSC, such that greater caseloads, and thus fewer resources spread across more cases, are associated with a decrease in SSC by a factor of about 0.65. In other words, when a court is busy, it tends to be less inviting of SSC. While the factor for traditional legal citations presents a similar IRR (in size and significance), the association between caseload and classical scientific citations is insignificant, suggesting that such sources are cited regardless of work volume. A similar finding applies to the use of expert testimony, where the association is insignificant as well. One possible explanation for this finding relates to the necessity of scientific evidence and/or expert testimony, which goes to the heart of this project: at times, judges face questions and quandaries that are not answered by their traditional tools of adjudication, but are nevertheless require an answer to dispose of the case. A second possible explanation relates to the nature of the data collected: though caseloads are a time-varying variable, they are modeled here as a time-fixed variable, so that more variation in the data may have yielded different results.³⁴

Hypothesis II examines the case-specific outcomes of SSC, or in other words it is an examination of what differentiates cases that cite social science from cases that do not. So far, results have supported hypotheses I and II, so that cases citing social science are more complex, involve legal issues in which doctrine is still being shaped (and to a lesser extent, involve standards rather than rules), and are more likely to appear in higher tribunals and courts with lessened caseloads. Case-specific outcomes present another line of inquiry that can be interrogated with these data in further differentiating between cases with SSC, and cases without.

³⁴ A snapshot of caseloads was taken in 2008 for each jurisdiction, and applied to all observations for that jurisdiction; this limitation was imposed due to the availability of data.

The most obvious result is that all of Dissent, Concurrence, and Change in Status Quo associate positively and significantly with SSC, traditional legal citations and classical scientific citations. As all three of these case outcomes are binary in measurement, the IRR indicates the factor change in SSC for cases with or without the said outcome. For instance, in cases where a dissenting opinion has been authored, SSC increase by a factor of 1.73. A concurring opinion increases SSC by a factor of 1.43, and if the disposition of the cases results in a change in the status quo upon hearing the case, SSC increases by a factor of 1.33. Similarly, significant findings are produced for traditional legal and classical scientific citations. Together, these findings suggest (once more) that SSC are utilized by judges, at minimum, as a tool to alleviate complexity or uncertainty (as suggested in Hypothesis I), but that at maximum, are a cardinal component of legal change. Put differently, such a strong and positive association between SSC and the said case outcomes provides prima facie evidence that precedent and judge-made law are inherently linked to, and even dependent upon, extra-legal knowledge. Furthermore, these results support Hypothesis II.1, but actually reject Hypothesis II.3, as both traditional legal and scientific citations co-locate with all three case outcomes in similar size and direction (while it is true that the IRR for Change in Status Quo is slightly higher for scientific citations, and the IRR for Concurrence is slightly higher for traditional legal citations – as is contemplated in Hypothesis II.3 – these differences are less than impressive).

The remaining component of Hypothesis II is also supported by the data, as judges do indeed cite traditional legal sources more and more often than classical scientific sources. Across the entire sample, scientific sources are cited at a rate of 0.102 per case, while traditional legal sources are cited at a rate of 0.328 per case. This difference (0.226) is significant ($t= 13.854$, $p\text{-value}<0.000$). Thus, when total citations (SSC) are broken down into the two mutually exclusive

categories described above, results unequivocally show that judges are three times more inviting of legal sources over scientific sources. The reasoning behind this finding set out above is couched in terms of diminished search costs and judges' natural homophilic tendencies to knock on doors they have already opened in the past. A similar argument was made by Sirico (2000: 1011). However, it may also be the case that the raw data presented in traditional legal sources is simply more relevant and helpful to judges, in which case, the nature of the legal issue adjudicated may be insightful.³⁵ Even so, and regardless of the underlying cause driving judges to look to legal sources more often than scientific ones, this finding may implicate the knowledge system as a whole and present in the form of predictable structural patterns.

Hypothesis III further interrogates findings implicating the knowledge system as a whole, to identify some of the aforementioned potential structural patterns. Another layer to the differentiation of cases with and without SSC relates to the question of how these cases are received within the greater court system, i.e., its knowledge network. Hypothesis III.1 particularly tests the in- and out-citation patterns of SSC cases. Table 5 reports the results for the four variables that try to capture the system-wide citation practices. First, results show that when judges make use of SSC, they are also more likely to cite legal authorities outside their jurisdiction. The association is positive and significant across all three sources, presenting a factor of approx. 1.25.³⁶ Second, Table 5 indicates that the reverse is true as well: when judges

³⁵ Arguments can be made for or against this proposition based on the results presented in Table 6. On the one hand, the legal issue most closely linked to traditional legal sources – NAs, due to their link to Contract Law – does exhibit the lowest mean of scientific citations, followed by BI (dormant standard), then PPP (active rule). On the other hand, PPP, which is closely linked to scientific sources due to the centrality of the psychotherapist-patient relationship, still exhibits the highest mean of citations to traditional legal sources. Thus, it is difficult to isolate the effects of legal subject matter from activity status. Either way, the results clearly show that judges' have an overt tendency to seek insight and guidance from traditional legal sources rather than scientific citations.

³⁶ As judges cite more applicable caselaw outside their jurisdiction, they also cite more SSC: a 1-unit increase in the ratio between legal authorities cited outside the jurisdiction to the legal authorities cited inside the jurisdiction (as this variable is group-mean centered, a 1-unit increase is equivalent to a 0.177 increase in the ratio) associates with an increase in SSC by a factor of 1.25.

make use of SSC, their opinion is more likely to be cited outside their jurisdiction by future judges. This association is significant and positive for SSC and legal sources (IRR~1.13) but not for scientific sources.³⁷ Together these two variables examine the depth of penetration of SSC cases, showing that compared to non-SSC cases, they reach deeper into the knowledge network: when a judge searches deeper into the network to find applicable caselaw, she is also more likely to call upon extra-legal sources; and when she does so, her opinion is more likely to penetrate deeper into the network as well, as it is being cited in more future cases outside her jurisdiction.

Table 3.5 is instructive with regards to the width of penetration as well: the volume of incitations of SSC cases is positively and significantly associated with the use of SSC. This is true of two citing sources – judges (future caselaw) and secondary sources. Thus, cases citing both scientific sources and traditional legal sources are themselves cited more often (compared to non-SSC cases) in the future by judges and authors. Moreover, as can be seen in the “Interactions” panel, this finding holds constant across all three legal issues examined, but for one exception: cases adjudicating NAs which cite scientific sources are significantly more likely to be cited outside the originating jurisdiction, compared to BI and PPP cases citing scientific sources. This finding is logical, as scientific citations in NA cases are quite rare (a rate of 3.7%), it may be that when such a citation is made, foreign jurisdictions are quick to take notice of said case.

Hypotheses III.2 and III.3 are set up to be competing hypotheses, seeking to test whether there is an association between SSC and expert testimony, and if so, what direction this association exhibits. Tables 3.5 and 3.7 indicate that this association does exist, and that it is a

³⁷ A case citing legal sources is associated with an increase in the ratio of citations by future judges outside their jurisdiction to citations by future judges inside their jurisdiction, by a factor of 1.13. Thus, a 1-unit increase in the said ratio (equivalent to a 0.167 rise in the ratio) associates with roughly 13% more SSC and 13.6% traditional legal citations.

negative one, supporting Hypothesis III.3 – the competing view. Thus, the testimony of an expert (when used by a judge) acts as a substitute for traditional legal citations, such that the use of expert testimony associates by a decrease in citation of legal sources by a factor of 0.75 (roughly 25% fewer citations when expert testimony observed). In Table 3.7, employing a RELR with expert testimony as the dependent variable, the association remains significant and negative with an odds ratio of 0.85. With respect to citation to scientific sources, Table 3.5 returns an insignificant IRR, but Table 3.7 reports a significant odds ratio of 0.85, indicating a negative association between scientific sources and the use of expert testimony. This may be an artifact of how each of the models (RENB and RELR) allows the random effects to vary, and the use of the dispersion parameter (itself a random parameter). Nevertheless, it appears that the use of expert testimony has a chilling effect on the use of SSC. Perhaps this can be explained in terms of efficiency and expediency, so that when an expert has furnished her opinion to the court, incurring search costs to find relevant SSC becomes redundant.^{38, 39, 40}

³⁸ An expert testifying for either of the litigating parties may be met with an exhaustive cross-examination which may include citation to legal and scientific sources; note however, that these citations need not be used by the judge in her opinion.

³⁹ A second possible explanation relates to one of the important inherent differences between a citation and an expert testimony: while the former is typically general and unrelated to the specific case being litigated, the latter usually applies more directly to the facts and circumstances relevant to the specific case being decided. This further suggests that there may be different classes of problems that judges face when they seek extra-legal aid in disposing a case. Illuminating in this respect is the differentiation between “adjudicative” and “legislative” set out by Davis (1942), as well as the different functions ascribed to the use of SSC by Monahan and Walker (1991; 1988). Thus, it may be that the use of one source of citation or another does not correspond cleanly to adjudicative or legislative, but that each of these types of facts enlist either of citations or expert testimony. This is a falsifiable question, and another potential avenue for future research.

⁴⁰ Table 3.7 includes additional results that merit brief reporting here. First, the association between the use of expert testimony and the level of tribunal is negative. Naturally, the highest tribunal very rarely admits expert testimony directly, but there is no reason to believe that cases ascending to the highest tribunal are inherently less likely to include an expert’s testimony on the record. Remember that this variable was coded to reflect the use of an expert’s testimony in an authoring judge’s opinion, regardless of whether the testimony was on record or presented directly to the judge. This may suggest that cases rising to the highest tribunal are associated with a more meager use of expert testimony because they are of a more general nature – that these cases were reviewed by the highest tribunal precisely because of their potential application to future caselaw. Second, both Tables 3.5 and 3.7 report insignificant results for Frye and Maverick jurisdictions. Initially, this would seem relevant only for the examination of experts (as this is one of the main differences among the Frye, Daubert and Maverick), but as the use of expert testimony clearly implicates the use of SSC – serving as a competing force – the choice of evidentiary standard also

Hypothesis III.4 entails spatial analysis, seeking to reject the null hypothesis of spatial randomness in the distribution of the dependent variables, as well as examines the possibility of clustering (spatially constrained and multivariate) of different modes of knowledge processing as they relate to extra-legal knowledge. Appendix C includes 3 maps depicting the spatial distribution of Scientific Citations (classical social scientific), Legal Citations (traditional legal), and Expert Testimony. A hurried glance may imply a pattern in at least one of the maps, but a series of Global Univariate Moran's I tests reveal that the data are distributed randomly in space for all three variables (pseudo p-values of 0.34 for scientific citations, 0.29 for legal citations, and 0.058 for expert testimony).⁴¹ Furthermore, as the mode of computation for Global Moran's I differs from the computation for Local Moran's I (Anselin and Ray, eds. 2010), where the former tests whether data are randomly distributed in a defined group of areal units (in this instance, the lower 48 states and the District of Columbia), the latter detects the significant

implicates the use of SSC. Third, while complexity positively associated with expert testimony, caseloads do not (similar to scientific citations), raising once more the possibility that certain applications of extra-legal knowledge are necessitated. Fourth, expert testimony associates significantly only with a Change in Status Quo (but not Dissent or Concurrence), and this association is negative – meaning that when a judge uses an expert's testimony in her opinion, a change in status quo is less likely. This is a logical result, as typically a judge's use of expert testimony is made from the record of the previous lower tribunal where the testimony was given; thus, if the judge harkens back to the arguments made by the lower court, it seems plausible that no change will be made to the status quo. Fifth, on the in- and out-citation patterns of cases with expert testimony, results show that more likely to be cited outside the originating jurisdiction, and more likely to be cited in future cases (but no significant results for citing outside the jurisdiction or citations made by secondary sources). This finding suggests that expert testimony can answer particular questions that reverberate throughout the network, so that judges wishing to expedite disposition, can look to see if such a particular question has been answered by an expert before (e.g., the opinion of a mental health expert testifying that a parent diagnosed with bi-polar disorder is not categorically unfit to gain partial custody of their children). As such particular questions are typically narrower in application, it is not surprising that cases with expert testimony are not cited more often by secondary sources, nor that the case in which the expert is testifying cites fewer legal authorities outside the jurisdiction – as the expert is providing an answer to the particular quandary raised. Finally, note the bottom of Table 3.7, reporting on the values of σ_u (=0.481) and ρ (=0.066). The first is a measure of the interclass correlation, i.e., what part of the variance is explained by random effects varying across jurisdictions. The second measures the intraclass correlation, i.e., the degree of variance captured within a jurisdiction. As can be seen, the interclass correlation is much larger, implying that many of these dynamics are quite variable across states, and that there is much less variance within each state as it regards the use of expert testimony.

⁴¹ Analyses were conducted using Queen Contiguity Weights of the first order, with 99,999 permutations. Sensitivity analysis was performed using Queen Contiguity Weights of the second order (lower orders included), as well as a distance band (minimum 1 neighbor), but yielded no significant results.

appearance of clusters within the defined group of areal units. A series of Local Moran's I test were conducted in the same manner to reveal no significant clustering on any of Scientific Citations, Legal Citations, and Expert Testimony.⁴²

These findings are very surprising considering the emphasis placed on the importance of space in social processes, and therefore, it is not possible to reject the null hypothesis of spatial randomness. Put differently, the manner in which judges utilize SSC and expert testimony is independent of the practices employed by their neighboring colleagues. Indeed, preliminary results of local tests conducted with a lower significance threshold ($\alpha=0.05$) returned very few clusters with an abundance of 'high-low' and 'low-high' cluster centers,⁴³ providing weak preliminary evidence for negative spatial autocorrelation. This means that with fewer restrictions applied to the local tests, a spatial pattern is detected, but as opposed to clustering, we find that the levels of Scientific and Legal citations, as well as the use of Expert Testimony are markedly different among some of the neighboring states in the analysis (the rest returning as insignificantly different from their neighbors). Appendix D includes these very preliminary results. Again, great caution is due here – no claim is made for the existence of negative autocorrelation, but rather some preliminary evidence to suggest that it remains a possibility.

The final question to be tackled regards the clustering of data⁴⁴ – both in geographic and multivariate space. Clustering is not an exact science (Garip 2012; Anselin and Ray, eds. 2010),

⁴² A similar sensitivity analysis was conducted for the local tests, and the significance threshold was set to $\alpha=0.01$ due to the size of the sample ($n=49$).

⁴³ A 'high-low' cluster center is observed when a state exhibits a mean level that is statistically higher than the average of its neighbors' mean level. A 'Low-High' cluster center is observed when the opposite is true.

⁴⁴ The data here refer to the variables relevant to citation practices and modes of extra-legal knowledge processing. To capture these dynamics across the states, clustering in multivariate space includes the variables of "Expert" (binary designation of whether expert testimony was used by a judge in her argument), "Any Legal" (binary designation of whether the observed case included any citations to traditional legal sources), and "Any Scientific" (binary designation of whether the observed case included any citations to traditional legal sources). The last two variables – used as count dependent variables above, are converted to binary form for this analysis so that (a) they

and requires a degree of trial and error to find the best (optimal) way to group observations. A number of different clustering algorithms were utilized, including Hierarchical Cluster Analysis, Spatially Constrained Hierarchical Clustering, Skater, K-means, and K-medians. In all cases, the algorithms attempt to maximize between group dissimilarity and minimize within group similarity to form distinct clusters featuring disparate characteristics, where one characteristic can be an areal unit's geographic location (so that closer units/jurisdictions are more similar as they are located more closely in space) (James et al 2013).⁴⁵ Thus, when a computation is conducted, the statistics returned are the total sum of the squared differences, the total within-cluster sum of squared differences, and the between-cluster sum of squares. To determine that indeed the computation had optimized clustering, the ratio of between-cluster to total sum of squares should be relatively high. There is no significance level, nor is there a soft threshold; to find the optimal clustering, one must conduct a balancing act between maximizing the between-cluster to total sum of squares ratio, but not allowing for a number of clusters that equals or even approaches the number of areal units (states). Best results were computed utilizing the K-means algorithm, with three specified clusters.⁴⁶

As can be seen, in Table 3.8 above, three distinct clusters can be observed in the data, each sporting significantly different levels of citations and usage of expert testimony. Each cluster identified exhibits a value for each of three variables that is unique to it. This means that states within a cluster are statistically more similar to each other than they are to states in other clusters, but more importantly, it suggests that there are (at least)⁴⁷ three unique and distinct

can be made equivalent and comparable to "Expert" which only has a binary designation; and (b) the 'modes' of usage can be better captured, i.e., prevalence rather than intensity or frequency.

⁴⁵ The primary differences between the various algorithms include the order in which nodes/obs are examined, the starting point of the computation, the method of linkage (what exactly is measured? Mean? Median? Min/max?), and how distance is measured (Euclidian, Manhattan, etc.) (James et al 2013).

⁴⁶ For a summary of clustering statistics and the results returned by different algorithms, see Appendix E.

⁴⁷ See Appendix E for more discussion on other possible cluster formations.

modes of knowledge processing, as it pertains to the use of extra-legal knowledge in courts. Note once more that these clusters were formed in multivariate space, so that no spatial pattern was observed, i.e., we cannot reject the null hypothesis that these clusters are spatially random.⁴⁸ Thus, while it may seem to the naked eye that certain patterns emerge in Figure 3.4, these patterns could not be verified statistically.

Table 3.8: Means Comparison Among Clusters

Variable	Cluster 1	Cluster 2	Cluster 3	Diff.*	Diff.*	Diff.*
	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	C1 – C2 (t-statistic)	C1 – C3 (t-statistic)	C2 – C3 (t-statistic)
Any Legal Cite	.101 (.301)	.12 (.326)	.383 (.486)	-.019 (-1.848)*	-.281 (-18.1)***	-.262 (-15.5)***
Any Scientific Cite	.026 (.16)	.038 (.193)	.126 (.332)	-.012 (-2.044)*	-.099 (-9.68)***	-.087 (-7.85)***
Expert	.104 (.306)	.268 (.443)	.193 (.394)	-.164 (-12.2)***	-.088 (-6.73)***	.075 (4.508)***
Obs. No. of States in Cluster	2,623 20	1,368 15	1,141 14	-- --	-- --	-- --

† p<0.1, * p<0.05,** p<0.01,*** p<0.001

* Conducted using two-sample t-test with unequal variance for each Cluster paired together to test differences in each of the outcomes described above.

⁴⁸ Again, this is a counter-intuitive finding and merits further investigation.

Figure 3.5 provides more insight as to the qualitative difference between the identified clusters. The left side axis represents the portion of total cases utilizing either of the three sources of Extra-Legal knowledge (traditional legal, scientific, or expert testimony). Relative to the total sample mean (grouping on the right), Cluster 1 can be identified as having a low level for all three variables. The 20 states that are members of Cluster 1, by and large, rely less on extra-legal knowledge, and when they do, the primary sources are citations to traditional legal sources and expert testimony. The 15 states in Cluster 2 place a unique emphasis on expert testimony, such that nearly 1 in 3 cases include judges relying on the opinion of an expert (so that in practice, experts furnish their opinion more frequently). Cluster 3 is also reliant on experts, but much more so on SSC (both legal and scientific), so that these 14 states are the most inviting of extra-legal knowledge. Hypothesis III.4 is thus supported in part (unique modes of knowledge are observed) and rejected in part (spatial randomness cannot be rejected).

Discussion

The goal of this study was to explore the usage of Extra-Legal knowledge in State Appellate and Supreme courts. Such extra-legal knowledge was proxied by judges' use of citations to traditional legal sources, classical social scientific publications, and the testimony of experts. Various facets of this usage were explored with the aim of contributing to extant knowledge regarding this dynamic: uncertainty, resource dependency, case-specific outcomes, and system-wide outcomes. Taken together, the evidence presented above tells two distinct, but interlinking tales. The first provides an anatomy of the high-leverage⁴⁹ case, while the second

⁴⁹ A high-leverage observation (a court case in this instance) is an observation that features extreme values compared to the sample mean. It need not necessarily be an outlier or an unreliable observation (though it may be). The power of leverage is statistical in nature, indicating that, for at least one variable, the high-leverage observation is able to skew the sample mean, trend, or prediction, in a manner that is disproportionate to its portion in the sample (i.e., $n=1$), more so than other 'non-high-leverage' observations in the sample. For instance, if five children rate Truffle Gouda cheese as 10 (on a scale from 1-to-10), four others rate it as 9, but the 10th child rates it as 3, the sample mean shall drop from 9.5 to 8.9. No other child has enough leverage to 'drag' the mean down like the 10th

raises serious implications for legal-change by examining the boundaries between disparate (yet related) worlds of knowledge – in this case, State Courts’ knowledge network, and Social Science. I discuss each of these tales in turn.

We tend to use clichés because they often reflect reality closely. There is perhaps no greater cliché in this line of research than summoning *Brown* (for a second time), but it serves as an edifying example. An easy critique of the work presented above is that, due to the nature of the data, there must be a small sub-sample of cases that have disproportionate effects on the results. This is true to some extent, and the proof is in the over-dispersion pudding. However, what cases makeup this contemplated sub-sample? The answer is *Brown*-esque cases.⁵⁰ In other words, if we stripped *Brown* (and other similar cases cited above, such as *Muller*) to the bear-knuckled objective data it exhibits, or in other words, if we examine its anatomy, this is what we find:

Table 3.9: Anatomy of the High-Leverage Case - *Brown v. Board* Sample Mean

Variable	<i>Brown v. Board</i>	Sample Mean	SSC>0*
Supreme Court	1	0.28	0.42
Complexity	42	41.2	64.5
Cited By (Caselaw)	2,711	33.7	68.05
Cited By (Secondary Sources)	17,606	12.4	25.3
Ratio Citing Outside Jurisdiction	0.88	0.098	0.21
SSC	10	0.43	2.3
Sample Size	N=1	N=5,132	N=955

* This culled-sample represents only the cases in the total sample that had at least 1 SSC.

child. In slightly more complex datasets (with a great sample size), these effects are much smaller, but can still be identified statistically via regression diagnostic tests such as the leverage vs. squared residual test.

⁵⁰ This comparison is meant with the utmost respect, and in no way intends to diminish the importance of *Brown*.

Now, it should be crystal clear that *Brown* extends in influence and historic magnitude far beyond its anatomy. Second, even the most casual observer of statistics should be apoplectic seeing this type of comparison. However, it is indeed quite instructive. *Brown* is a high-leverage case in the legal system; any first-year law student could attest to that, easily I should hope. However, studying the anatomy of the case provides some quantitative evidence to explain why – this case (and its insights) have circulated through courts’ knowledge network 2,711 times, over a period of 67 years, and counting.⁵¹ Moreover, *Brown* had a disproportionate effect on secondary sources as well – having been used as an academic authority over 17,000 times over a similar period of 67 years, and counting. The argument made here, is that that *Brown* makes very deliberate use of SSC, deploying Extra-Legal knowledge in such a way that the opinion handed down is made very attractive to future judges and scholars.

But using *Brown* as a vignette to demonstrate the anatomy of a high-leverage case can only take us so far. Other features of the high-leverage case’s anatomy are not applicable to *Brown*, as it was adjudicated in SCOTUS. Hence, features such as citation outside the originating jurisdiction, specific-case outcomes, use of expert testimony, evidentiary standard, level of tribunal, caseload, and type of law cannot be collected. However, as it clear from the data, these features are important in outlining the high-leverage case, so that they are worth repeating and elucidating. Thus, the high-leverage case is a complex case (longer opinion, involving more legal issues, citing more legal authorities in support), adjudicated in higher tribunals with lower caseloads. The high-leverage case is more likely to engender some form of disagreement among the judicial panel. The high-leverage case is more likely to be observed under uncertain circumstances (doctrinal fluidity, legal standards, complex factual questions).

⁵¹ *Brown* was last cited in May 2021, in *Doe v. U.S.*, 141 S.Ct. 1498 (Mem).

This was particularly noticeable in cases with a large number of SSC, which discussed “cutting edge” topics such as artificial procreation,⁵² DNA samples,⁵³ grandparents’ rights,⁵⁴ same-sex partners’ rights,⁵⁵ and other issues in regards to which the law has (hitherto) had relatively little to say.

Moreover, the high-leverage case exhibits wider and deeper penetration into the knowledge network, as it is cited more (both by law and secondary sources), and cited more outside the originating jurisdiction. The high-leverage case also reaches deeper and wider into the network, as it cites more legal authorities, and more legal authorities outside the adjudicating jurisdiction. Finally, and perhaps most important for the purpose of this essay, the high-leverage case makes more frequent use of extra-legal knowledge (traditional legal and scientific sources primarily, and expert testimony to a lesser extent). Therefore, the ability to identify this particular component (use of extra-legal knowledge) enables us to better locate and study high-leverage cases.

To this point, the data have answered the “when” question – the various factors associating with SSC. However, it is now important to ask the “why” question as well: why does this matter? The answer presented here is far reaching. As Extra-Legal knowledge exerts its influence when the stakes are highest, the cases that include such knowledge bear extraordinary weight upon the legal system as a whole. These are the cases that present judges (and the law) with a fork in the road, and it is Social Science that serves to guide (or simply nudge) judges in a

⁵² See: *In re F.T.R.*, 349 Wis.2d 84 (2013); *In re Adoption of J.S.* 2014 WL 5573353 (2014); *K.E.M. v. P.C.S.* 38 A.3d 798 (2012); *In re Adoption of Saul* 804 N.E.2d 359 (2004).

⁵³ See: *In re Welfare of M.L.M.* 813 N.W.2d 26 (2012).

⁵⁴ See: *Ex parte E.R.G.* 2011 WL 2279206 (2011); *In re Marriage of Meister* 367 Wis.2d 447 (2016); *In re Marriage of O'Donnell-Lamont* 337 Or. 86 (2004); *Schmehl v. Wegelin* 927 A.2d 183 (2007).

⁵⁵ See: *D.M.T. v. T.M.H.* 2013 WL 5942278 (2013); *Cote-Whitacre v. Department of Public Health* 844 N.E.2d 623 (2006); *T.B. v. L.R.M.* 2005 WL 697578 (2005).

certain direction (be it objectively right or wrong). In other words, the use of Extra-Legal knowledge is linked (empirically) to legal change. This argument is elaborated upon below.

As noted in the Hypotheses segment *supra*, the axes of standards vs. rules and dormancy vs. activity were utilized as a proxy for the clarity of law. Assuming these proxies do in fact faithfully serve their purpose, it is possible to claim (however cautiously), that judges utilize extra-legal knowledge to dispose of cases when the law is unclear. Perhaps another way to formulate this finding would be to say that judges use SSC to fill in a certain gap between the facts of the case (adjudicative) and the law (administrative) when it exists. Such a formulation comports with Monahan and Walker's three functions for SSC (make law, determine facts, and provide context), though the data are currently unable to distinguish between the functions. Moreover, while Rublin (2011) postulates that SSC inclusion is a function of how "settled" a social scientific field is, these data show that SSC may also be a function of how "settled" a legal field is, as is shown by significantly higher proclivity of judges to apply Extra-Legal knowledge when the law is active (PPP).

Thus, standards can be understood as a legal mechanism that provide judicial flexibility in the face of great factual variance. As these facts include extra-legal facts, extra-legal knowledge assists the judge in fitting the facts to the law and resolving the case. This conceptualization of standards (and the ensuing extra-legal knowledge they engender) does not contemplate legal clarity as lacunae, but rather as an inherent disjunction between the law and the facts of cases it seeks to regulate.⁵⁶ Moreover, a gap between law and fact forces judges to constantly match

⁵⁶ This means that we may expect to find more extra-legal knowledge in all instances where this gap between law and fact occurs: (a) when law seeks to catch-up to technological changes (e.g., privacy and social networks); (b) when law is heavily tied to strong moral sentiments, but not perfectly aligned therewith (e.g., family law, vice, and criminal law); (c) when law is based upon, and seeks to regulate complex technical matters (e.g., environmental regulation – EPA, health regulation – FDA, communications regulation – FCC); and (d) when law seeks to regulate itself (e.g., rules of evidence, local court rules).

social categories of ties, to pre-determined legal categories of ties so that when egregious mismatches occur – precedent is created and/or law changes (Zelizer 2005; 2000).

This ‘precedential’ character described, and thus the potential for legal change are further bolstered by the results obtained for case-specific outcomes. Each of Dissent, Concurrence, and a Change in Status Quo were strongly associated with SSC. Among the culled-sample (n=955), Dissent was observed in 23.2% of cases, concurrence in 21.8%, and a Change in Status Quo in 58.8%. While these percentages may not seem impressive at first, it is prudent to consider that all three are typically absent for the vast majority of case law: while SCOTUS has the prerogative to deny Certiorari (and thus only choose to review cases that it wishes to overturn, Tanenhaus 1963), State Appellate and Supreme courts do not have a similar liberties, and are required to hear many more cases – so that ostensibly, there is less of a possible “reverse bias” as exhibited by SCOTUS. Furthermore, while some scholars argue that the norm of Stare Decisis has lost much of its binding power (Segal and Spaeth 1996), other scholars argue that this norm is actually more influential in the process of adjudication as a whole, and that the true power of Stare Decisis applies not at the level of SCOTUS, but rather at the lower level courts – including State Appellate and Supreme courts that are bound by SCOTUS, and other higher tribunals, as the case may be (Knight and Epstein 1996). Finally, Dissent, despite its high visibility and importance to the legal system, is actually quite rare: an inquiry conducted by Epstein, Landes and Posner (2011), revealed that the proportion of cases with dissenting opinions in the Federal Courts of Appeals (excluding SCOTUS) is between 2%-8%. Thus, SSC cases exhibit nearly 3 times the frequency of the most conservative estimate.⁵⁷

⁵⁷ This may serve as the basis for future research: if SSC are more likely to be included when the law is unclear or precedential, we should expect to find more SSC in federal Courts compared to State Courts.

If Extra-Legal knowledge habitually co-locates with precedential treatment of the law (let us call this, ‘legal change’), then the process of admitting Extra-Legal knowledge into the court system merits further attention (much of which is generously given in the pages above), but also an interrogation of the Extra-Legal sources themselves. Especially in light of the fact that the sources of Extra-Legal knowledge are variable, and that judges have clear preferences regarding the fields of knowledge in which they wish to graze. This manifests in two separate (but empirically related) manners.

First, the results found strong support for the primacy of traditional legal citations over classical scientific citations. The explanation suggested above was framed in terms of homophily and search costs, and it seemed to have predicted the results quite well (over three times the amount of legal citations compared to scientific ones). This finding is intuitive, but it may also imply the existence of a systemic failure – an error in the knowledge network. This is because traditional legal sources potentially convey information that mirrors the information published in scientific sources. Perhaps this is a contentious statement, but if such a dynamic exists, then it foists upon the network a sub-optimal brokerage function, as judges are gleaning information about the right topics from the wrong sources. This is particularly true if the traditional legal sources (the lion’s share of which are student edited law review publications) serve as brokers between classical social scientific sources, and the courts, i.e., if law reviews are citing scientific sources for topic X, and judges are then citing law reviews for topic X as well, the problem arising when topic X is of a clinical or empirical nature.

This potential sub-optimal brokerage dynamic places a certain onus on the shoulders of social scientists and experts to provide insight that is methodologically sound, however, it is judges that are the ultimate arbiters of what extra-legal knowledge enters their arena. As social

science is employed by judges – at a time of great need – it is crucial that it be “good” rather than “junk science”. Unfortunately, junk science has already found its way into courtrooms before (e.g., Eugenics), and will undoubtedly continue to do so in the future – this is one of the costs associated with Extra-Legal knowledge. However, the costs can be minimized in a number of different manners, so that the benefits of extra-legal knowledge far outweigh the costs. A high degree of veracity in Social Science research is already a central aim of all researchers, who are driven to excellently perform regardless of what impact they may have on the legal system. Therefore, this aforementioned onus is already placed on the shoulders of researchers.

The burden of veracity is not social scientific researchers’ cross to bear alone; indeed, it is shared with judges as well. Ostensibly, judges do not simply cite any odd SSC that supports their view – in fact they rarely do so at all, and only in certain (extreme) circumstances identified in this paper. The scarcity of SSC, coupled with the disproportionate effect they have due to the circumstances of their appearance, raise a troubling difficulty: how are judges to evaluate the quality of social scientific research? A prime concern in citing social science is whether the work cited is externally valid (to a sufficient degree). While there are many judges who are very well versed in the social sciences – many have formal education in economics, psychology or sociology – most Judges, trained only in the Law, have not the expertise nor the knowledge to evaluate the external validity of social scientific research. This leaves open the possibility of sub-optimal use of SSC due to faulty inference from the source or due to a fault in the source itself. Such dangers become all the more apparent once certain social scientific insights become popular trends and are cited by judges without careful consideration on an individual basis (e.g., the brief and tortured life of Parental Alienation Syndrome illustrates this point well, See: Chapter 2).

In addition to the problematic primacy of traditional legal sources, the data uncover the clustering dynamic, or three unique modes of knowledge, that are distributed randomly in space. Behind a Rawlsian veil of ignorance, where scientific information is equally distributed and accessible to all jurisdictions (which is a safe assumption to make), would we not expect to find only one mode of knowledge intake? Would not the one mode that proves most efficient, most helpful to judges be adopted by all jurisdictions? This is where various factors come into play, to differentiate between said clusters. While no spatial pattern could be identified, other factors may bear on the manner in which states cluster around admitting Extra-Legal knowledge. One possible explanation may be cultural – this is proxied in the data by a measure of a state’s political orientation. For instance, results suggest that Cluster 3 – the most inviting of extra-legal knowledge – is significantly more democratically leaning than states in Clusters 1 and 2. This reflects recent surveys and research on similar topics.⁵⁸ State culture and characteristics may also have some influence on how (and how much) expert witnesses are utilized. Cluster 2, which is most inviting of experts, includes states that are either small in population size (OR, ID, MT, WV, SC, RI, CT, NB, UT), or large(r) states with very dense urban centers (IL, AZ, TX, LA). This may suggest that informal social networks are created such that a long-standing and reciprocal relationship is created between experts and judges. These relationships probably exist in most jurisdictions, but perhaps in Cluster 2, they are more prevalent, resulting in higher levels of usage. For instance, in LA, a very small group of experts (n=4) comprised roughly 80% of the

⁵⁸ See: Perceptions of Science in America. 2018. American Academy of Art & Sciences. Cambridge Mass. Available at: <https://www.amacad.org/sites/default/files/publication/downloads/PFoS-Perceptions-Science-America.pdf> (last visited June 16, 2021) showing how republicans have much less confidence in science compared to democrats; and Brian Kennedy and Cary Funk. Democrats and Republicans differ over role and value of scientists in policy debates. 2019. Pew Research Center. Available at: <https://www.pewresearch.org/fact-tank/2019/08/09/democrats-and-republicans-role-scientists-policy-debates/> (last visited June 16, 2021) discussing the devalued role republicans attribute to science in policy making, compared to a higher value attributed by democrats.

cases in which expert testimony was used by the authoring judge (n=50). Indeed, Cluster 2 states have significantly smaller populations compared to states in the remaining clusters.

Another explanation for the cluster diversity (i.e., a deviation away from a hypothetical ‘best-practice’ mode of knowledge intake) relates to structural constraints and path dependency. For instance, an important determination during divorce is whether the legal regime in a state espouses community property or equitable distribution (each applying a different base-line when determining the division of assets). The data show a very strong positive association between community property states and SSC. Similarly, the data show that Cluster 3 (most use of extra-legal sources) has the highest proportion of community property states, and Cluster 1 (least use of extra-legal sources), has the lowest proportion. This is but one small example for how a seemingly innocuous legal/structural feature can modify knowledge networks.⁵⁹ Conversely, the surprising finding regarding the choice of evidentiary standard went under the radar so far. While a community property regime seemed to have a great deal of statistically predictive power, Frye vs. Daubert states cannot be distinguished: both allow a statistically indistinguishable level of expert testimony into their courts. Considering the brief history provided above this should not be the case – these legal standards are not performing as advertised. The expectation would be for Frye to be positively associated with expert testimony, by this is not the case ($r^2 = -0.024$, insignificant at 5%). Thus, a structural-legal feature that should be facilitating fewer SSC (as it should be more inviting of expert testimony, due to the lower level of the Frye standard, and expert testimony competes with SSC), does not, while a structural-legal feature that does not directly bear on SSC (community property) results in more SSC.

⁵⁹ This raises a more general question regarding the unintentional consequences of similar legal features (or laws), but this is outside the scope of this project.

LIMITATIONS AND FUTURE RESEARCH

There are a number of limitations to consider in connection with this project. First, the sample is thematically narrow. BI, NAs and PPP are not very distant, legally, so that perhaps the external validity of the data and findings are limited to these realms of the law (and social science).⁶⁰ Moreover, while particular axes have been identified, based on the existing literature in the field, a justified critique would be that the three legal issues studied here were cherry picked in a manner most convenient to advance the argument set out above.⁶¹ While the legal issues and sample design were prudently selected to reflect the various hypotheses generated, their selection does not reflect an inherent difference in the observed variable of interest (selection bias) as there is no reason to believe that extra-legal knowledge is more or less prevalent in this issues compared to other equivalent issue in Family Law.⁶² Ideally, the methodology employed here could be extended to additional legal fields and issues (e.g., Corporate Law – Rule of Reason, Torts – Strict Liability, Labor Law – Worker Compensation) so that if similar findings are made, they would be supported by a variety of data.

Second, the research design, wealth of hypotheses and analysis does not allow isolation of a particular effect, above what the regressions provide. While IRRs, ORs, and multiple t-tests and interaction variables were explored to answer particular questions, it was not possible to

⁶⁰ Indeed, there were multiple cases that were caught in the net of two searches simultaneously (BI+NA and BI+PPP).

⁶¹ This may be a bit harsh, as there was no possible way to know that either of the issues studied would yield results that are different from other legal issues. Only a careful study of hundreds and thousands of cases pertaining to a specific legal issue could determine such results.

⁶² Other legal issues within the sub-field of Family Law that were considered for this project included: Orders of Protection, Abuse/Neglect, Determination of Delinquency, Parental Rights, International Treaties, Adoption, Cohabitation, Third Party Rights (extended family), and Child Support. The eventual selection of BI, NAs, and PPP was a function of data availability, link to the hypotheses, and the feasibility of collecting a representative sample. These parameters were determined in an early pilot study that included over 500 test cases involving other legal issues.

isolate effects such as unique subject matter (e.g., interpreting a nuptial agreement executed abroad). Additionally, one important type of legal issue was not introduced into the analysis: this is the active-standard. A doctrinally fluid standard that was amenable to modeling, and appropriate for the sample collected here, could not be located within Family Law. Future research would be wise to incorporate such an active legal standard. Such research would also shed some light on the question of doctrinal stability, or how long it takes for an active law to become dormant (or how frequent litigation must be), again, assuming a soft threshold differentiates the two ends of the spectrum.

Other potential future inquiries abound. The research design employed here could be utilized to explore the use of SSC (and other sources) by legislators in the process of passing Bills into Laws. Such research, coupled with the current research, would provide more detail on the exact mechanisms through which legal change and social science interact, and provide further insight into the Law & Society relationship as well. Computational techniques could be used to vastly expand on the sample size, and produce a more wholistic view of the interaction between realms of knowledge, though this would of course present new challenges unique to this method of analysis (and a careful balancing between quality and quantity). The upside to this line of inquiry is immense, as computational methods may be able to capture a system-wide sample of SSC cases applicable to all areas of case law, thus vastly augmenting the external validity of the study.

Finally, while this project tackles the when and why questions, the how question remains obstinately under-explored quantitatively since Monahan and Walker's insightful work (1991; 1988), conducted three decades ago. Such an inquiry would focus on how SSC are used, when they are observed in court, and would entail a deeper qualitative look at SSC cases (this sample

includes 955 SSC cases, and would be a good start). The results above hint at a number of possible dynamics at play. For instance, it seems quite plausible that judges rely on SSC for support when they dissent or concur. Or, that judges seek insight from SSC when there is a high level of factual variance in a case (complexity, subject matter), as is evidenced by the BI cases, where multiple relevant extra-legal facts must be considered.

Following Corbin's 100-year-old legal maxim: "Hard cases make good law" (1923), the argument presented above can be extended generally to the relationship between Social Science and the Law. There is a good deal of literature on the relationship between Law and Society (Calavita, 2016, provides an excellent overview of this relationship), but there is always more work to be done to better understand how they interact. Here, one very clear, very precise avenue has been identified, through which Social Science (and hence, Society) bears on the development of case law (and hence, the Law): at the margins, Law opens its borders to insight gleaned from social scientific research. These insights, emigrating from one realm of knowledge to a different realm (for which they were not necessarily created), may exert disproportionate impact, due to the circumstances of their arrival. When SSC are used to support judges' decisions, they directly shape the law, one case at a time; in the Anglo Common-Law legal system, this amounts to change of the entire system. Moreover, while no evidence was found to suggest that 'border control' implicates the degree of emigration of Extra-Legal knowledge (Frye/Daubert do not predict SSC), there is still the theoretical puzzle of how judges are to use these emigrating insights, produced in a different realm of knowledge for a different purpose. This is not to suggest that such social scientific insights are not portable or that that are ill-fitted to the Law, but that this possibility merits appreciation and further exploration, especially in light of the high stakes involved.

APPENDIX D: LOCATING AND SELECTING CASES

For BI: (1) in “Advanced Search” select a specific state in jurisdiction field; (2) enter “Best Interest of the Child” in the field “this exact phrase”; (3) limit to case law reported after January 1, 1994; (4) narrow results by selecting “S.Ct.” and “App.” Case law; (5) narrow results by selecting reported cases only; and (6) sort results by “relevance” (so as to receive cases in which BI a central issue).

For NA: (1) in “Advanced Search” select a specific state in jurisdiction field; (2) enter "prenuptial agreement", "antenuptial agreement", "premarital agreement", “nuptial agreement” or "postnuptial" in the field “any of these terms”; (3) limit to case law reported after January 1, 1997; (4) narrow results by selecting “S.Ct.” and “App.” Case law; (5) narrow results by selecting reported cases only; and (6) sort results by “relevance” (so as to receive cases in which PPP a central issue).

For PPP: (1) in “Advanced Search” select a specific state in jurisdiction field; (2) enter “patient privilege” in the field “this exact phrase”, and the terms “psychotherapist”, “psychiatrist”, “therapist”, and “psychologist” in the field “any of these terms”; (3) limit to case law reported after January 1, 1997; (4) narrow results by selecting “S.Ct.” and “App.” Case law; (5) narrow results by selecting reported cases only; and (6) sort results by “relevance” (so as to receive cases in which PPP a central issue).

Sources not coded as SSC:

- dictionaries (unless from other disciplines, such as medicine)
 - senate and congressional reports
 - legal encyclopedias
 - int'l treaties and conventions
 - internet sites clarifying function of organization or program
 - citations to fictional or humanistic history
 - no internal gov't reports
 - no amicus curiae
 - no gov't policy manuals
 - no judicial guidelines
 - no commentary on existing legal acts
 - Foreign law not considered
 - Foreign case law not considered
 - American Law Reports and ALI recommendations
 - Restatements
-

APPENDIX E: VARIABLES COLLECTED AND MEASUREMENT

1. Time-Invariant Variables:

- 1.1. Supreme Court – this is a binary indicator, designated ‘1’ if the case was being adjudicated in the highest tribunal of the state.
- 1.2. Best Interest of the Child – a binary indicator for subject matter, designated ‘1’ if the case was on the topic of BI.
- 1.3. Psychotherapist Patient Privilege – a binary indicator for subject matter, designated ‘1’ if the case was on the topic of PPP.
- 1.4. Nuptial Agreements – a binary indicator for subject matter, designated ‘1’ if the case was on the topic of NA.
- 1.5. Frye – a binary indicator for the evidentiary standard employed by the adjudicating jurisdiction, designated ‘1’ if the state employs a Frye standard.
- 1.6. Daubert – a binary indicator for the evidentiary standard employed by the adjudicating jurisdiction, designated ‘1’ if the state employs a Daubert standard.
- 1.7. Maverick – a binary indicator for the evidentiary standard employed by the adjudicating jurisdiction, designated ‘1’ if the state employs neither a Frye or Daubert standard.
- 1.8. Jurisdiction Size – this is natural log of the population size of the relevant jurisdiction in 2010.
- 1.9. Political Orientation – this is a count of the number of times a jurisdiction voted democrat in the most recent eight presidential elections; ranges from 0 (jurisdiction voted only republican) to 8 (jurisdiction voted only democratic).
- 1.10. Community Property – a binary indicator for the legal regime of asset division during divorce, designated ‘1’ if the state employs a community property regime.

1.11. Caseload – a continuous variable; this is the natural log of the number of cases filed in family courts in a state, per 100,000 residents in 2008.

2. Case Specific Variables:

2.1. Pages – a continuous measure of the number of pages per case.

2.2. Legal Authorities Cited – a continuous measure of the number of legal cases cited by the adjudicating judges.

2.3. Westlaw Headnotes – a continuous measure of the number of Westlaw headnotes, indicating unique legal issues deliberated upon in the case by the Westlaw team.

2.4. Case Complexity – this is a combined measure of pages, legal authorities and Westlaw headnotes, to provide an overall measure of case complexity. Pairwise correlations among the three variables reveal high levels of correlation, all significant at $\alpha=0.01$. A test of Cronbach's Alpha yields a reliability coefficient of 0.836, indicating that the three variables are closely linked, reliably measuring the same construct (case complexity).

3. Case Specific Variables:

3.1. Change in Status Quo – a binary indicator for the final disposition of the case; reversal in part (or any similar holding) was also designated as a change in status quo.

3.2. Dissent – a binary indicator for a dissenting opinion. Designated '1' only if a dissenting judge entered a dissenting opinion.

3.3. Concurrence – a binary indicator for a concurring opinion. Designated '1' only if a judge entered a concurring opinion.

4. Citations:

4.1. Total Number of Citations – a count variable indicating the total number of SSC identified in a case.

4.2. Any Citations – a binary indication; designated ‘1’ if even a single SSC was identified in a case.

4.3. Soc. Sci. Citations - a count variable indicating the total number of classical social scientific citations identified in a case.

4.4. Any Soc. Sci. Citations – a binary indication; designated ‘1’ if even a single soc. sci. Citation was identified in a case.

4.5. Legal Citations - a count variable indicating the total number of traditional legal citations identified in a case.

4.6. Any Legal Citations – a binary indication; designated ‘1’ if even a single legal citation was identified in a case.

5. Expert Testimony - a binary indication; designated ‘1’ if expert testimony was furnished to the court (or was made part of the case record), AND was considered by the adjudicating judge or judges.

6. Case In- and Out-Citations:

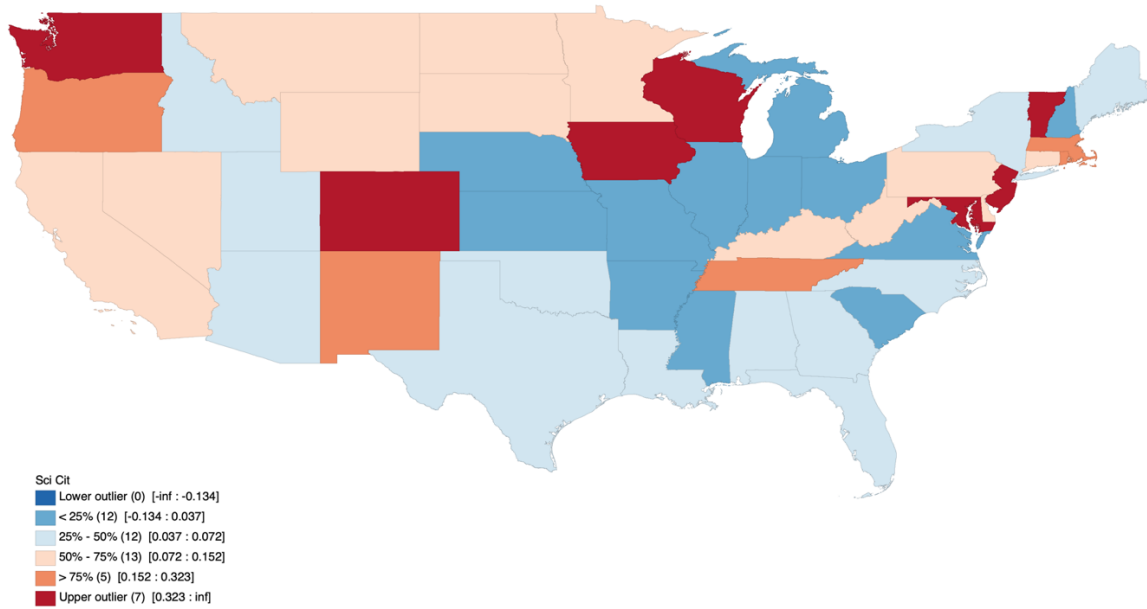
6.1. Citing Outside Jurisdiction (out-cite) – a count variable indicating the number of legal authorities cited by the court that originated outside the adjudicating court’s jurisdiction.

6.2. Cited Outside Jurisdiction (in-cite) – a count variable indicating the number of times the adjudicating court was cited by other courts located outside the original court’s jurisdiction.

- 6.3. Cited by Judges (in-cite) – a count variable indicating the number of times the adjudicating court was cited in future case law (both in- and out-side the adjudicating jurisdiction).
- 6.4. Cited by Secondary Sources – a count variable indicating the number of times the adjudicating court was cited in future publications (not case law) such as ALR reports, legal textbooks, law review articles, Family Law digests, American Jurisprudence reports, and state case summaries.

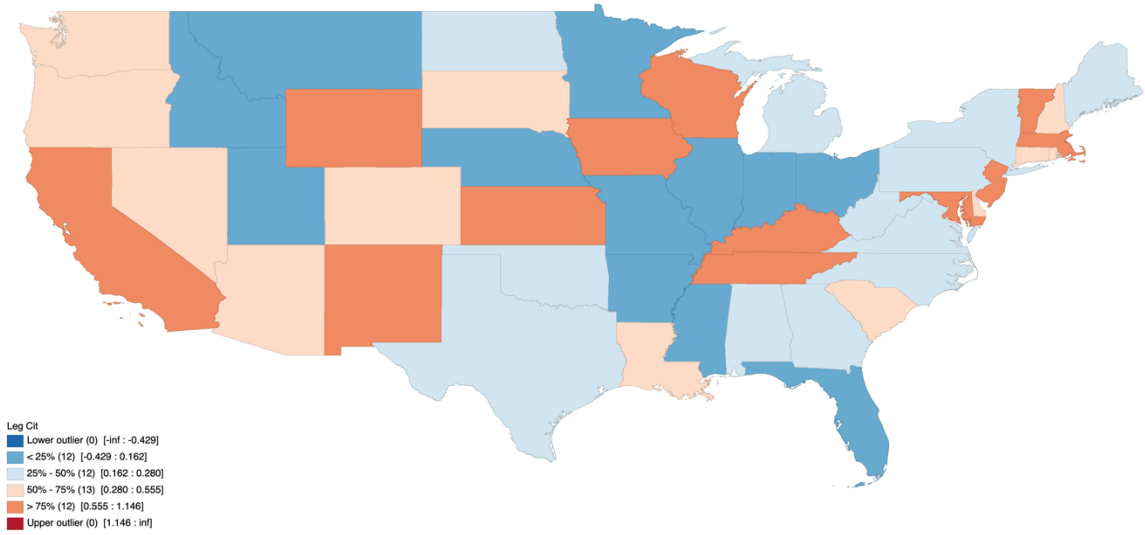
APPENDIX F: MAPS

Figure 3.6 : Map of Scientific Citations



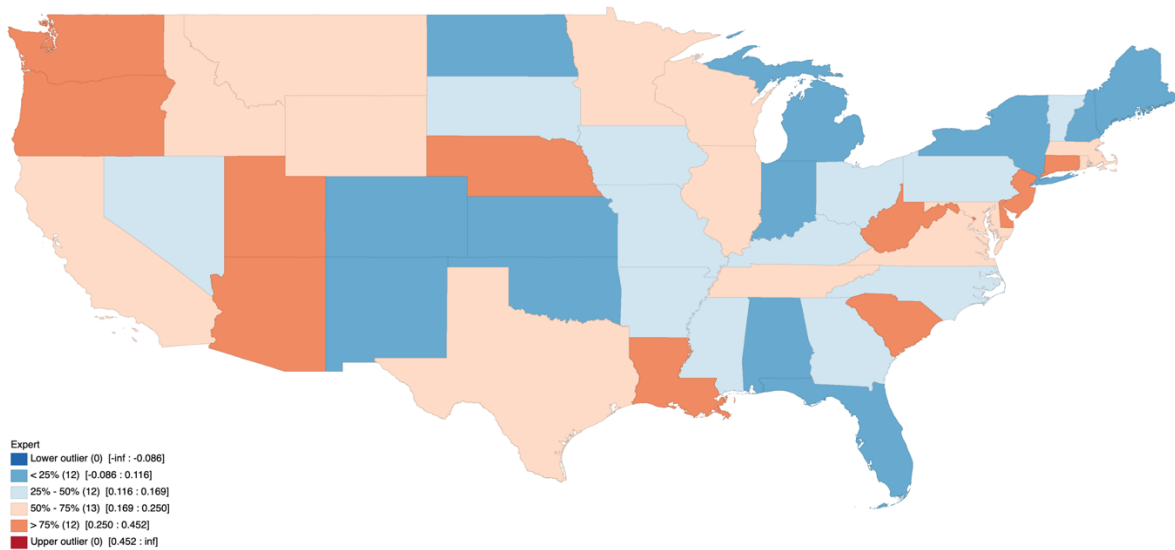
This box map has a hinge of 1.5, indicating that the inter-quartile range extends from 1.5 std. dev. below the mean to 1.5 std. dev. above the mean. Two additional quartiles are added to either end of the quartile range to capture outliers: Low Outlier Q – dark blue; Q1 – lighter blue; Q2 – lightest blue; Q3 – lightest red; Q4 – Light red; Upper Outlier Q – Dark Red.

Figure 3.7: Map of Legal Citations



This box map has a hinge of 1.5, indicating that the inter-quartile range extends from 1.5 std. dev. below the mean to 1.5 std. dev. above the mean. Two additional quartiles are added to either end of the quartile range to capture outliers: Low Outlier Q – dark blue; Q1 – lighter blue; Q2 – lightest blue; Q3 – lightest red; Q4 – Light red; Upper Outlier Q – Dark Red.

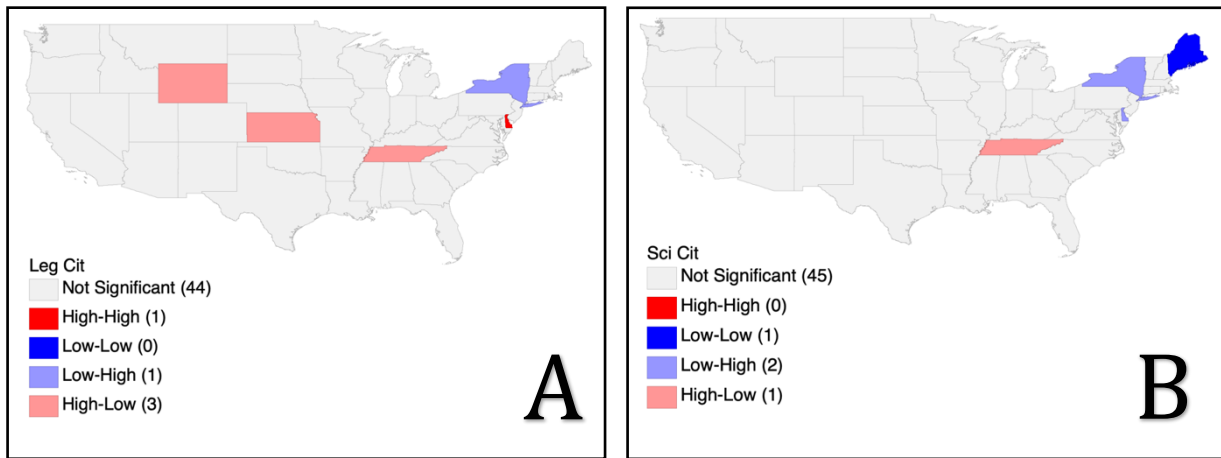
Figure 3.8: Map of Expert Testimony



This box map has a hinge of 1.5, indicating that the inter-quartile range extends from 1.5 std. dev. below the mean to 1.5 std. dev. above the mean. Two additional quartiles are added to either end of the quartile range to capture outliers: Low Outlier Q – dark blue; Q1 – lighter blue; Q2 – lightest blue; Q3 – lightest red; Q4 – Light red; Upper Outlier Q – Dark Red.

APPENDIX G: PRELIMINARY RESULTS FROM LOCAL MORAN'S I TEST

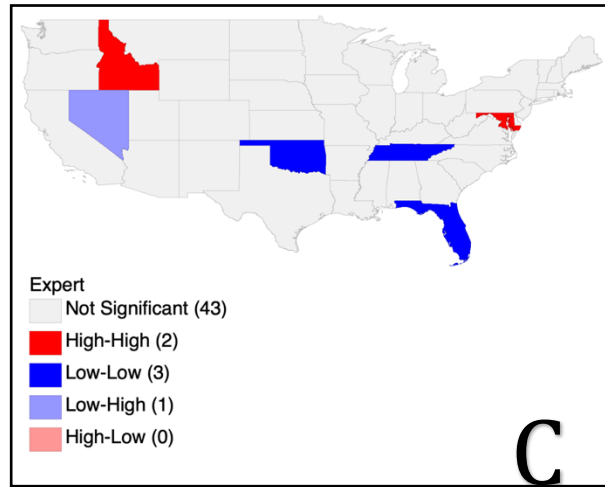
Figure 3.9: Map of Results from Local Moran's I



Panel A (Legal Citations) shows WY, KS, and TN as High-Low cluster centers, indicating that their contiguous neighbors all exhibit a statistically lower level of legal citations (significant at 5%) than they do; NY is a Low-High cluster center, indicating that its neighbors all exhibit statistically higher mean levels of legal citations; and DE is the single High-High cluster center, suggesting a small cluster of states (NJ, MD, DC, PA) that all share similarly high mean levels of legal citations.

Panel B (Scientific Citations) shows TN as a High-Low cluster center, indicating that its contiguous neighbors all exhibit a statistically lower level of legal citations (significant at 5%) than TN does; NY once again exhibits a Low-High position (see panel A), as does DE (suggesting that the high-high cluster observed in panel A for legal citations does not apply to Scientific Citations); ME appears as a Low-Low cluster center, indicating that its neighbors share a similarly low level of scientific citations.

Panel C (Expert) here cautious interpretation would suggest that there is in fact a spatial pattern (positive autocorrelation) in that three major states in the south (OK, TN, FL) are Low-Low states, meaning that all the contiguous neighbors (the entire southeast region) shares a similarly low level of expert usage (significant at 5%). Another small High-High cluster is again detected around MD, and possibly in the northwest (ID), though NV (Low-High) makes this a more difficult interpretation.



APPENDIX H: RESULTS FROM CLUSTER ANALYSIS

Table 3.10: Comparing Clustering Algorithms

Algorithm	Number of Clusters Specified	Total Sum Of Squares	Within-Cluster Sum of Squares	Between-Cluster Sum of Squares	Ratio of Between-Cluster To Total Sum of Squares	Isolates? (Single-Observation Clusters)
K-Means	5	144	30.209	113.791	0.79	Yes
K-Means	4	144	36.874	107.126	0.744	Yes
K-Means	3	144	46.76	97.243	0.675	No
K-Means	2	144	79.862	64.138	0.445	No
K-Medians	6	144	30.087	113.913	0.791	Yes
K-Medians	5	144	41.001	102.999	0.715	No
K-Medians	4	144	42.3481	101.652	0.706	No
K-Medians	3	144	46.8058	97.194	0.675	No
K-Medians	2	144	80.13	63.87	0.444	No
HCA	4	144	37.332	106.668	0.741	Yes
HCA	3	144	47.214	96.786	0.672	No
HCA	2	144	80.13	63.87	0.444	No
Spatially-Constrained	14*	144	79.12	64.88	0.45	No
Skater	4	144	100.066	43.934	0.305	Yes
Skater	3	144	114.396	29.604	0.206	Yes
Skater	2	144	129.189	14.81	0.103	Yes

* Minimum number of clusters for spatially contiguous results.

Based on the data presented above in Table 8, spatially constrained clusters are sub-optimal (Skater, SCHC), as they yield too many clusters, or isolates. As the relevant research question here is whether groups of states share similar citation patterns ('modes' of knowledge'), it is unhelpful to consider clustering that creates single unit clusters (often observed with respect to CA and NY). This leaves roughly 8 potential clustering computations, and after disposing of the computations which returned a relatively low BTT ratio, we are left with five computations (highlighted in Table 8). Common sense, and a qualitative knowledge of the data and milieu aid

in discerning among these computations. First, the various computations all return 3 clusters as relatively optimal fits; second, while the data are hierarchical (observations over time, nested within states), the randomization method used by HCA may be less appropriate for these data; third, K-medians (as can be inferred from its name) focuses on median levels rather than mean levels – considering the high degree of intra-state variance in the data (intra-state variance is much larger than inter-state variance for all three variables), it may be wiser to use the K-means method, and allow for the various means (better capturing the outlier observations – of which there were many) to be utilizing in the clustering process. Therefore, the computation utilized for clustering is the K-means algorithm with 3 clusters specified.

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CHAPTER 4: NON-SCIENTIFIC SOURCES AS BROKERS OF SCIENCE AND THE JUDICIAL ECHO- CHAMBER

Abstract: This chapter revisits the data on Parental Alienation Syndrome (PAS) presented above in Chapter 2, to demonstrate two newly identified failures in the association between Law and Social Science, pertaining to the flow of information within the network, and the sources used as authority therein. Specifically, the data will show that Legal sources and Non-Peer-Reviewed sources functionally gatekeep the information flowing between courts and Scientific sources. Furthermore, the data show that courts often rely on citations made in earlier caselaw, regardless of their quality, such that citations supporting the now discredited theory of PAS, were propagated throughout the citation network. Both the above contributed to the prolonged life of PAS within the court system.

Introduction

Chapter 2 presented an unusual puzzle: Parental Alienation Syndrome endured in the legal system, and was still applied in resolving custody disputes for a full decade after it was deemed to be a discredited theory in Social Science academia (including legal academia).¹ This chapter investigates two underlying causes that facilitated the unwanted longevity of PAS: a disconnect between courts and Scientific academia, and the duplication of past citations to create an echo chamber in courts.

Judges often rely on Scientific evidence to resolve disputes (Faigman 1999), an observation that has been particularly true of Family Law (Robertson, Laura, and Broadhurst 2019; Rathus 2018; Rathus 2012). In doing so, judges “use” Social Science by citing authorities (Acker 1990), to make law, find fact, and/or provide social context (Monahan and Walker 1991; Monahan and Walker 1988; Monahan and Walker 1986). And when they do so, judges exhibit a certain inclination to cite a particular type of source (see chapter 3 on citation patterns),² or a sub-set of sources (Sirico 2000; Sirico and Margulies 1986).³

There seems to be good reason to discriminate among potential sources, as they do not all exhibit the same quality of scholarship. When courts seek the guidance of Social Science, this question becomes even more acute, as the quality of scholarship must be evaluated in tandem with the veracity of the scientific evidence presented (Grunwald 2013; Faigman 1989), although legalists do not always possess the skill to do so (Acker 1990; Sperlich 1980b; Blake 2019; Grunwald 2013; Faigman 2006; Lempert 1988; Rathus 2012; Reinhard 2020; Rustad & Koenig 1993; Suggs 1979; Scurlock 1964), which may result in the use of evidence of suspect veracity

¹ For a detailed discussion on the background and history of PAS, please refer back to Chapter 2.

² Demonstrating that Legal Sources are cited 3 times as much as Scientific sources (16.8% vs. 5.1%).

³ Finding that judges tend to cite elite Law Reviews more frequently.

(Rathus 2018; Faigman 1989; Perry and Melton 1984). Thus, in lieu of accessing Scientific sources which entail higher search costs (Acker 1990), judges may choose to rely on Legal sources,⁴ if indeed the latter provide some guidance pertaining to the issue at hand.

The origin of the source of information is crucial when the veracity of Scientific evidence is at question, as the review and editorial process differs by the type of source. This is not a question of quality or superiority, but rather a question of goals – different review processes strive to manufacture disparate products. Most notably, the scientific peer-review process takes upon itself to ensure the veracity and validity of the evidence presented therein. Therefore, sources that employ other editorial processes (or none at all) may inadvertently publish Scientific evidence that would not survive the fiery crucible that is the peer-review process. Again, this does not reflect on the quality of scholarship, but rather on the overall probability of including evidence of questionable validity. The potential for publication of such problematic Scientific evidence is of course drastically augmented when no review-process is required (e.g., self-published materials).

If courts habitually rely on Non-scientific sources when seeking guidance on a question pertaining to Scientific evidence, then the system as a whole obtains information that is sub-optimal and prone to exhibit certain failures. Furthermore, if Scientific sources are themselves hesitant to cite and thus “use” caselaw, for the same reasons that legalist may be hesitant to cite Scientific sources, then a disconnect may occur between the two. This may lead to a form of interaction whereby Non-scientific sources are effectively gatekeeping information between

⁴ Legal sources are defined as the Traditional Legal sources used mostly in Legal Scholarship, such as Law Reviews, specialized legal journals and horn books, whereas Scientific sources are defined as publication created in the Classical Social Scientific venues, such as peer-reviewed articles and book. These definitions are covered in great detail below in the Theoretical Background.

courts and Scientific sources. There is no inherent disadvantage to a system thus constructed,⁵ unless the information flowing from one side to the other (courts to Scientific sources) is diminished in quality. Unfortunately, this may be the case, for if courts are obtaining their Scientific evidence directly from Non-scientific sources and/or from Non-Scientific sources that have “processed” Scientific evidence obtained from Scientific sources, there may be too high a potential for lost and biased information.

This problem is further compounded by the practice of mirroring citations. Perhaps because of high search costs and the resource strain (Acker 1990; Scurlock 1964) and wanting proficiency (Sperlich 1980b; Blake 2019; Grunwald 2013) courts tend to rely on citations that have already been made, rather than seeking out a unique source by conducting independent research. The process of mirroring is path dependent, as a ‘Mathew-like-effect’ leads to a positive feedback, whereby a source cited more, becomes more authoritative, so it is then cited more.

Merryman (1954: 615-625) sets out a lucid account of how path dependency lends an almost random, artificial facade of authority to certain cases cited in the court system. In electing to cite prior caselaw, a judge is making a number of decisions regarding the applicability – both in fact and law – of the cited case to the case being adjudicated. This applicability is later transmitted to future judges who can use the citation itself as a proxy for applicability. Over time, the cumulative effect (more citations to a particular source) radiates a stronger sense of authority. The difficulty associated with mirroring practices is that (a) the sources of original, non-redundant information are limited (Burt 2005); and that (b) a mirroring of old citations grants

⁵ There may even be benefits to such a system, whereby Law Reviews function as translators or synthesizers of knowledge for courts (Huntington 2018: 305-10).

them an artificial degree of authority, which is later used to justify their future use (via citation) (Monahan and Walker 1988; Merryman 1954).

As applied to the case of PAS and the use of Social Science in court, the combination of citation preference, along with path dependency and the creation of artificial authority results in an echo-chamber, where certain sources become more prominent than they should. This is in many ways a microcosm of the PAS case study, applied to unique sources rather than to an entire theory. PAS again presents a good case to empirically track this proposed echo-chamber, to highlight the prevalence of co-locating citations, and how they are prominently utilized by courts in the network.

Theoretical Background

What exactly is Social Science? In confronting this question, this project does not seek to supplement the running definition of Social Science,⁶ but rather, as this investigation implicates multiple systems of information, each a stand-alone depository of knowledge (yet, overlapping with other depositories) the task here is to set out rough boundaries that delineate and separate said systems of information. Thus, in assessing interactions between and among systems of information, certain prognostic indicators can be employed to differentiate among sources; such indicators may include, inter alia, organizational traits (courts or academia), authorship (judge, practitioner, or scholar), or mode of production (case law, law review, peer-reviewed journal, or non-peer-reviewed publication). Each of the aforementioned indicators are employed to identify already extant well-established boundaries distinguishing between three primary systems of information contemplated in the analyses below: State Courts, Legal Sources, and Scientific Sources.

⁶ Merriam-Webster Dictionary defines Social Science as: “a branch of science that deals with the institutions and functioning of human society and with the interpersonal relationships of individuals as members of society.”

The first and most intuitive boundary to draw is the organizational identity producing a source of information, that is, is a source being authored within the court system or outside it. In other words, Social Science can be negatively defined by what it is not, namely, case-law. While the legal system in general (Parsons 1962; Calavita 2016), and case-law in particular (McAdams 2015; Elrond and Dale 2008; Mnookin 1975) are an inextricable part of social life, the knowledge produced in, and propagated by courts is clearly outside the domain of Social Science.

The more challenging boundary to draw is that separating between sources produced outside the halls of justice, authored by legal scholars, scientific researchers, practitioners, and clinicians, and binning them as either Legal or Scientific Sources. Here the boundary is certainly vaguer due to the degree of overlap between venues of publication and authors' affiliation. Nevertheless, while no single indicator can perfectly proxy a source's affiliation as either Legal or Scientific, the venue of publication signals which system of information a source is primarily linked to. Thus, publications in Law Review Articles, Specialized Law Journals, Horn books, and Text Books are categorized as Legal Sources, while publications in peer-reviewed Journals and research reports (e.g., Census Bureau) are categorized as Scientific Sources.⁷ Borderline cases – for example, empirical analysis published in a Legal Journal – were examined using the standard set out by Acker (1990: 3-4) in his investigation of the Supreme Court's use of Social

⁷ To obtain robust results, a second indicator was used to differentiate between Legal and Scientific Sources: formal education of the Author. Thus, if the author received a formal legal education, her publication was considered to be a Legal Source; in the event that a source was authored by multiple authors, a formal legal education of one of the authors was used to identify the source as Legal. This method of differentiation did not yield significantly different results, such that the analysis below focuses on the venue of publication, as did similar previous research projects.

Science in the Supreme Court.⁸ This effectively meant that the editorial process (peer-review or student body) was a helpful indicator. Additionally, this allowed the differentiation of a fourth group: Non-Peer-Reviewed sources (NPRs); these are sources that were either self-published, or sources not subject to any formal review process that could be identified.

The differentiation between Legal sources, Scientific sources, and NPRs is rarely undertaken in the literature, as typically only interactions between courts and either of Legal Sources or Scientific Sources are studied empirically. By considering the different source types, a more encompassing view of the interactions among information systems is revealed. In particular, differentiation between Legal and Scientific sources allows for the examination of dynamics previously unexplored in the association between the two, namely, the dominance of Legal Sources compared to Scientific Sources.

In examining the interaction between Social Science (Legal sources, Scientific sources, and NPRs) and the Courts (caselaw), citations serve as proxies for use. Though citations are by no means a perfect indicator for ‘use’ in the respect contemplated here, they are now a well-established tool used for over seven decades in the literature (Acker 1990), though both the method of identifying citations and the nature of citation as proxy typically underestimate actual use (Petherbridge and Schwartz 2012). And though highly variant in form, citations are stable in presence, so that all sources habitually rely on citations in the regular course of authorship (Falk 1994).

⁸ “‘Social science research evidence’ was defined as information derived from the traditional methods of science—through systematic observation and objective measurement, allowing for replication and empirical verification and within the subject purview of the social sciences, the study of behavioral events relevant to individuals and social relations, including psychology, sociology, psychiatry, economics, political science and criminal justice, but not history. [...] This definition [...] is useful because it distinguishes reliance upon empirical information, derived from scientific study, from logical reasoning, case precedent, textual interpretation, historical analysis, and other traditional sources of legal authority.” (emphasis in the original, Acker 1990: 3-4). This test was applied on a case-by-case basis to borderline cases.

When citations are systematically studied – whether for a particular legal issue, sub-field, or tribunal, they can be aggregated into a network: each source functioning as node (or vertex), and the citation functioning as a directed tie (or single-directional edge). When measured over time, a citation network becomes acyclic, in the sense that citations only flow backwards in time, and no two sources can cite each other. Thus, Citation Networks are one of the many types of networks that invite quantification and the use of the tools of network analysis (Newman 2010; Kadry and Mohammed 2014). They are frequently used in Social Science to study information flows and the temporality of Scientific closure (Shwed and Bearman 2010), and have just recently been applied to the study of Law (Sadl and Olsen 2017; Nunes and Hartmann 2021). One particular tool of interest that is commonly employed in network analysis is the measurement of centrality (Borgatti, Everett and Johnson 2013), whereby a number of different measures capture a node's (in this case – a source's) functional position in the network.⁹ In fact, this type of measure (or measures derived therefrom) can provide a different way to evaluate the salience of a case, source, or issue, in that the functional position of a node within the network can be coupled with its individual indicators to determine salience.¹⁰

⁹ Different types of centrality measures include the 'Betweenness Centrality' – measuring the degree to which a node serves as gatekeeper of information to other nodes, 'Eigenvector Centrality' – measuring the degree to which a node's neighbors feature prominently in the network, and 'Degree Centrality' – a simple enumeration of the number of in-degree and out-degree citations made by a source (in-degree: how many times was a source cited; out-degree: how many times did the source make a citation) (Borgatti, Everett and Johnson 2013: 163-181). Additionally, the ties between a node's neighbors in the network adds complexity and sophistication, as the degree of closure and constraint in a node's network can be measured as well, to reveal important implications about said node (Burt 2005: 93-103).

¹⁰ One influential measure of issue salience was set out by Lee and Epstein (2000), and focused on the media attention connected to a legal issue. Other approaches to the measurement of salience adopted in recent works on the use of Social Science in Courts include particular features of the cases studied, such as type of review, constitutionality of issue, overturning precedent, divided vote, resolving circuit split or declaring a statute unconstitutional (Petherbridge and Schwartz 2012: 998-999; Blake 2019: 238-39).

Data & Methods

The data used for analysis below are the same data presented in Chapter 2: all sources identified as participating in the PAS debate (n=684). These sources were qualitatively examined to identify the stance they took on the question of whether PAS should be included in the DSM.

Analysis was conducted using three methods associated with network analysis,¹¹ as well as a fourth test to study the prevalence of citation mirroring. First, the citation network was constructed so that the centrality measures¹² of each node could be measured and recorded. The citation network is divided into four partitions: (1) Caselaw (n=229); (2) Legal sources (n=235); (3) Scientific sources (n=184); and (4) Non-Peer-Reviewed or self-published sources (NPR, n=36),¹³ for a total of 684 sources comprising the complete universe of sources participating in the PAS debate. This is an acyclic citation network, meaning that citations can only be made to earlier sources, and no two sources can cite each other.¹⁴ In this network, the nodes represent the sources, and citations represent the ties thereamong. Two sociograms were then produced, each utilizing a different algorithm determining the location of nodes in space. The first algorithm employed is the Kamada-Kawai, Free, that positions the nodes according to particular attributes of the node vis-à-vis the network. For the sake of simplicity, the attribute shaping the layout in this sociogram is the centrality of the node within the network.¹⁵ The second algorithm employed

¹¹ Network analysis was conducted using the open source program Pajek (Batagelj and Mrvar 2003).

¹² See above, FN 9.

¹³ These publications do not pass through the peer-review process, and receive no professional and/or substantive editing that is officially sanctioned outside the publishing venue, so that these materials are inherently more suspect in their quality and veracity.

¹⁴ In two rare instances (4 sources of the 684, or ½ of a percentage point), articles that were published in a special edition of a particular journal did exhibit mutual citations. In these two instances, one of the citations was randomly dropped to create an acyclic network and analysis were performed. Robustness checks were then performed using the ties that were dropped to see if the choice of tie (citation) had any effect: results indicate that the choice of citation selected for the citations among these two sets of four sources did not influence results at all.

¹⁵ See: Batagelj and Mrvar 2003. For more on force directed graphs, and the use of spring forces to optimize graph energy, see: Kobourov 2013.

was the same base algorithm (Kamada-Kawai, Cluster Optimization), however it is employed in such a way that nodes are positioned according to their attributes vis-à-vis the partition to which they are attached (as opposed to their attributes vis-à-vis the entire network, as conducted above in the first sociogram). This layout produces a view of how central a node is within its cluster/partition, and how central that cluster/partition is to the network as a whole (Batagelj and Mrvar 2003). The sociograms produce a preliminary glimpse of the information flows and network dynamics extant in the citation network. The visual evidence presented in the sociogram can then be tested using quantitative tests.

Second, the volume of traffic between partitions is examined to better understand the information flow within the network. This examination offers additional evidence to support visual findings presented in the sociograms, and provides a more definite and accurate measure of the traffic flowing between the different partitions, and thus, the interaction between partitions.

Third, the functional position of partitions and individual nodes can be further examined using the 'Critical Path Method' (Batagelj and Mrvar 2003). This method assigns different traversal weights to each source, based on the traffic associated with it. In other words, information does not flow equally throughout the network, such that some sources become more important, for instance they are cited more frequently, cited more by other sources that are themselves cited frequently, or occupy a particular functional position in the network (they bridge between two unconnected groups of sources). Thus, the traversal weight assigned to each source indicates how important it is to the flow of information. Moreover, as the PAS network is acyclic, a critical path can be drawn, linking together the most important sources in the network, from the

first (earliest) source, to the last (latest source), to identify the critical path of information flowing forward through time.

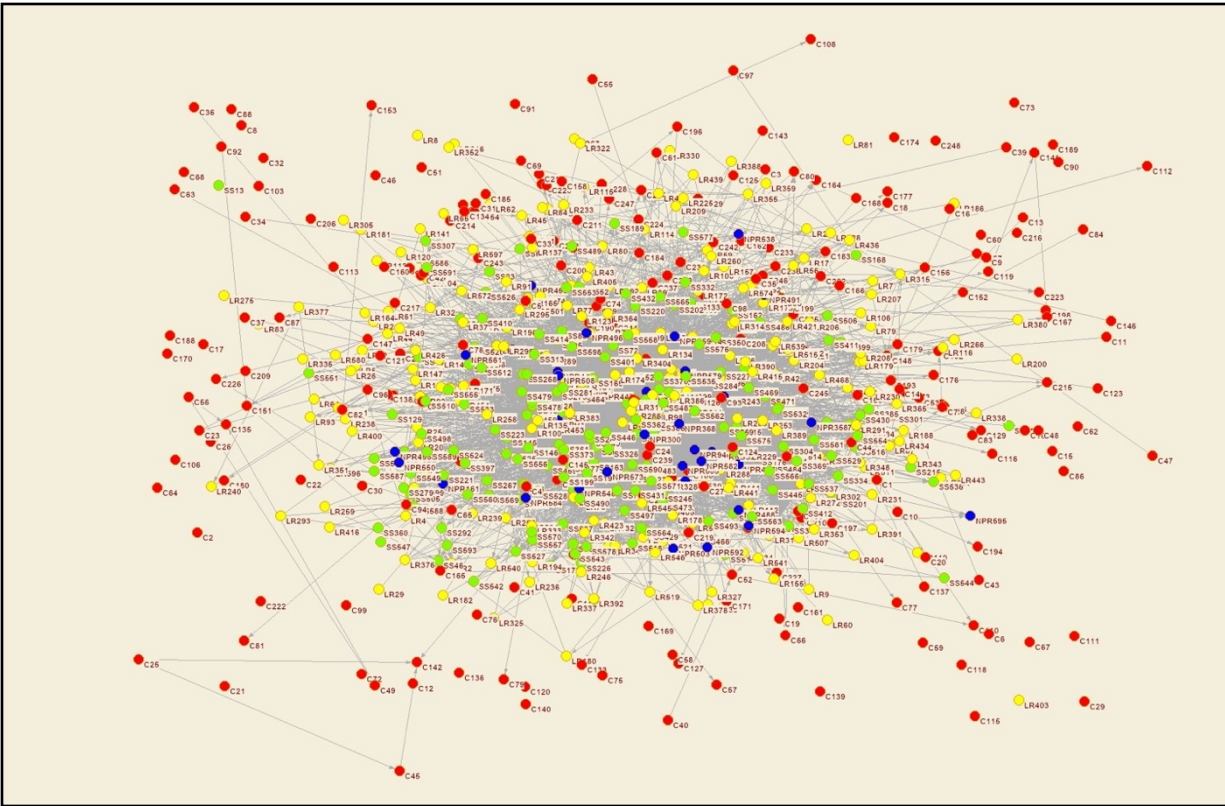
Finally, citation mirroring is examined via co-locating citations: when a source of origin refers to a target source, the target source was examined, and the citations it made were compared to the citations made by the source of origin. If any of these citations were identical, this was considered a co-location.¹⁶ This is the most conservative way to measure the mirroring of citations, as there are most likely many cases in which the source of origin mirrors citations without citing the target source, but was nevertheless influenced thereby (Petherbridge and Schwartz 2012). Co-locating citations are then tabulated and plotted over time (both per year, and cumulatively); the proportion of co-locating citations to non-co-locating citations (unique citations) is then examined to better understand how prevalent this practice is.

Results

A sociogram for the complete citation network is presented in Figure 4.1. While perhaps visually pleasing, there is little to glean from this dense presentation of the entire network. Nevertheless, it suggests a number of interesting dynamics to further investigate. First, there is a marked core-periphery dynamic present in the network, whereby caselaw seems to be located primarily on the periphery, the core is comprised mostly of Scientific and NPR sources, and Legal sources appear to occupy the adjacent position – between core and periphery. Second, while the network seems quite dense, there is a noticeable portion of caselaw nodes that are isolated, i.e., are not connected to any other node in the network.

¹⁶ To qualify as a co-locating citation, the source of origin had to use the target's citation in a similar manner (in support or rejection of PAS). In other words, this sample does not include citations made later in time, denigrating or disagreeing with a citation made by the target source, or using it to directly disagree with the target source.

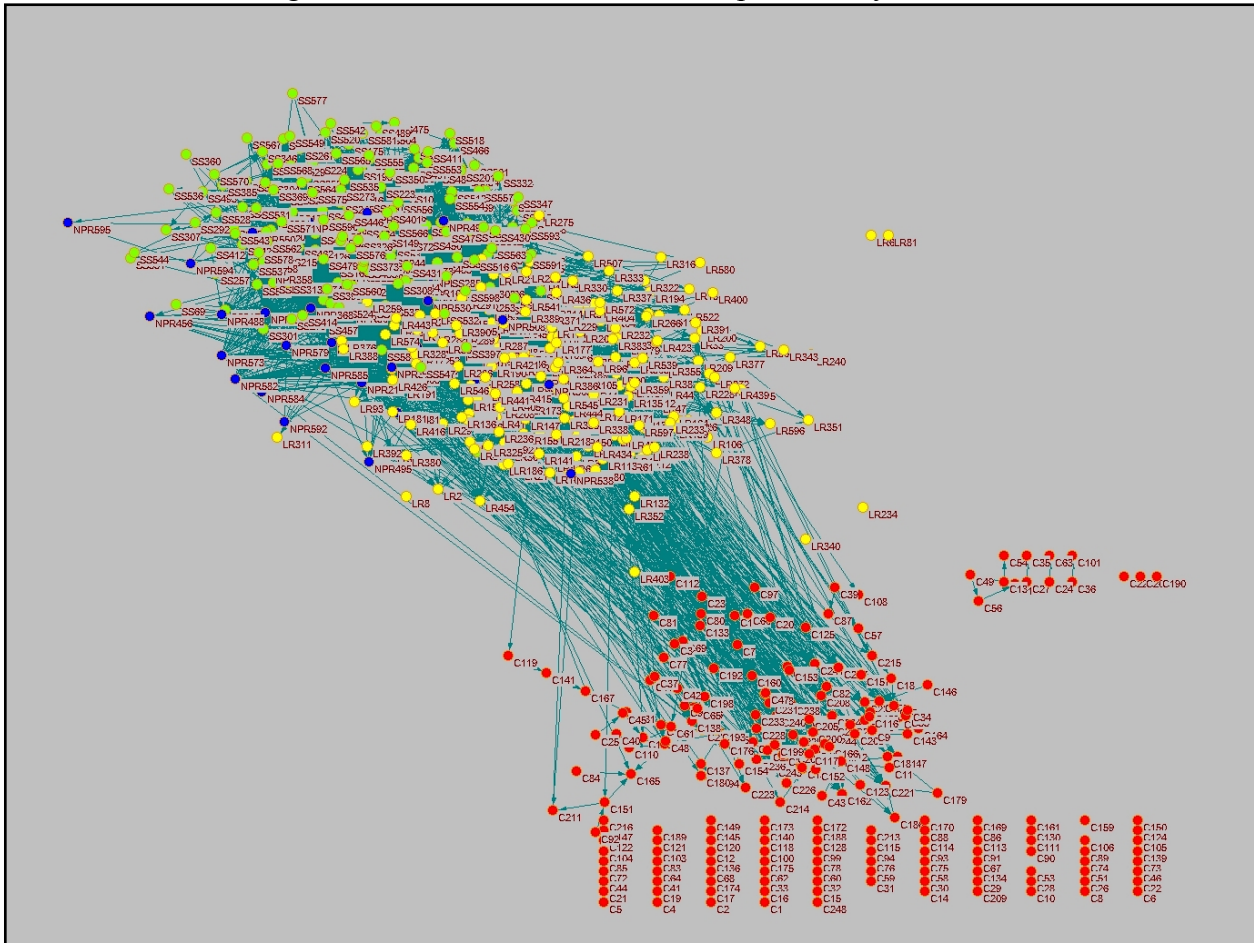
Figure 4.1: PAS Citation Network



In this figure, the red nodes, labeled “Cxx” are court cases; the yellow nodes, labeled “LRxx” are legal sources; the green nodes, labeled “SSxx” are scientific sources; and the blue nodes, labeled “NPRxx” are non-peer-reviewed sources. The “xx” designation indicates the unique index number each source was given during the coding process. For instance, SS113 is the 113th scientific source to be examined and indexed. The nodes in this sociogram are positioned using the Kamada-Kawai, Free algorithm.

Figure 4.2 highlights both the dynamics observed above. As can be seen, courts do in fact occupy a peripheral position, including a large number of network isolates (n=91, approx. 40% of caselaw). Second, the flow of information begins to take on a more definite shape, as it appears that Legal sources and NPRs are positioned between courts and Scientific sources, or in other words, that Legal sources and NPRs serve as brokers in the network, gatekeeping the information flowing from Social Science to courts and vice versa. This visual dynamic is supported by three quantitative analyses: comparing the volume of inter-partition citation, examining the critical path, and comparing the centrality of each partition.

Figure 4.2: PAS Citation Network, Optimized by Clusters

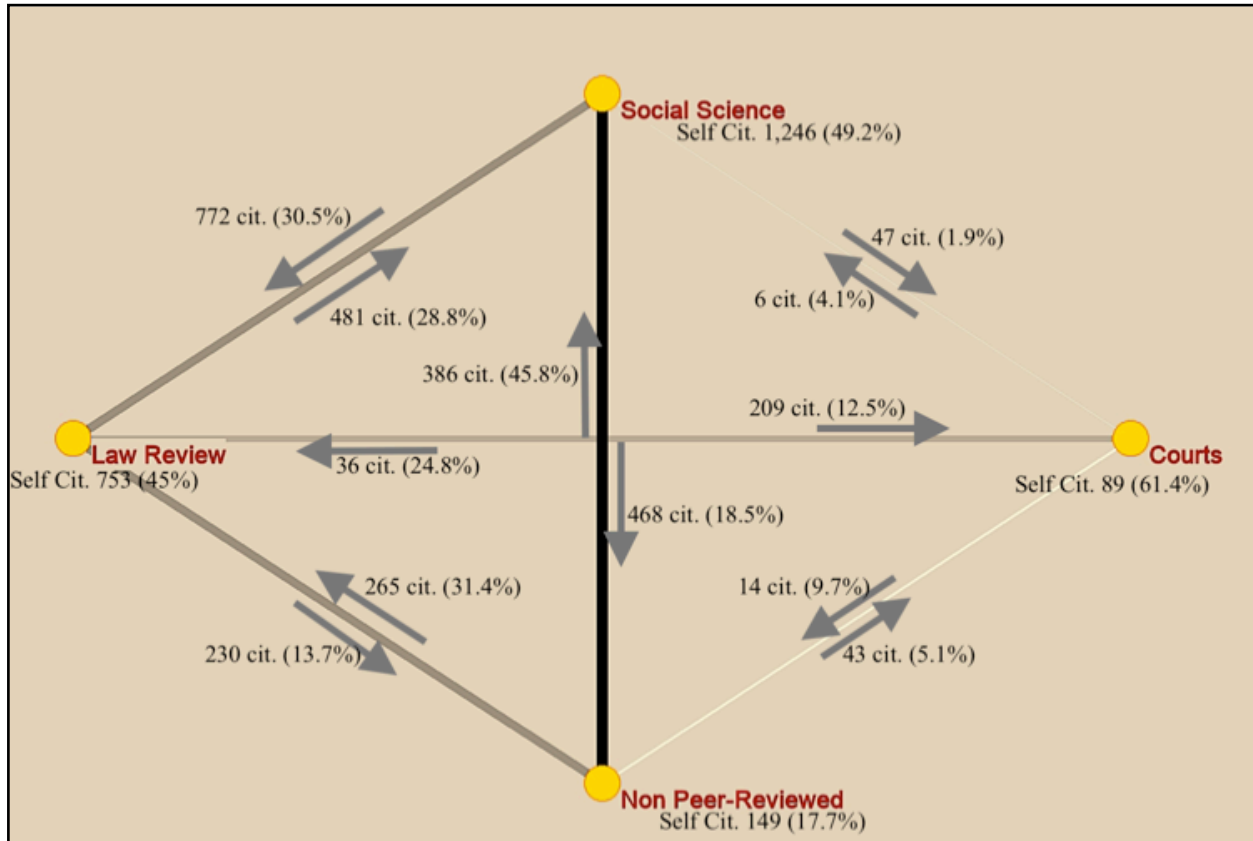


In this figure, the red nodes, labeled “Cxx” are court cases; the yellow nodes, labeled “LRxx” are legal sources; the green nodes, labeled “SSxx” are scientific sources; and the blue nodes, labeled “NPRxx” are non-peer-reviewed sources. The “xx” designation indicates the unique index number each source was given during the coding process. The nodes in this sociogram are positioned using the Kamada-Kawai, Cluster Optimization algorithm.

Figure 4.3 describes the traffic, or frequency of association (the number of citations) exchanged between each of the four venues. It shows that the majority of citations made by courts are self-citations (citing other legal authorities), though the frequency is surprisingly low at around 61%. This means that almost 40% of citations made by courts adjudicating PAS is made to Extra-Legal Sources.¹⁷

¹⁷ Extra-Legal sources include any source that is not binding, and is not part of the traditional tool box utilized by a judge. Thus, these include Legal Scholarship, Scientific publications, NPRs, and expert testimony.

Figure 4.3: Inter-Partition Citation Frequency



In this figure, all four partitions and the citations among them are presented. The width and shade of a line indicates how frequently these two partitions cite each other: wider lines with darker shades indicate more interaction (via mutual citations). The small arrows are labeled with the number of citations an originating partition make to a target partition, and the percentage points indicate how many of said partition's citations are directed towards target partition. For example, the very thin white line connecting Social Science and Courts indicates a very sparse interaction between the two (few citations); Courts cite Social Science 6 times (amounting to 4.1% of all citations made by Courts), and Social Science cites courts 47 times (amounting to 1.9% of all citations made by Social Science).

But, while the court dedicated 40% of its citations to Extra-legal Knowledge (56 citations), only a very meager proportion was directed towards Social Science – just over 4%, while Legal Sources and NPR were cited at much higher frequencies – 25%, and 18%, respectively. The lack of communication between Social Science and Courts is symmetrical, as Social Science rarely refers to caselaw – a frequency of only 2%. Thus, the flow of information is stunted with regards to the interaction between Social Science and the courts, providing strong evidence for the existence of a structural hole (Burt 2005) a network void which presents other

nodes (or partitions) in the network with the opportunity to bridge the gap – and it would seem as though this is precisely what Legal sources and NPRs do in the case of PAS.

The Critical Path depicted in Figure 4.4 exhibits a strong presence of Legal sources and NPR. It includes 62 sources (roughly 9% of the total sample, see Table 4.1), of which over 60% are Legal sources and NPR. Scientific sources, which would ideally figure most prominently in the path, represent about 1/3 of the path. Interestingly, courts also play a role in the path, as caselaw is part of the path.

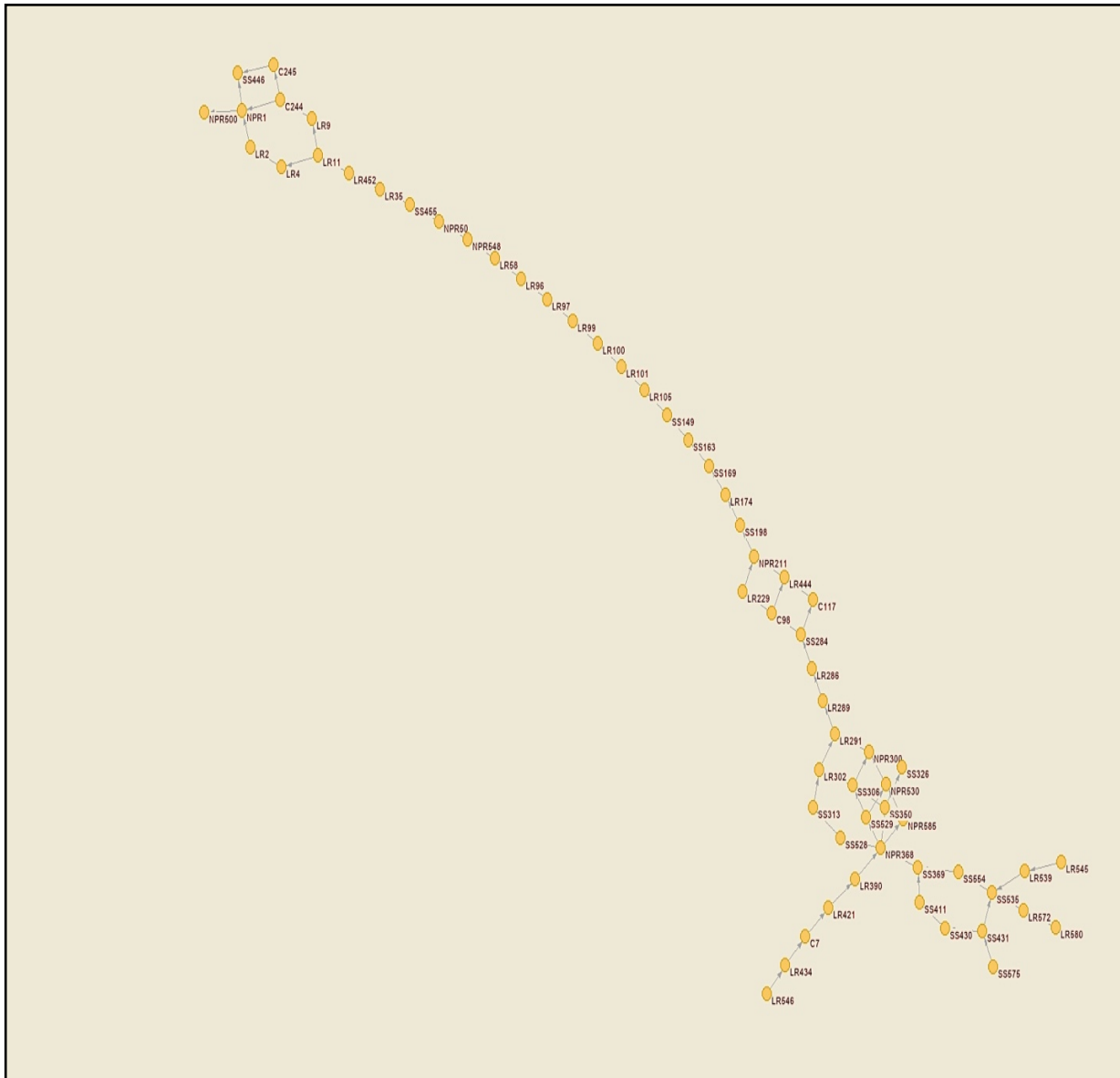
Table 4.1: Critical Path Composition

	Path Obs.	Total Obs.	Partition Proportion	Path Proportion
Legal Sources	28	235	0.119	0.452
Scientific Sources	20	184	0.109	0.323
Courts	5	229	0.022	0.081
NPR	9	36	0.250	0.145
Sum	62	684	0.0906	1.0

The third quantitative analysis conducted is the comparison of partitions’ centrality in the PAS network. Centrality can be measured in a number of different ways, depending on the question raised. In this instance, the centrality measured is betweenness centrality, which measures the degree to which a source serves as a gatekeeper of information within the network, i.e., how much of the information flow must be directed through a source. This centrality measure is particularly apt, considering that the question interrogated here primarily deals with the flow of information in the network, as influenced by the gatekeeping function assigned to nodes and partitions. To provide more robust results, a second centrality measure is tested as well – the traversal weights assigned to each source in creating the Critical Path. While not a traditional centrality measure, traversal weights are instrumental in answering the question at

hand: which of the sources and partitions figures more prominently in the flow of information throughout the network. Results are presented in Table 4.2.

Figure 4.4: Critical Path in PAS Network



This figure shows the critical path of PAS development in the network (beginning on the top-left – earliest sources, and ending on the bottom-right – latest sources). Nodes/sources are labeled according to their partition: “Cxx” – courts; “LRxx” – Legal sources; “SSxx” – Scientific sources; and “NPRxx”.

Table 4.2: Comparing Partition Centrality Measures

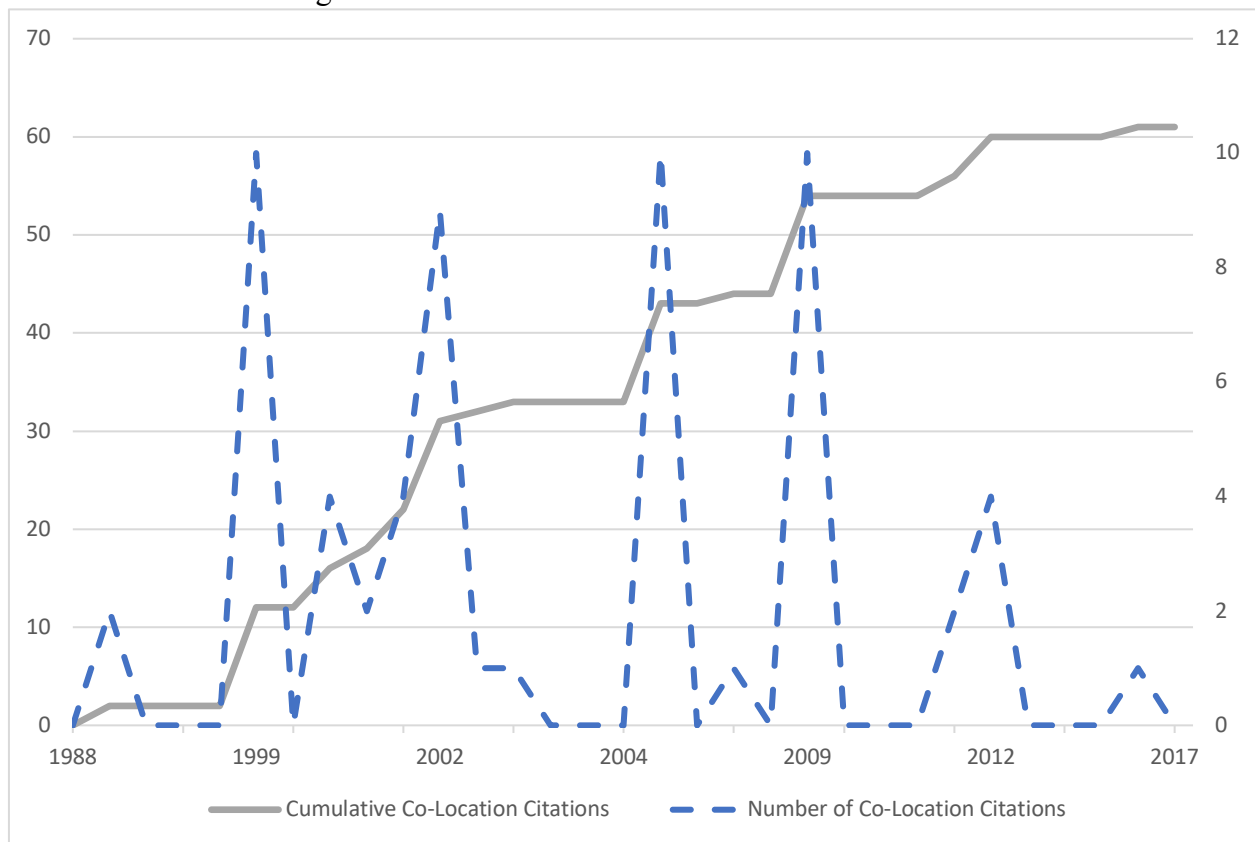
Partition	Betweenness Centrality Mean (Std. Dev.)	Traversal Weights Mean (Std. Dev.)	Number of Obs.
Legal Sources (L)	379.16 (1862.3)	.031 (.087)	235
Scientific Sources (S)	892.55 (4075.2)	.045 (.097)	184
Courts (C)	104.75 (986.4)	.002 (.016)	229
NPR (NPR)	2926.4 (7841.9)	.108 (.187)	36
Diff: L – S (p-value)	513.38 (0.51)	.014 (.45)	--
Diff: L – C (p-value)	-274.4 (1.0)	-.028 (0.002)**	--
Diff: L – NPR (p-value)	2547.27 (0.000)***	.078 (0.000)***	--
Diff: S – C (p-value)	-787.8 (0.05)*	-.042 (0.000)***	--
Diff: S – NPR (p-value)	2033.88 (0.000)***	.063 (0.000)***	--
Diff: C-NPR (p-value)	2821.68 (0.000)***	.105 (0.000)***	--

† p<0.1, * p<0.05,** p<0.01,*** p<0.001

* Conducted using two-sample t-test with unequal variance for each partition paired together to test differences in each of the outcomes described above.

When directly comparing between the centrality of partitions in the network, results indicate that most central in the network is the NPR partition. The least central partition in the network, unsurprisingly, are the courts. Finally, Legal and Scientific sources cannot be distinguished statistically. Thus, it cannot be said that Scientific sources figure more centrally than Legal sources in the network, and the reverse is true as well. These results indicate the centrality of a partition in the network as a whole – they do not consider, say, how central Legal sources are to courts, how much of a gate-keeping function they serve, or how important particular sources are to the flow of information (this is covered in the Critical Path). Nevertheless, these data show that throughout the tortuous rise and fall of PAS as a Social Scientific theory, Scientific sources were not cast as the protagonist.

Figure 4.5: Co-located Citations in the PAS Network



The dashed line, referring to the right axis, indicates the number of co-located citations observed per year. The solid line, referring to the left axis, is a cumulative count of the number of total co-located citations in the sample.

Figure 4.5 portrays the co-location of citations. In all, 61 co-located citations were found among court cases that made at least one citation to an Extra-Legal source in the network (n=31). The mean number of citations to Extra-Legal sources is roughly 0.4 per case in the entire caselaw sample (n=229); among the culled sample, the mean rises to 2.64. And of these 2.64 citations to Extra-Legal sources made by courts, 1.96 citations mirror an earlier source. In terms of proportions, this means that only 25.75% of citations made to Extra-Legal sources by courts, were to unique sources.

An examination of the co-located sources shows that many could have been better selected. These sources are clearly more central in the network, exhibiting a mean Betweenness Centrality and Traversal Weights that are 5-7 times greater than the sample mean. However, the median is not statistically different from the median exhibited by the entire sample, meaning that the average is radically amplified by a few highly central sources cited by courts, such that the remaining sources must have been extremely peripheral to the network (an indicator that they were not influential, which may imply lower quality). Of the 28 sources that were mirrored, 21 were Legal sources, 4 were Scientific sources, and 3 were NPR. Examining the PAS Validity score assigned to each source shows that, on average, the sources were more likely to support PAS rather than to reject it. This is all to say, that the sources echoed and artificially replicated throughout the network are, in hindsight, less than ideal.

Discussion

The results demonstrated structural failures in the flow of information throughout the network. A preliminary glance at the network as a whole suggested a core-periphery dynamic. By then laying out the network in a manner that highlights the partitions therein, further visual evidence of this core-periphery dynamic was provided, but more importantly, it revealed a

substantial structural hole in the network between Social Science and courts, a hole that seems to be bridged by Legal sources and NPRs. Three quantitative analyses were then conducted to provide further evidence for the existence of this structural hole, and the functional positioning as brokers assumed by Legal sources and NPR. First, the frequency of interaction (via citations) was examined – showing that the sparsest interaction in the network takes place between Social Science and courts, and that courts more frequently rely on legal sources and NPR. Second, the Critical Path was constructed to show that over 60% of the sources most crucial to the flow of PAS, were Legal sources and NPR. Third, the centrality of each partition was compared, showing that NPR was actually cast as the protagonist, rather than Scientific sources, that could not be statistically distinguished from Legal sources.

These results, coupled with evidence to demonstrate very frequent citation-mirroring, leave little room for doubt that the network, the information flow within it, and the knowledge produced thereby (e.g., resolving custody litigation), were problematic, to say the least. The question now becomes normative, i.e., is this how information ought to flow in the network? The short answer is no. The long answer is, naturally, more complicated. First of all, identifying NPRs as both poor sources of information and as poor brokers of information is straightforward. However, some of the most central sources – many of which appeared in the Critical Path – were in fact NPRs. This seems like an evident failure. Second, the important question to raise is whether Legal sources are ideally positioned as brokers between courts and Scientific sources. There are a number of possible answers – some affirmative some negative¹⁸ – but perhaps the point to make here is that, even if Legal sources are positioned properly, blame should be shared

¹⁸ Chapter 5 discusses this particular issue in length.

by all, as the network as a whole exhibited multiple failure in the flow of information to and from all partitions.

Do these results explain the PAS puzzle raised in the introduction? Did the faulty flow of information and citation-mirroring cause PAS to overstay its welcome by 10 years? This is not possible to determine from the analysis conducted above. Causation is not established, so that it is unclear served as truck and what as trailer. Furthermore, the causal relationship between information flow and citation-mirroring is not established, though they are clearly empirically linked. Thus, there are still many important and relevant questions to answer. Is the observed information flow a function of the issue (PAS) or is it the other way around? In other words, it is possible that contentious ideas such as PAS beget contentiousness within the network, leading to the disconnect between different partitions, a disconnect which then presents opportunity for brokerage. It would be helpful to study other cases that are similar to PAS to explore this possibility.

It is clear, however, that neither of the observed information flow, or the mirroring of citations (or the premature transfer identified in Chapter 2) were helpful in resolving the PAS debate in a timely manner. The entrenchment of PAS in the system, may have been obviated – even in the face of the said dynamics – if a clear and efficient exit mechanism existed in the court system. Thus, while courts are well adept at adjudicating the legality and constitutionality of law, they are not the ideal place to adjudicate the validity of Science (Grunwald 2013; Faigman 1989; Haack 2009; Sanders 2009; Richman 2004). A great deal of attention is directed toward the front-end process, i.e., the entering of Social Science into court, and it should be as this is a crucial juncture (Monahan and Walker 1988). Various suggestions for improvement have been proffered by scholars over the years (Huntington 2018; Sanders 2009; Monahan and

Walker 1988; Levine 1984; Sperlich 1980), though none have come to pass. Perhaps it is time to direct some attention toward the back end, in creating a feasible and efficient mechanisms to identify cases such as PAS, hopefully before they have celebrated their 10th birthday, thus allowing a timely departure of Scientific evidence that is found to be invalid.

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CHAPTER 5: THEORETICAL INTERVENTION & POLICY IMPLICATIONS

The three forgoing studies interrogate a number of previously identified failures, while demonstrating new and under-explored failures in the association between Social Science and Law. This chapter succinctly summarizes the findings made in the studies, placing them within the context presented above in Chapter 1 on the failures of using Social Science in court. The normative implications flowing from the issues are then explored in the second half of the chapter.

PREVIOUSLY IDENTIFIED FAILURES

(1) Premature Transfer

Chapter 2 highlighted this faulty mechanism, whereby unsettled, unformed Scientific knowledge enters the courts by way of citation and the use of expert testimony. Premature Transfer is not itself a system failure, but rather a pragmatic observation resulting from various failures in the use of Social Science in courts: (1) this is likely to occur during the early stages of a developing new scientific theory or framework, and as science itself is subject to a host of social pressures, these early stages should be viewed with suspicion, and given time to coalesce in the scientific community; (2) even a well settled and formed theory can be distorted by the adversarial process, such that the potential for mis-use and mis-application of scientific knowledge is ever present. Furthermore, the pressures created by the adversarial system encourage attorneys to utilize any and all sources that may aid in obtaining a better resolution for their client; thus, PAS was referred to in custody cases, as it provided litigating parents (typically fathers) scientific authority and thus leverage in negotiating child custody; (3) the legal system in

general, and Family Courts in particular, do not have a uniform and reliable scrutiny process to evaluate incoming scientific evidence, so that PAS – a highly questionable, still forming theory – was able to enter the court system. The standard used to determine the admissibility of experts’ testimony was ineffective in preventing the use of PAS, regardless of which standard was applied; and (4) in conducting their personal assessment and considering the weight of PAS when determining the best interest of the child, judges and attorneys lack the required level of proficiency that would allow them to cast doubt upon PAS, and either reject it outright, or be more patient with its application until it has passed through the scientific peer-review process (and then reject it, as did the Social Sciences).

(2) Entrenchment

Chapter 2 shows how entrenchment actually happened in practice: Social Science prematurely entered the legal system, remained within it, and was used to dispose of cases for roughly 30 years, 10 of those taking place after PAS was discredited by the Social Sciences. PAS should never have entered the court system (hence the prematurity of transfer), and it should have never stayed as long as it did. To drive the point home, jurisdiction-specific analysis presented in the appendices to Chapter 2, demonstrates some states (e.g., OH) have yet to eject PAS out of their knowledge system. PAS provides further nuance to the entrenchment issue in that it highlights its backend failure: no exit mechanism. Much has been discussed about how and when Social Science enters the legal arena, but much less ink has been lavished on how it may exit the court system. This is most likely because, to date, the only official mechanism set in place is the same mechanism used to discriminate among caselaw and statute. Thus,

constitutional challenges, breaking with precedent, and creative interpretation are not appropriate to adjudicate Social Science, nor are courts the proper venue to undertake this endeavor.¹

NEWLY IDENTIFIED FAILURES IN THE ASSOCIATION OF LAW AND SOCIAL SCIENCE

(1) Different Modes of Obtaining Extra-Legal Knowledge

State Courts in different jurisdictions find their Social Science in disparate ways. This itself may be troubling and an indicator for the poor uniformity in the processes of evaluating Scientific evidence. However, more troubling is the fact that the avenues leading from Social Science to court, namely, expert testimony, Legal sources, Scientific Sources, and NPR sources, are themselves statistically linked: for instance, expert testimony is found to negatively associate with the use of Social Science via citations. This is not an exhaustive list of the avenues from Social Science to court (e.g., the use of Social Science presented by Amici was not examined), so that there is still much to explore. However, it is clear that (a) there are different ways to bring Social Science into court; and (b) these are balanced in various manners such that they are statistically distinguishable. The difference among jurisdictions relates not only to the preference in using one method to obtain Social Science or another, but in the frequency of use, and thus the overall usage of Social Science in court.

¹ An important strand of the literature discusses the use of Social Science on the legislative level rather than in the judiciary. This seems like a much better fit for Social Science due to the level of generality, the structural features of legislatures (committees, broad appeal to various constituencies, greater resources, etc.), and character of the legislative process (which is not tasked with resolving an immediate dispute). While appealing, the use of Social Science by legislatures is not without its problems, see: Faigman 1999: Chapter 5 (describing how Social Science can be manipulated to produce skewed results to appease certain constituencies); Huntington 2018: 304 (discussing the lack of standards to ensure the quality of empirical evidence presented before legislatures). While a fascinating, and relevant issue, this is beyond the scope of this project.

(2) Extensive Diffusion

Social Science, upon entering the courts, assumes a unique authority. Once inside the system, it has now the air of authority granted to it by whomever suggested it to the court, by the original citing court that deemed it useful, and by the researchers that authored it. This authority is further augmented if a source is echoed by future judges. In such instances, cases citing Social Science sources diffuse very efficiently throughout the court system, penetrating deep and wide. These cases spread wide and far, as they are cited more often by courts, and by secondary materials – which provide additional authority to the source by doing so. These cases also penetrate deep into the system, as they exhibit the rare ability to break state boundaries and travel to new jurisdictions, a privilege typically reserved for the rare high-leverage case. Moreover, in adjudicating these cases, the judges – who cite Social Science – also reach further into the knowledge network in drafting their opinion, as they cite more legal authorities from outside their jurisdiction as well. This finding is not problematic *per se*, but when extensive diffusion propagates “Junk Science” throughout the court system, poor outcomes are likely to surface.

(3) Brokerage and Information Flows

This dynamic, demonstrated in Chapter 4 using the PAS network data, is closely linked to the question of scrutiny and evaluation of Social Science in court, but nevertheless distinct. This is because the brokerage described represents a structural failure rather than a procedural one. In other words, the procedure for evaluating evidence is acutely necessary, but its effectiveness is greatly hindered by the structure of the network. When judges cite Social Science – with the purpose of relying on Scientific Authority – the best possible sources will always be Classical Scientific sources that produce peer-reviewed works. This should not be taken as a denigration of Law Reviews – which serve their own crucial purpose in the court system (Petherbridge and

Schwartz 2012; Sirico 2000; Acker 1990). Moreover, Law Reviews, specialized legal journals, and other legal sources are not solicited only by authors with no expertise in Science; indeed, many researchers publishing in Law Reviews are Scientific experts themselves, and some even share a dual-proficiency in Science and the Law. However, the point here is not to spare the feelings of authors and journal editors, but to highlight a system failure: Traditional Legal sources are not subject to the same peer-review process that Classical Scientific sources must traverse. The examining and editorializing processes are inherently different, the most important aspect being that Legal sources are not reviewed for their scientific methodology or overall veracity. This problem is further compounded when NPR sources make their way freely into courts and become central and impactful therein, as was demonstrated by the case of PAS.

(4) Mirroring Citations and the Echo-Chamber

In addition to an observed preference toward particular venues to obtain Social Science sources, judges also exhibit a certain tendency to mirror earlier citations made by their colleagues. The use of early citations is not, in and of itself, problematic, though as any parent would implore of their child – all in moderation. The case of PAS demonstrated an extreme use of citation mirroring, such that only $\frac{1}{4}$ of the total citations made to Social Science were unique and original sources. In reaching out to such unique sources, the court system is imbuing its knowledge network with more information, thus allowing itself a more robust account of any idea circulating through it. Though finding such unique sources entails certain costs – some may be prohibitive to lower courts – they can undoubtedly provide a more accurate account of any particular idea or issue. Also problematic in the notion of mirroring citations, and no doubt a contributor to entrenchment, is the artificial authority grated to such mirrored sources. Given the right path, a misleading source can balloon to gargantuan proportions, being cited as authority

and relied upon in the disposition of hundreds and thousands of cases, as was observed in the PAS sample.

(5) Lack of Information Feedback

As the literature in this field often takes the legal system as the subject of inquiry, examining dependent variables (qualitatively and quantitatively) such as case outcomes, salience, frequency of use, etc., the arenas of academia and Social Science receive less attention. The very topic of inquiry is dubbed “use of Social Science in court” implying a narrower investigation into the more general association between Law and Social Science. The studies illustrate that Social Science is not immune to wrong doing, specifically with respect to Law. It is true that Social Science is not conducted in service of the Law, but it is also true that denizens of the Ivory Tower ought not to be completely disconnected from legal machinations pertaining to their field of research. Legal Scholars and expert witnesses that routinely engage with the Law tend to be more aware of developments within the legal arena, but it seems as though Social Scientific researchers are much less so: the PAS data reveal that the body of Classical Social Scientific research engaged in the PAS debate made a meager 47 citations to courts, representing less than 2% of its outgoing citations. There is no expectation that Social Science ought to routinely draw knowledge from courts, but the case of PAS reveals an acute disconnect between the two. Social Science would benefit from a more frequent use of caselaw in two instances at least: (a) when the debate over Scientific validity and veracity spills over into courts; and (b) when the debate in courts can serve as raw material to demonstrate how an idea is being applied in practice. Both the above instances are well documented in the case of PAS. Furthermore, a careful qualitative examination of all Social Scientific sources revealed that most of the researchers classically trained in Social Science (psychologists, psychiatrists, sociologists, social workers, etc.) were

well aware of the controversial status of PAS in court, more often than not lamenting its exitance. Yet, very few researchers metaphorically reached out to the court system (via citations) to extend their analysis to the state of PAS in courts, possibly because they are themselves not proficient in the Law.

Remember that Social Science is inherently linked to society, the legal system and courts included, so that the events transpiring in court must serve as some form of input to the Social Scientific research process – a positive feedback loop as it were. However, this feedback loop is, at best, severely flawed, and at worse, non-existent. This is by no means a call to unify Law and Social Science, or to foist one mode of inquiry unto the other; rather, this is simply an observation of structural failures in the information flow.

Combining the above findings in a more general framework for the association of Social Science and Law, Table 1.1, as presented in Chapter 1 can now be updated as follows (bold items represent the theoretical intervention made):

Table 5.1: Failures Identified in the Association of Law and Social Science

Source of Failure	Symptom of Failure
A. Inherent Differences between Law and Science	<ol style="list-style-type: none"> 1. Disparity of Goals 2. Generalization level of results 3. No Legal Basis for Social Science 4. Science is not Purely Objective
B. Organizational Features of the Adversary System	<ol style="list-style-type: none"> 1. Adversarial System Distortions 2. Entrenchment → No Exit Mechanism 3. Expert and Amici Selection Bias 4. Insufficient Scrutiny of Scientific Knowledge 5. Disparate Modes of Obtaining Extra-Legal Knowledge 6. Sub-Optimal Brokerage 7. Extensive Diffusion
C. Individual Features of Legalists	<ol style="list-style-type: none"> 1. Legalists not Proficient in Scientific Method 2. Translation Loss of Information 3. Echo Chamber and Judicial Mirroring of Citations
D. Structural Features of the Social Sciences	<ol style="list-style-type: none"> 1. Lack of Input from Courts 2. Researchers not Proficient in Legal Inquiry

POLICY & IMPLICATIONS

This segment focuses on the normative implications flowing from the failures identified above, suggesting where possible, general guidelines for policy intervention. Special attention is paid to the works of scholars in the field who have expertly identified and suggested corrections of their own. The goal therefore, is not to duplicate their efforts, but rather to explore additional avenues of thought in the hopes of addressing and minimizing particular failures, to the extent that this is feasible.

Brokering Between Social Science and Courts

This issue, and the way it was presented above may draw some scorn, as it may be understood to denigrate the value of Legal sources. The argument however is more nuanced. In drawing upon Extra-Legal sources to resolve an issue that is inherently linked to Social Science, there are sources that are more helpful than others. The problem, as stated above, is not in the quality of authorship, but in the editorial process. The many potential pitfalls of poor Scientific research have been carefully detailed by previous scholars (Grunwald 2013; Faigman 1989), so that it is clear the dangers intrinsic to scientific research present themselves in publications submitted to legal journals as well. But, unlike the peer-review process, Legal sources are less-equipped to identify and address said dangers, and thus more likely to published works that exhibit at least some flaws. NPR sources present an even greater potential of publishing works of questionable quality.

The case of PAS is admittedly extreme, as it involved publications of *very* poor quality, and a great deal of them, most of which were found among the pages of Legal sources and NPRs. Again, this is not the typical case, and there is good reason to believe that Legal sources are able

to identify such very low-quality works (though NPRs less so), and intervene via correction or rejection. Therefore, the real problem lies on the margins (as does most of life), where works exhibiting smaller flaws manage to pass through the editorial process undetected. This is a simple question of probability: the rigorous peer-review process is more likely to identify flaws than the legal editorial process, mostly due to the fact that the latter is not created for that purpose. Thus, the overall quality (read: scientific veracity) of sources published in Legal sources may be lower than the overall quality published in Scientific sources – when applied to inherently scientific matters.

If this is indeed the current state of affairs, there are three possible policy interventions. First, Legal sources can assume a different role in the network, and thus in facilitating a better flow of information. Huntington (2018: 308-310) suggests that legal scholars must become translators and synthesizers of Social Science, as they are best positioned to digest the knowledge and apply them to legal rules and policies.² This position, based on inimitable work on the increasing penetration of empirical research into Family Law, is supported in part by the data presented above. Assuming the role of translators, Legal sources can greatly benefit courts, especially when much translation is required, and its application to a legal issue is not plainly evident. However, synthesis presents a certain difficulty, as it necessarily involves a scientific determination, which is then not subject to peer-review. In lieu of the synthesizing function, it may be more helpful for Legal sources to assume the duties of an early warning system, i.e., to identify that an idea or literature is unsettled, and/or that it is controversial, and/or that it has not yet attained positive-closure in the relevant Scientific community. This function already exists:

² There are additional voices calling for a more robust role for Law Reviews as translators, but also specifically as brokers between Social Science and courts, as they are thought to serve as efficient instruments to disseminate knowledge created in the Social Sciences, see: Hafemeister 1992.

early on in the PAS debate in Social Science, a number of Legal sources (Law Reviews and specialized legal journals) published works warning courts about the dangers of using PAS in courts (Knowlton and Muhlhauser 1994; Wood 1994; Myers 1993; Patterson 1992; Ricketson 1991; Oberdorfer 1991). The authors, all legal Scholars, raised the call, which went unheeded: only two of these sources were ever cited by courts a total of eight times. As the reader will remember, PAS became contentious in courts only around 1996, but the first of these sources to be cited was Cheri Wood's article from 1994 cited in a NY Family Court in 1994.³ This shifts the blame from the Legal sources to the courts, but it does not change the fact that this function would be helpful and useful to judges in providing a preliminary filter for unwanted Scientific evidence.

A second policy intervention relates to the use of specialized legal journals. Gone are the days where arithmophobia⁴ drove legalists into their profession. There is today a plethora of sub-fields within the Law that deal in highly sophisticated quantitative analysis, and an equally rich variety of specialized journals such as the *Journal of Law & Society* and the *Journal of Law and Economics*, which employ a double- or single-blind peer review process.⁵ Indeed, these are the sources that are ideally placed to broker between Scientific Knowledge and courts, as many of the authors are proficient in both Science and Law, and their work is then thoroughly evaluated on its merit. Moreover, an effective argument in support of positioning these journals as brokers is the simple fact that as information travels through more nodes – in this instance, Scientific sources, cited by Legal sources, that are then cited by courts – it begins to decay, or in other words, the geodesic distance between the transmitting and receiving node is negatively

³ *Matter of JF v. LF*, 181 Misc. 2d 722, 694 N.Y.S.2d 592 (Fam. Ct. 1999).

⁴ Arithmophobia is the fear of numbers.

⁵ The *Journal of Law & Economics* employs a single-blind peer-review process, see: <https://www-journals-uchicago-edu.proxy.uchicago.edu/jle/instruct>, last visited July 11, 2021.

associated with the quality of the information conveyed (Borgatti, Everett, and Johnson 2013: 15-19). Unfortunately, as stated above, the primary differentiator between Legal and Scientific sources was the review process employed by a source, so that journals such as the two just referenced, were considered to be Scientific sources. This brings us back to square-one – judges are citing Legal sources three times more often than they are citing Scientific sources, even those sources that are substantively located within the legal discipline. Therefore, the question becomes how can such specialized journals become more accessible to judges? The answer to this question is beyond the scope of this essay, but considering the evidence presented above, it warrants some institutional attention.

Third, Social Science has a role to play, even if minor. One avenue through which Social Science can appeal to courts is as Amici (Reinhard 2020; Blake 2019), though this route has its problems (Collins et al 2015; Rustad and Koenig 1993), and is not frequently used in lower courts, where the mass of litigation takes place. Another route Social Science might pursue to aid courts is through special editions and annual reviews. At times, journals publish a volume dedicated to one issue or question. These editions typically contain a great deal of expository information, including the primary concerns and challenges the said issue must confront. Similarly, annual reviews typically tackle a topic within a sub-field, producing an essay that describes the state of the topic within the literature, again providing helpful markers to courts. The same work in reverse: Scientific scholars would benefit from examining various sources discussing the state of a particular statute or sub-field of law, for instance as the Family Law Quarterly has been doing for quite some time. Both the above undoubtedly take place – legalists studying reviews and researchers studying legal surveys, however, as is clear from the results, this does not happen often enough. Therefore, the relationship between Law and Social Science

can be tightened by increasing communication. The PAS data revealed that the sparsest channel of communication was observed between courts and Scientific sources (going both ways).⁶ While this channel of communication is measured only in terms of citations, which underestimate the actual volume and quality of communication (Petherbridge and Schwartz 2012), it remains a proxy for use, and use is slight. An active effort to consider the Law or Social Science – when necessary – can strengthen this line of communication, leading to other formal and informal lines of communication which may eventually shape courts’ citation preferences.⁷ Again, this dynamic is not absent and can be observed, whether through Professional Organizations bringing joining legalists and scholars such as the Association of Family and Conciliation Courts,⁸ through cooperation between courts and universities (Huntington 2018: 305) or via continuing Judicial Education programs (Domitrovich 2017). But the fact remains, that if this connection were strong (enough), it would appear in the data.

It is evident that there is something of a catch, or internal inconsistency in this argument. On the one hand, judges should drink directly from the well, surpassing the brokerage and mediation of non-scientific sources. On the other hand, they do not possess the knowledge to internalize and process the information published in the Scientific sources. The answer, as always, lies somewhere in the middle. Legal sources are not systematically awful at presenting Scientific Knowledge or even in synthesizing it, just as judges and attorneys are not completely devoid of scientific sophistication. The greater point made here, is that there are better, and worse flows of

⁶ It would be helpful to study whether this finding extends to fields outside of Family Law, and outside of Social Science, and if it is better or worse.

⁷ The underlying goal would be to raise proficiency in Science, thus lowering search costs in obtaining Extra-Legal Knowledge, that can ultimately shape citation preferences. There is in fact evidence to support this claim: judges with a formal education in a Scientific discipline exhibit a greater proclivity to cite Scientific sources (Acker 1990: 9; Blake 2019: 236). It would be infeasible to require that all legalists obtain a formal education in Science, so that the challenge becomes raising the floor to a level which would allow preferences to shift.

⁸ E.g., the Illinois chapter of the AFCC organizes an annual conference with Family Judges, Matrimonial Attorneys, and scholars from various fields, see: <http://www.afccillinois.org/illinois-events> (Last visited July 11, 2021).

information; the flow of information – as presented above – is problematic, as courts systematically rely on Legal sources to make scientific determinations. On a case by case basis this may be efficient, but when viewed from the perspective of the entire Knowledge network, this is undesirable.

Evaluating Incoming Scientific Evidence

This is both a simple, yet incredibly complex procedural issue. It is simple due to the fact that all that is required is a straight-forward test that must be applied before Social Science can be used in court, regardless of the avenue through which it enters. Monahan and Walker have already laid out a clear and enticing 4-step test to employ (1988: 468), that has been endorsed by other scholars as well (Huntington 2018: 303; Faigman 2010; Falk 1994: 49; Acker 1990). The incredible complexity lies in the application of the test, for instance how is a judge to evaluate the methods employed by the research at hand? How is she to definitively deem that it has received support by other research? Not only are these difficult questions to answer – even for the Scientifically inclined – they are also time-sensitive, as has been demonstrated by the case of PAS. If a judge conducted the Monahan and Walker test in 1990, five years after its ‘inauguration’, PAS may have passed as it was then supported by a body of knowledge, published in peer-reviewed journals, employed clinical methods recognized in the professional community, and was generalizable to a particular issue (was a child suffering from parental alienation syndrome).⁹

Monahan and Walker further recognize that even before any test is applied, the manner in which the source is obtained is crucial as well (1988: 468-471). This is where the burden shifts

⁹ Some sources to serve as basis for this test would be: Palmer 1988; Gardner 1989; Gardner 1985.

from structural failures in the network to the legalists themselves. Sub-optimal brokerage and citation preferences notwithstanding, Extra-Legal Knowledge is eventually obtained. An individual legalist cannot shift network-wide dynamics, nor can she single handedly influence the citation patterns of her peers. However, she can still run a step-0 test on the sources she is confronted with, to determine whether or not this source should even be considered for examination. This is distinct from evaluating the methods, generalizability, or support by the scientific community,¹⁰ as it focuses first on basic markers of scientific validity: the review process prior to publication (if at all there was one). This need not be a high bar, but readers would be surprised at how many of the materials in the PAS debate would not pass even the lowest bar. Such markers might include: non-peer-reviewed sources (already covered), self-published materials, pseudo-academic blog posts, publications in obscure and discontinued journals, and publication in journals unaffiliated with an academic institute or professional organization. This list is not exhaustive, and should be updated to include the many problematic markers omitted here. Using such a ‘step-0’ test renders the evaluation quantitative rather than qualitative, or more of a legal rule than standard as it were. Thus, it may be the case that the legalist will (sub-optimally) obtain a great treasure of sources, but a well-functioning step-0 would rule out the most suspect sources. Furthermore, to alleviate pressures created by the adversarial system and the balancing of one’s professional prestige,¹¹ the step-0 examination of

¹⁰ This stage of the test is actually near-impossible to determine accurately, as identifying the objective state of an issue is much more difficult than it may seem – a mere scan of the literature is not always enough (see: Shwed and Bearman 2010). This raises the question of how accurate must such an assessment be, harkening back to the break between *Frye* and *Daubert*, regarding general acceptance in the field vs. a more exacting test (Parry 2004).

¹¹ Though described only in terms of a ‘debate’, PAS became a figurative battleground between proponents and opponents, as scholarly debate often led to very personal attacks, some of which spilled over into the pages of published works. (see: Dallam 1998; Bruch 2001; Gardner 1998; Faller 1998). The sad story of PAS also has a sad ending, as the originator of PAS, Dr. Richard Gardner, took his own life in 2003, after having suffered from Type I Complex Regional Pain Syndrome, as was reported by his son (<https://www.nytimes.com/2003/06/09/nyregion/richard-gardner-72-dies-cast-doubt-on-abuse-claims.html>, last visited July 11, 2021).

Extra-Legal sources can be tied to an ethical standard as well. While legalists strive to zealously represent the best interest of their clients,¹² the level of their dedication must not be allowed to cover for the entry of suspect knowledge into court, whether by omission, ignorance, or in bad faith.

The focus, then, must shift to the step-1 test: once a source is found to be minimally reliable, how is it to be evaluated further with regards to its applicability, methodology, and support within the relevant scientific community? It is suggested here that a step-1 type test is near-impossible to implement, due to the challenge of applying it uniformly. The evaluation of expert testimony, as well as Extra-Legal Sources is not uniform throughout the legal system.¹³ Thus, even if a test was laid at the feet of legalists, there is good reason to suspect that its application would be prohibitively varied, primarily because it entails a qualitative assessment (coupled with a lack of proficiency in Science). While the potential for variance (and thus fairness) may be lessened by adding more rules and more particular tests to evaluate Extra-Legal Knowledge, this raises the specter of an overly complex evaluation regime, and a lack of flexibility to allow for the use of novel evidence (Pfeffer 2015), both of which have yet to address the difficult problem of qualitative assessment. However, this seems to be the reigning trend, as *Daubert* tasked courts with making a more sophisticated evaluation of the testimony furnished to the court (Faigman 2013), though it has yet to live up to its promise as a superior standard.¹⁴ This seems very much like a no-win situation, especially as the data have shown that expert testimony and Social Science citations are competitive in nature.

¹² ABA's Model Rules of Professional Conduct: Preamble and Scope.

¹³ See Chapter 1.

¹⁴ See Chapter 1, sub-segment on *Daubert vs. Frye*.

The lack of uniformity also presents itself on a jurisdiction-wide level, as Extra-Legal Knowledge is obtained differently and differentially welcomed by disparate clusters of jurisdictions. While it would be reasonable to expect variance in the use of Extra-Legal Knowledge across jurisdictions, the disparities revealed in the data are far-reaching. Ostensibly, given well established standards and equal access to all sources, courts would settle on an optimal level of Extra-Legal use, as well as an optimal volume of use. However, when some jurisdictions employ 2-3 times these volumes compared to others, and exhibit a significantly different balance among them, it is fair to question whether these differences can be attributed to factors other than state level indicators such as size, political orientation, a particular legal regime (e.g., community property states), especially when these factors are held constant for the purpose of analysis. Thus, structural failures and preferences reemerge as possible contributors to the observed disparities in the use of Extra-Legal Knowledge.

The lack of uniformity in rule and/or application, as well as the difficulties presented by performing a qualitative assessment of a subject matter with few tools to do so, leave little room for effective policy prescription. Moreover, the use of strict rules or flexible standards seems to yield statistically indistinguishable results. This is further complicated by the fact that application of a step-0 type test to any and all Extra-Legal Knowledge would not be sufficient. Scholars have suggested that specialized bodies could assume these ‘step-1’ responsibilities from courts.¹⁵ To the extent that this suggestion is feasible, it would be warmly welcomed. Another possible, though possibly disappointing suggestion, urges courts and attorneys to exercise patience when seeking authorities to support an argument in court.¹⁶ The data have shown that PAS was used in

¹⁵ See Chapter 1

¹⁶ However, this too is not a perfect suggestion, as too long a ‘waiting period’ before application may result in Type II errors (a false negative), as opposed to applying science too early, resulting in a Type I error (false positive) (see: Sanders 2009: 86-88).

a California court as early as 1987,¹⁷ a mere two years after being published for the first time – and was most likely used in lower courts even earlier. At the time, PAS was clearly unsettled, and untried by peer-review, the impressive qualifications of Dr. Gardner notwithstanding.¹⁸ Furthermore, the egregious manner in which PAS was used early on,¹⁹ might also suggest that it was used in bad faith. Thus, had courts and attorneys exercised more patience (and good faith), regardless of their proficiency in Science, the tango between PAS and the courts could have been shorter.

It is also interesting to note that the vast majority of sources warning of the dangers of PAS in its very early life stages (before it was taken in for review by the Scientific community), were Legal Sources to which both judges and attorneys had access to, sources which entailed a low search cost.²⁰ Thus, it might be worth considering, as was suggested in connection with the ‘step-0’ test, inserting certain ethical obligations in the use of Social Science sources. Such an obligation need not bar legalists from use of a source if it has passed a step-0 evaluation, for the determination of whether and to what degree a literature is settled is difficult to make. Nor would it require an attorney to set qualifications to the Extra-Legal sources presented to the court, as this is both a slippery slope, and is a task assigned by the Adversarial system to opposing counsel. However, the creation of an ethical rule that obliges legalists to consider the veracity of a source may take its effect in the shadow of the law.

¹⁷ *Coursey v. Superior Court*, 194 Cal.App.3d 147 (1987).

¹⁸ Dr. Gardner was trained in the Columbia University Law School, and had built a reputation as a specialist in the field of Child-Psychiatry.

¹⁹ PAS was used, inter alia, to defend against allegations of child abuse and sexual abuse on the grounds that the alienating parent programmed the child to make said allegations against the targeted parent (Wood 1994).

²⁰ Regrettably, a mass of Legal sources published later in time, advocated for the use of PAS in courts as a helpful tool in custody litigation.

The New Expert

The analysis above provides some concrete insight into the use of expert testimony, as well as its association with the use of Social Science via citations. Thus, experts are used frequently in Family Court, as 17% of cases used expert testimony. The reader will be kind to remember that this is a conservative estimation due to the manner in which “use” was coded, so that the usage rate is likely higher in practice.²¹ Furthermore, the data indicated that when an expert’s opinion is used, the court is statistically then less likely to draw upon Social Science sources – both Legal and Scientific, so that they compete for their place in court. This means that when an expert’s testimony is used, this testimony – regardless of its quality – will receive less support from other forms of Social Science.²²

A third interesting and unexpected insight was that expert testimony was found to negatively associate with the size of a state (this finding was significant and robust), such that smaller states use expert’s more frequently. An examination of the cluster most welcoming of experts (Cluster 2, 27% of cases, depicted above in Chapter 3, Figure 3.6), suggests that these states are all relatively small, with few urban areas that can be characterized as either (a) large and dense urban areas (RI, OR, CT, SC, LA, WA, NE, DC), or (b) sparsely populated urban areas (ID, MT, DE, WV, UT), and two states that simply don’t fit the bill (AZ, NJ). These characteristics lend their hand to the formation of dense, tight-knit social networks, where information travels fast, and can be obtained at a low cost (Borgatti, Everett and Johnson 2013: 150-158). Under such circumstances, nodes in the network (experts, attorneys and judges) develop reputations (so that more information about them is revealed) and begin to form strong

²¹ See method sub-segment in Chapter 3.

²² It is very interesting to examine if the use of Expert testimony associates in the same way with the use of Amici. Blake 2019:248 (showing an association between the use of Amici and the use of Social Science citations in court).

connections based on a high level of trust (Burt 2005: Chapter 3). This would further suggest that experts become repeat actors in court, and/or that they have a well-known reputation within the court system. This reputation may relate to which judges are more welcoming of their opinion, or to their position on a certain matter (e.g., for or against PAS). These dynamics may lead to an inflated use of experts, as well as to a biased use thereof.²³ Moreover, such social pressures and dynamics may be more visible in the Cluster 2 states, but may still manifest in other states as well. In fact, it is likely that such close-knit ties between actors in smaller court systems (such as Family Courts) is present in every state.

The ‘old expert’ has been characterized as such: a repeat actor whose positions and politics are well known, who has developed personal ties of trust with judges and attorneys and appears in court frequently, furnishing an opinion that is less likely to receive validation from external sources. Put thusly, the policy prescription becomes clear (though not necessarily feasible). Though this is a somewhat exaggerated characterization, note the number of failures that are implicated by it: subjectivity of science, adversarial distortions, entrenchment, expert bias, disparate modes of obtaining knowledge, lack of scientific proficiency, lack of legal proficiency, echo chamber (but with experts rather than citations), extensive diffusion, and an argument can be made for brokerage when the frequency is very high (e.g., in the District of Columbia, an expert is used in 40% of Family Court cases).

The ‘new expert’ can be instrumental in minimizing many of these failures. First, the new expert should base their testimony on clearly defined sources, which should then be entered into the record (so that judges and attorneys in higher tribunals can examine the basis of the testimony). The old expert undoubtedly bases their claim on various sources and well-established

²³ This evidence is anecdotal so that it must be read with caution. Nevertheless, this is a falsifiable question that should receive more attention in the future.

science, but not always do these enter the record. Second, it is high time to consider whether litigating parties should be able to bring expert witnesses at all. The alternative would empower judges to be the exclusive consumer of expert opinions. This is more akin to the inquisitorial judge choosing from a defined pool of qualified experts, and has been suggested in the literature (Sanders 2009; Haack 2009: 21²⁴). However, additional steps would be necessary to avoid the potential bias caused by various social pressures, such as delegating the authority to assign an expert to an individual or body of experts trained in matching between expert and the issue being adjudicated, or experts can be even be assigned randomly, similar to how litigants can be randomly assigned to a judge. Moreover, as it is clear that particular issues within well identified legal sub-fields make greater use of experts, these can be labeled as such in the court system so as to properly manage caseloads and preparation for trial.

Courts and Social Science: A Relationship in Bloom

So far, the implications listed out above lead the reader through murky waters replete with doom and gloom statements: legalists make poor use of science, the adversarial system distorts evidence, states are subject to various pressures that further distort the intake of Scientific evidence, Law Reviews (and non-peer-reviewed sources) do a lousy job of brokering between Social Science and courts, Scientific researchers are comfortably hidden away in their Ivory Tower wanting nothing to do with courts, experts present biased testimony which is not properly evaluated, etc. While these failures have been observed, they do not reflect on the court system as a whole, nor should they bear negatively on the relevant actors. Legalists, researchers

²⁴ Describing the “CASE” project created by the American Association for the Advancement of Science, to create a pool of independent experts, which resulted in early settlements and disagreement among the independent experts.

and experts all play a crucial and positive role in bringing Social Science to court, and in doing so, directly improve the process of dispute resolution. Few would argue that Social Science has no place in court. These actors overcome immense barriers, often working in contentious environments with few resources (Family Courts) to the benefit of litigants, who are the eventual beneficiaries of the use of Social Science. Unfortunately, the relationship between courts and Social Science is not perfect (otherwise many scholars would be without a job), and requires a constant refinement. And this is the major task this essay sought to undertake: to provide a modicum of insight and guidance to both partners in this relationship, with the hopes that the productive bond they have forged can become stronger.

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CONCLUSION

This thesis set out to discuss the manner in which Social Science and the courts interact, focusing on specific aspects of this relationship that require a tune up. The questions of why and how Social Science is used in court were discussed to provide a general background, and provide context for the primary topic of interest, namely, problematic features in the use of Social Science in court. The next segment provided a unique survey of failures that have been identified in the illuminating works of scholars, placing them within the greater context of Science and the Adversarial System to suggest underlying causes driving the failures/symptoms identified. Three quantitative studies were then presented to add nuance to the existing failures identified in the literature, and to highlight newly unidentified failures and features of the broader association between Law and Social Science. The studies drew upon two original datasets regarding the rise and fall of PAS in academia and in the court system, as well as an encompassing representative sample of three legal issues adjudicated in State Courts: The Best Interest of the Child, Nuptial Agreements, and Psychotherapist-Patient Privilege.

The examination of the citations networks of courts and academia resulted in a number of novel findings. First, the life course of PAS was carefully examined to illustrate how it was brought into courts (and used thereby) at too early a stage in its development. This mechanism was identified as Premature Transfer. Next, it was shown that even after PAS attained negative-closure in academia (i.e., consensus was formed that it is an invalid theory), it was still employed by courts for over a decade. Indeed, PAS has not yet been officially discredited in some jurisdictions today. Thus, after its premature entrance into the court system, PAS became entrenched and endured too long; this was contemplated to be the result of a lack an exit mechanism for discredited Science that nevertheless managed to enter the court system.

Second, the data demonstrated how Social Science is extensively diffused throughout the court system, such that it can become entrenched therein. Moreover, the data unequivocally demonstrated that caselaw citing Social Science penetrates the citation network (conceptualized as a knowledge network) both wider and deeper, i.e., such cases are cited more (by other courts and by academia), and are cited more outside the original jurisdiction. These data also provided a first look at the association between different types of avenues through which Social Science enters the courtroom. While Legal and Scientific sources are positively associated, they both negatively associate with the use of expert testimony in court, indicating that these are competing avenues rather than complimentary. However, in utilizing the various avenues to Social Science, different jurisdictions do so in disparate manners that are statistically distinguishable, both in balancing between the different avenues, and in the overall frequency of Social Science use.

Third, the flow of information between courts and academia was shown to be patterned in a such a way that Legal sources (Law Reviews, specialized legal journals, horn books, etc.) and Non-peer-reviewed sources broker between courts and the Scientific journals. In doing so, they effectively gatekeep information within the greater knowledge network. Additionally, the actual mutual interaction between court and Scientific journals was very sparse, exhibiting the least amount of traffic between any other venues in the network.

There is yet much to uncover. Some promising lines of research, raised throughout the essay include a deeper investigation into the interaction between the various sources of Social Science, while adding new sources that were not considered here (e.g., Amici briefs). It is also important to shed more light on the causal links between underlying causes and the symptoms of failure identified in the association between Social Science and courts, as policy prescriptions are severely limited if the source of the symptom set out to be corrected is unknown. It has also been

suggested above that there are certain, as of yet, unobserved social pressures that may interfere with the use of expert testimony, as well as other unknown factors shaping the mode utilized by a jurisdiction when obtaining Extra-Legal Knowledge.

Finally, it bears repeating that Social Science and the Law have a healthy and productive relationship. As this dissertation concentrated on failures in this relationship, naturally the contributing actors and venues were portrayed negatively. However, this should not be the main take away; rather, the insights raised above should be thought of as constructive critique rather than reprimand, as this project sought to assume the role of marriage counselor rather than divorce attorney to one of the interested parties of Social Science and Law.