

Prepared for the 2005 Annual Meeting of the American Political Science Association,  
September 1<sup>st</sup>-4<sup>th</sup>, 2005, Washington, DC

**Patterns of Judicial Influence:  
Tracking Regulatory Takings Policy  
in the Lower Federal Courts**

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**Abstract**

*The CITE-IT project employs information technologies in innovative ways to investigate the development and dissemination of precedent in the American legal system, based on a study of the issue of “regulatory takings.” This manuscript describes the initial phases of this multidisciplinary project, specifically the methodologies we have developed to identify the corpus on which the study itself will build – all federal-level regulatory takings decisions following the 1978 Penn Central Supreme Court decision. While a comprehensive, clearly identified collection of decisions – pertinent to a single area of law – presents a great resource for legal scholars, defining such a collection is in fact quite challenging. Using a combination of conventional research techniques and computer automation, we identified 2,780 decisions, of which approximately 68 percent were found to be pertinent to regulatory takings law. We then developed query strategies that “triangulate” across multiple search results to isolate “true” regulatory takings decisions within that pool (thus reducing Boundary Specification Error). Formatting features common to all decisions enabled us to automatically extract additional data (e.g., formal citation, court location, date, decisions cited), which were converted to graphical form (as well as more formal metrics for further analysis). This manuscript describes these processes, as well as a review of the scholarship on precedent and citation analysis, and a summary of the history of regulatory takings. We conclude with our future research goals, including expanding this pool to include all federal cases since 1922, as well as all relevant decisions handed down by the state supreme courts.*

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\* We are enormously indebted to James Rose, Aleks Aris, Shalini Krishnamurthi, and Liz Jurinka, whose skill, hard work, and outright genius have been critical to this project.

# 1 INTRODUCTION

The United States judicial system can be viewed as a multi-tiered network, connected not only by institutional design but also by mutual reliance (albeit, to varying degrees) upon a common set of references in the body of law. The CITE-IT project (Courts and Influence Tracking Employing Innovative Technologies), an NSF-funded (SES-0416455) multi-disciplinary research initiative at the University of Maryland<sup>1</sup>, focuses on the relational dynamics among these courts, assessing the articulation, development, and dissemination of legal precedent throughout the system.

With few exceptions, empirical judicial research has focused on a single court or court layer (Haire, Lindquist et al. 2003). By contrast, we are interested in the interactions of several judicial layers – the US Supreme Court, all US Circuits, all US Districts, and all state supreme courts. In doing so, we hope to shed light on a debate as to whether the courts are best characterized as a “team,” each contributing to the effort to “get it right” (Kornhauser 1995), or as a system of “principals and agents,” in which semi-independent lower court judges strive to avoid higher court audit (Songer, Segal et al. 1994; Cameron, Segal et al. 2000). More broadly, we are concerned with the relative influence of different actors in the emergence, dispersion, alteration, and abolition of legal precedent through-out the U.S. judicial system.

To illuminate these and other questions, we have chosen to study the case law whose central question is whether environmental, zoning, and other regulations implemented by state and federal governments amount to “regulatory takings” under the Fifth and Fourteenth Amendments. We aim to understand the manner in which the judiciaries have collectively developed the law on this particularly high-stakes political issue. We believe regulatory takings is a good choice for several reasons. It presents a comparatively narrow constitutional question that has involved courts of all levels. Moreover, the Supreme Court’s recognition of regulatory takings has a clear beginning point of demarcation (1922) with a relatively long time horizon.

We estimate the total universe of decisions – casting the net widely and running to the most current judicial terms – to number over 5,000, a corpus sufficient to capture both spatial and temporal variations. Yet while it is a commonplace and rather straightforward research problem to locate the major case law addressing a legal question, we are aware of no published work that has attempted to identify a comprehensive corpus of judicial decisions on a particular area of law (though possibly Glick’s 1992 study of “right to die” case law comes closest). Clearly, isolating the complete population of an evolving body of law is no simple task – it requires not only a rigorous solution of the boundary specification problem (discussed in Section 3.1), but also a tractable means of estimating the rate of false-positives, and a reliable method for extracting relevant data (e.g., citations) from all decisions individually.

To confront tasks of such magnitude and complexity, we developed a methodological approach that we believe presents exciting opportunities for future legal scholarship and other social sciences. After adapting a handful of tools from information science to our needs, we discovered that we were able to address questions of greater scale and complexity with increased accuracy, consistency, and transparency. These tools include a variety of computer-supported research methods: automated file acquisition, transformation, and data extraction; dynamic, relational database management; and graphical presentation of network relations between cases. They have

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<sup>1</sup> See [www.bsos.umd.edu/GVPT/CITE-IT](http://www.bsos.umd.edu/GVPT/CITE-IT) for more information.

enabled us to isolate a single area of law, and as well as identify and map the citations between each decision in that population. Because our database will be of such broad jurisdictional and temporal scope (yet focused on a relatively narrow, rapidly evolving area of law), we believe it will provide nearly clinical conditions to test theories about the development of law. In the future<sup>2</sup>, this will enable us to address a broad range of questions concerning the flow and communication of precedent, as well as relative court influence and prestige.

This manuscript describes the initial phases of this multidisciplinary project, specifically the methodologies we have developed to identify the corpus on which the study itself will build – all federal-level regulatory takings decisions following the 1978 *Penn Central* Supreme Court decision. Restricting our initial work to these decisions allowed us to fine-tune our methodology, before applying it to the full body of regulatory takings decisions. This paper describes these processes, as well as a review of the scholarship on precedent and citation analysis, and a summary of the history of regulatory takings. We conclude with our future research goals, including expanding this pool to include all federal cases since 1900, as well as all relevant decisions handed down by the state supreme courts.

### 1.1 HOW DOES NEW LEGAL DOCTRINE EMERGE?

The application of precedent, by which judges consider legal principles expressed in previous opinions, is among the most significant concepts in American law. But what exactly is the influence of precedent in judicial decision making? There is a rich vein of research addressing responses to Supreme Court precedent among lower court judges, especially for highly controversial policies (Peltason 1961; Manwaring 1962; Johnson and Canon 1984; Songer and Sheehan 1990). The decisional norm of *stare decisis* dictates that judges are to utilize rules from prior cases to structure the approach to current ones that present similar or analogous questions. Many scholars maintain that the justices take pre-existing law seriously and that yesterday's decisions serve as an ongoing source of meaningful reference (Knight and Epstein 1996; Spriggs II and Hansford 2002). On the other hand, attitudinalists have long argued that justices consistently vote their policy and ideological preferences, with minimal regard for precedent (Segal and Spaeth 1996; Segal and Spaeth 2002). Yet, although abundant evidence indicates that non-legal influences are ubiquitous, research points to a general tendency among lower court judges to comply with High Court precedent (Baum 1978; Johnson 1987; Songer, Segal et al. 1994), rather than striking their own course.<sup>3</sup>

The precise contours of a legal rule established by the Supreme Court are not constant. In fact, determining boundaries of a rule is generally an iterative process, in which the Court broadens, restricts, and or explains the rule in a series of cases (Landes and Posner 1976). Legal rules thus exist in a state of perpetual evolutionary development, as changes in the larger context affect

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<sup>2</sup> As we explain, we developed these approaches while identifying all federal-level regulatory takings decisions since 1978, and are currently in the process of extending that corpus to 1900, and including any such decisions handed down by state supreme courts.

<sup>3</sup> We do not mean to imply that defiance among lower court judges does not occur (see Peltason, J. W. (1961). Fifty-Eight Lonely Men: Southern Federal Judges And School Desegregation. New York, Harcourt, Brace and World. , Manwaring, D. R. (1962). Render unto Caesar: The Flag-Salute Controversy. Chicago, IL, University of Chicago Press. , Uchida, C. D. and T. S. Bynum (1991). "Search Warrants, Motions to Suppress and 'Lost Cases': The Effects of the Exclusionary Rule in Seven Jurisdictions." Journal of Criminal Law and Criminology 81: 1034-66. ), but the general tendency seems to be some degree of compliance.

their efficacy, court personnel are renewed, and as variations on each central theme present themselves in litigation – all producing continuous demand for re-interpretation and clarification. This also comports with Kornhauser’s (1995) theoretical conception of a “resource-constrained team,” in which judges at all levels are engaged in a collective effort to reach the right decisions, and where the hierarchy is as conducive to error prevention as it is to error correction (also see Caminker 1994). Thus, legal principle is adjusted at the top, as warranted by changes in circumstances, providing signals and guides to judges below who preside over the great bulk of the system’s caseload.

Others have emphasized the relative independence and heterogeneity in policy preferences among the judiciary to construct a theoretical model of courts as a principal-agent system (Songer, Segal et al. 1994; Cameron, Segal et al. 2000). Because the Supreme Court can, at best, only selectively monitor its agents, the real incentive for judges below is less to “toe the line” than to minimize the likelihood of review by not straying too far from the mark. In addition, circuit-level judges might want to remain fairly consistent with each other, since divergence among circuits seems to be a fairly strong cue for Supreme Court review (Songer, Segal et al. 1994).

There is also some debate about how the judiciary manages to collectively develop the law across multiple levels and jurisdictions. While there are general expectations regarding reflexive precedent (according to which a court is consistent with itself), vertical precedent (judges follow rules articulated by higher courts) seems to exert the strongest pull. Indeed, some have argued that the creation of legal parameters under this scheme produces a decision-making calculus that is less costly than it otherwise would be, and that it has helped to structure our system of courts as an authority hierarchy (Phelps and Gates 1991; Topf 1992).

## **1.2 THE EMERGENCE OF REGULATORY TAKINGS**

The concept of regulatory takings is rooted in the Fifth Amendment of the US Constitution, which states, “... nor shall private property be taken for public use, without just compensation.” In a significant break from the past, Justice Holmes, writing for the Court in 1922, found that this clause could be applied not only to physical seizure of property, but also to land use regulation: “while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking” (*Pennsylvania Coal Co. v. Mahon*, 260 US 393). Four years later, the Court upheld the authority of local governments to regulate land use by enacting zoning ordinances under state police power. Although the ordinance in question forbade commercial and industrial usages of specified parcels of land, thus diminishing the value of the appellee’s property, the Court rejected the claim that a regulatory taking had occurred (*Village of Euclid v. Ambler Realty Co.*, 272 US 365 [1926]).

However, after issuing these two landmarks in the 1920s, the Court remained relatively silent for an extended period, despite comprehensive advances in regulatory scale, allowing lower courts to develop the law without guidance – but not without notice. Writing in the mid-1970s, Bruce Ackerman remarked upon the virtual flood of environmental legislation in that era. “The result,” he observes, “has been a set of confused judicial responses.... More significant than one or another judicial decision, however, is the pervasive judicial recognition that compensation law – after a long period of neglect – is in need of a fundamental reconsideration” (1977, p 3-4).

In 1978, in the face of a long-flowing stream of litigation and a variety of approaches developed in lower courts during its fifty-year hiatus, the Court acknowledged that it had failed “to develop

any ‘set formula’ for determining when ‘justice and fairness’ require that economic injuries caused by public action be compensated by the government” (*Penn Central Transportation Co. v. City of New York*, 438 US 104, 128). It admitted to instead relying on ad hoc, fact-specific inquiries. Two years later, the Court articulated another standard in *Agins v. City of Tiburon* (447 US 255 [1980]): “The application of a general zoning law to particular property effects a taking if the ordinance does not substantially advance legitimate state interests . . . or denies an owner economically viable use of his land” (at 260). A series of Supreme Court decisions since then has created a complex, often confusing, body of law regarding what regulations “go too far” to become a compensable taking.

Thus, regulatory takings is a heavily litigated area of law that began with vague US Supreme Court precedent and open invitation to lower court experimentation in the 1920s, which then experienced a half-century without the expected guiding hand from above, enabling lower courts to be primary players in the development of the law. Moreover, since the High Court’s re-engagement, it has issued a series of conflicting and confusing decisions. If the Court had let its *Penn Central* test germinate, regulatory takings law might well be less confused than it has become. As such, it presents an excellent opportunity to observe the court system under varying conditions.

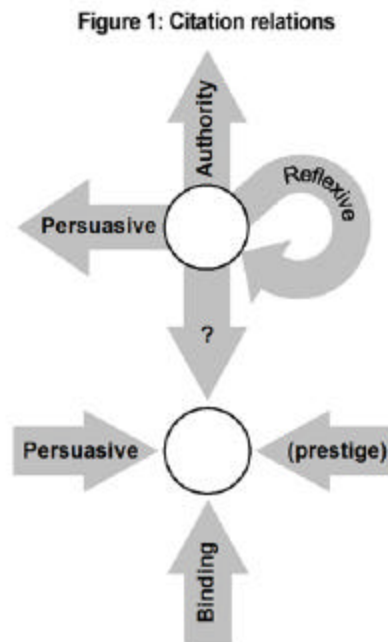
## **2 THE COMMUNICATION OF PRECEDENT**

The central premise of our research is that the communication of precedent throughout the US Supreme, Circuit and District courts, as well as state supreme courts, reveals influences of the court system on legal developments. Citation analysis is a well-established method – scholars have used this technique to investigate a variety of dimensions of legal change for nearly seven decades (see Mott 1936; Merryman 1954; Merryman 1977; Caldeira 1985; Walsh 1997; Klein 2002). Citations to precedent are objective, statistically measurable evidence (Landes, Lessig et al. 1998) of the institutional aspect of law – providing clues about “extra-legal” factors that influence its development (Johnson 1986).

Because of the centrality of precedent to the perceived authority of judicial decisions, and the importance placed upon the communication of legal principle both to the process of legal argumentation and for sustaining the legal hierarchy, a network analytical framework seems particularly apt to the study of courts. In fact, a great deal can be learned about the court system by tracking the flow of precedent, operationalized as citations within courts’ decisions (Mott 1936; Caldeira 1983). Scholars have used citation analysis to explore how judges communicate with one another within the hierarchical constraints, to estimate relative influence of particular courts and individual decisions, and to assess the importance of increasing professionalism (Canon and Baum 1981), geographic proximity (Harris 1982; Caldeira 1985), cultural similarities of states (Caldeira 1985), and variation in interstate versus intrastate citations (Landes and Posner 1976; Harris 1985). Walsh (1997) has suggested that citation patterns should reflect whether a court is developing a new legal doctrine (i.e., broader and more frequent references) or addressing a “settled” area of law. Similarly, Johnson has argued that the “age” of citations can be expected to vary according to whether an area of law is “typified by a high degree of consensus” (1985). Klein (2002) finds reason to suspect that judges will on occasion purposely ignore precedents with which they disagree and that some decisions failed to be cited because subsequent courts are simply unaware of them. Penetration of precedent is not always immediate, which, in addition to the above, can be attributed in part to differences in judicial taste, or intellectual curiosity for specific legal questions (McIntosh and Cates 1997).

A common starting point for such research is to examine the reasoning and frequency of citations to a given decision by subsequent courts, and the array of previous decisions that its author(s) cite as relevant precedent (Caldeira 1985). Citation networks can be represented as a directional graph, in which each decision (*node*) is connected to others by citations (*arc* or *edge*) (see Wasserman and Faust 1999, p 121-36). These linkages can be one of two basic classes. Citations to earlier decisions within the text of a given decision are known as “OUT CITES.” Subsequent citations to a given decision are referred to “IN CITES.”

In his 1985 analysis of State Supreme Courts, Caldeira compared frequencies of cross-jurisdictional citations, interpreting courts with higher proportions of IN CITES as *prestigious*, and those with higher levels of OUT CITES as *dependent* on other courts’ legal reasoning. This early research suggests that prestige is heterogeneously distributed across courts<sup>4</sup> (see also Harris 1982). But whereas early efforts focused solely on single court strata, expanding the analysis to federal circuit and district courts provides a more comprehensive test. Building on these concepts, we developed a slightly more complex taxonomy (see Figure 1). OUT CITES to higher courts may be understood as appeals to *authority*, with IN CITES from lower courts suggesting an acknowledgement of binding authority. Where OUT CITES within a given decision reference courts of the same hierarchical strata, they are understood as an appeal to *persuasive* precedent; similarly, IN CITES from parallel courts provide hints at its persuasiveness.



Instances where a court refers to decisions handed down within its own venue (e.g., the 6<sup>th</sup> US Circuit Court), we identify as *reflexive* citations. These are harder to interpret, as they may reflect either the persuasiveness of the original decision, or variant on binding authority, under the norm of *stare decisis*. Equally difficult – and understudied – are citations from higher to lower courts. Although the US Supreme Court clearly cites appellate court rulings on a regular basis, little empirical or theoretical attention has been paid to this “downward” citation phenomenon, or to the more general issue of why and under what conditions does a higher court cite a lower one. For instance, although Landes and Posner (1976) count citations to courts of appeals decisions by the US Supreme Court, they fail to question the implications of such patterns for hierarchical models of court interaction.

Most research assessing legal citations to date has been limited due to the tremendous effort required to find, retrieve, and code a sufficient number of cases to produce a useful database. Given the proclivity of judges to cite authority to support their reasoning, a relatively modest sample could easily lead to thousands of OUT CITES, each of which need to be individually identified. Until quite recently, this process could only be accomplished manually, meaning that most empirical judicial research has been based on relatively small, random samples of a single-court (e.g., Johnson 1985; Johnson 1986) or court strata (e.g., Harris 1982; Caldeira 1983;

<sup>4</sup> Prestige has also been shown to vary according to the legal issue under consideration (Canon and Baum 1981), but the paucity of issue-specific research has made it impossible to determine the range of variance.

Caldeira 1985; Caldeira 1988). While a few projects appearing within the past year have demonstrated the dramatic scaling improvement that information technology offers, these have also been limited to either a single strata (Chandler 2005; Fowler and Jeon 2005), or so overly inclusive as to produce only the most general observations about the communication of precedent throughout the American legal system (Smith 2005).

### 3 ISOLATING THE STUDY POPULATION

While a comprehensive, clearly identified collection of decisions – pertinent to a single area of law – presents a great resource for legal scholars, defining such a collection is in fact quite challenging. In the next two sections, we describe our methods for searching and acquiring a comprehensive corpus on a single question law, and for estimating the proportion of misidentified cases, while attempting to eliminate false-positives in an efficient manner.

The task of identifying an entire corpus of decisions on particular area of law has proven to be a far more interesting and challenging aspect of the research than we initially anticipated. The problem differs from traditional legal research, because we are concerned with not only the current state of the law, but also its development, and the manner in which new precedents are disseminated throughout the legal system. While attorneys may ultimately hope to extend an existing legal rule to a new situation, they must, nevertheless, focus on the current state of the law governing the dispute. Since we are interested in the processes through which law develops, our challenge is to identify the *entire* pool of decisions related to a single question of law.

To some extent, the difficulty of the challenge depends on the area of law one is investigating. If only a handful of decisions are relevant to a particular issue, traditional legal research in which one reads all of the potentially relevant decisions is a realistic means of identifying the pool. In the case of regulatory takings, however, that pool is likely to number in the thousands. We can also imagine circumstances in which identifying the entire pool might be relatively uncomplicated even for a larger body of case law. For example, it might be the case that there is a particular phrase that is so unusual, and essential to a particular issue, that the phrase would function as a nearly perfect "marker" for decisions falling within the pool. This is clearly not the case for regulatory takings, and in fact, we suspect such examples are rare.

The acquisition process we have developed involves three steps: (1) identifying key decisions, (2) searching for decisions that cite those cases, (3) and crafting additional searches that combine keywords and phrases with Westlaw's *KeyCite* system. In developing this process, we have been guided by a number of considerations. First, in addition to accuracy, we wish that our approach can be reproduced by others wishing to pursue similar types of investigations. While we developed this method to identify the full body of regulatory takings decisions, we believe these methods could be used to comprehensively define decisions pertaining to any legal topic. Second, since the pool of decisions bearing on a particular area of the law may number in the thousands, it is essential that the method not be prohibitively time-consuming. Thus, we are mindful of the intractability of individually reading thousands of decisions to determine their relevance. While we have found that our approach is capable of achieving a surprisingly high ratio of relevant decisions, perfect accuracy is not a realistic goal. Third, since the problem of generalizing network structures from smaller samples (Frank 1978) differs significantly from our task – identifying subtle variations in a spatially and temporally diverse population – we believe that *false-positives* are more tolerable than *false-negatives*. In other words, we believe it is more

important for the pool to be comprehensive than that we eliminate every instance of a decision not addressing regulatory takings (we discuss this idea further in Section 4).

### 3.1 IDENTIFYING THE NETWORK

One of the most common and persistent challenges in network studies is known as *boundary specification error* (BSE). While the non-metaphorical use of the term “network” may suggest objectively observable facts, networks are quite often very difficult to define, regardless of whether one focuses on the population or the relationships constituting such structures (Marsden 2005). Since we have chosen to treat all citation links between cases equally<sup>5</sup>, we avoid the problem of determining which relations (out of the many possible) are the *relevant* links tying our network together. We are left with the non-trivial challenge of determining which decisions “belong” to the body of regulatory takings law, and which do not.

BSE has been found to originate in both researcher expectations (i.e., *nominalist* approaches), and the means of gathering data (Wasserman and Faust 1999). When human beings are the subjects, researchers often attempt to identify network members through surveys or observation, or formal participant records (e.g., all members of the American Bar Association). Each has associated strengths and weaknesses, for which strategies have been devised to overcome. One such problem, generally known as *respondent bias*, finds error from the variability of memory and meaning those surveyed attach to their relationships (Marsden 2005). However, given the centrality of the court record – both the decisions and the citations linking them together – to the American common law system, it is safe to assume that archival errors will have been identified and corrected through the widespread use of the two major legal databases, Westlaw and Lexis-Nexis (Spriggs II and Hansford 2000).

Both databases reference the same pool of legal decisions and provide comparable interfaces to help researchers locate decisions through structural relations (i.e., IN-CITES and OUT-CITES), as well as global “terms and connectors” searches (Songer 1988; MacLeod 1996). We chose Westlaw because of the usefulness of the additional material it adds: summaries of each decision; *headnotes*; and *KeyDigest* numbers, which we found to be extremely helpful during both our initial searches and spot-checking queries. Because judges and courts are not always explicit about the fundamental terms of each area of law they address, and since language tends to vary across both time and geography, Westlaw’s efforts to “translate” the law into a standard language greatly improves our ability to identify decisions when searching for general terms (Gerson 1999).

*Snowball sampling* (by which researchers use information provided by initial samples to further populate networks) is a widely-accepted approach to reducing BSE (Frank 1999; Salganik and Heckathorn 2005). Adapting snowball techniques to legal research is a straightforward exercise, given structural character of precedent (and the expected reliability of the legal databases). Aided by the secondary literature on regulatory takings, we identified twenty-three Supreme Court decisions from *Penn Central* forward that address questions concerning regulatory takings. Given the highly visible and binding nature of the Supreme Court’s decisions, we assume that any federal RTD following *Penn Central* is exceptionally likely to cite *Penn Central* or at least

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<sup>5</sup> We have decided (at least for these first phases of our research) to ignore the potential significance of variations in the “meaning” of individual citations (e.g., string cites, or whether a reference is upholding or overturning an earlier ruling).

one of the other 22 subsequent Supreme Court decisions. These IN-CITES are easily identified with Westlaw's *KeyCite* feature (Liebert 1999). However, while it is tempting to collect *all* decisions that reference one of these cases, in fact, such a search overshoots our target. Supreme Court decisions that address regulatory takings often also discuss other areas of the law, as well. Thus, courts might cite those Supreme Court decision on points unrelated to regulatory takings. Consequently, we have had to develop a more sophisticated means of distinguishing RTDs.

To improve the accuracy of the *KeyCite* searches, we employed another Westlaw feature: *headnote* notations. Published decisions (which appear in West's printed reporters) and some unpublished decisions (appearing only online) are preceded by headnotes, written by Westlaw, which summarize the issues addressed and legal statements made by the court. The significance of headnotes for our purposes lies in the fact that judicial decisions typically address questions in more than one area of the law. Suppose Decision X has two headnotes, the first concerning regulatory takings, and the second an unrelated issue (e.g., standards for summary judgment). Westlaw allows researchers to *KeyCite* only the decisions which cite Decision X on points related to the first headnote. Accordingly, for each of the twenty-three known Supreme Court RTDs, we searched Westlaw for the federal court decisions post-*Penn Central* that cite the decision on relevant headnotes. This strategy assumes that federal court decisions citing one of these Supreme Court decisions – on a point of law related to a headnote addressing regulatory takings – are highly likely to be relevant to our study.

While we believed that *KeyCiting* on headnotes would produce a higher-accuracy pool (by reducing the number of false-positives), we were still concerned the strategy might omit some cases. Moreover, given that our larger research question centers on the structure of communication between courts, populating our dataset solely by a snowball sampling approach presents a possible tautology (Scott 2004). To reduce the number of false-negatives (i.e., missing “true” cases) and the possibility of structural bias, we also developed a series of terms-and-connectors (i.e., Boolean) searches<sup>6</sup> to capture decisions containing keywords relevant to regulatory takings. Not only can such searches be applied across the entire Westlaw database, but because they are also *astructural* in nature, they provide an effective solution our tautology problem.

However, simple Boolean searches – based solely on shared words or phrases – are either unlikely to cover the full range of language associated with regulatory takings, or so broad as to produce high rates of false-positives. Fortunately, another Westlaw feature – the *KeyDigest* numbering system – greatly facilitated this process (eight of the ten Boolean searches we developed draw on this tool). *KeyDigest* numbers represent the outline system<sup>7</sup> Westlaw developed to “tag” headnotes as relevant to a particular legal issue. After identifying the *KeyDigest* numbers most frequently associated with the twenty-three core cases, we also ran a frequency distribution of *KeyDigest* numbers for a full-text search on “regulatory takings.” We

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<sup>6</sup> Boolean searches are those that find specific combinations of words and phrases in a document (or set of documents). We use the term “global” to emphasize the ability to search throughout the entire Westlaw database (as compared to structural search strategies).

<sup>7</sup> For example, *KeyDigest* numbers associated with “EMINENT DOMAIN” begin with “148k”. *KeyDigest* numbers grow longer as issues become more specific: for example, *KeyDigest* number 148k2.27 refers to the following: EMINENT DOMAIN/WHAT CONSTITUTES A TAKING; POLICE AND OTHER POWERS DISTINGUISHED/ENVIRONMENTAL PROTECTION

then manually checked those numbers to identify which were relevant to RTDs and which were not. Using this information, we then created three queries to search solely on KeyDigest numbers, plus five that combined these numbers with keywords identified while reading the twenty-three decisions, a technique that Songer has suggested (1988) as the most likely to produce comprehensive and reliable results. For example, our second Boolean search includes only decisions that include: (1) either the KeyDigest number for Eminent Domain (148) or the KeyDigest number for Zoning and Planning (414); *and* (2) the phrase ‘regulatory taking’. We also ran two searches based simply on the presence of the phrase ‘regulatory taking’ (one looked for the phrase anywhere in the decision, and the other limited to the synopsis or digest portions).

Combining the KeyCite and Boolean strategies led to thirty-three means of pulling RTDs into our initial pool. Our priority was to be over-inclusive in our initial selection process so that no relevant cases were excluded (i.e., “false-negatives”) before “cleaning” the data to remove false-positives. An RTD may escape one, two or even thirty of our separate lines of attack, but we believe it is extremely unlikely that it could successfully evade all thirty-three searches. After eliminating duplicates, we had identified a pool of 2,780 likely federal-level RTD decisions that have been handed down since 1978, interlinked by 17,577 unique<sup>8</sup> citations.

#### **4 RESOLVING THE DATASET**

Since our principal concern in populating the dataset was to reduce the possibility of missing cases (i.e., false-negatives), we fully expected to capture a number of false-positives within our initial pool. However, we are also quite concerned with any effects that false-positives might have on our results. Since these would be related to their proportion in the pool, we also need to estimate the overall “accuracy” rate of the pool, and develop some means of sorting HITS (“true” RTDs) from MISSES (false-positives).

##### **Box 1: Defining a Regulatory Takings Decision**

In Case A, the plaintiff claims that a regulatory taking has occurred. The court declines to consider the claim for procedural reasons unrelated to the law of regulatory takings. Case A is not an RTD.

In Case B, the plaintiff brings a claim that a regulatory taking has occurred. The court declines to consider the merits of the claim on the grounds that the claim is not ripe, because the plaintiff has not exhausted other available remedies for recovering compensation from the government. Case B is none-the-less an RTD, because the policies governing the ripeness analysis are particular to the regulatory takings context.

In Case C, the plaintiff asserts multiple grounds of recovery, including a claim that a regulatory taking has occurred. The Court declines to consider the merits of the regulatory takings claim, because it holds that the outcome of the dispute is determined by its disposition of the plaintiff's other claims. Case C is not an RTD.

In Case D, the plaintiff does not explicitly assert that a regulatory taking has occurred. The Court, however, elects to treat the claim as a regulatory taking claim, and adjudicates the case under the law of regulatory takings. Case D is an RTD.

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<sup>8</sup> Eliminating duplicates, as happens whenever a decision includes multiple references to single decision. This

Before attempting to determine (or improve) the accuracy rate of the pool, we first needed to develop formal guidelines for what constitutes a genuine RTD. One might think that it should be a simple thing to determine whether a decision pertains to regulatory takings or not, and there are examples where this is relatively straightforward. Yet many cases are not so easily assessed (see Box 1). For instance, plaintiffs' lawyers often advance multiple arguments – “throwing everything to see what sticks.” Courts may not address all such claims explicitly, but rather do so in an off-handed manner. Also, since the concept of regulatory takings is an interpretation of the constitutional protection against outright seizure, we must also distinguish RTDs from “ordinary” takings decisions. If the government action that is being challenged is regulatory in nature – rather than an outright physical condemnation – then it is an RTD.

It is also possible that a court might explicitly state that a case does *not* involve a regulatory taking. The key here is not whether the court agrees with the plaintiff, but whether the court considers the issue in the first place. If the plaintiff claims a regulatory takings loss and the court examines the issue, but finds this is not the case, this is still an RTD. On the other hand, if there is no regulatory claim, but rather the court refers to regulatory takings by way of explanation or contrast, then it is not an RTD. For example, a decision could read something like: “Unlike regulatory takings, physical takings cases like this one...” – again, not an RTD.

Again, between the thirty-three KeyCite and Boolean searches, we produced a pool of 2,780 decisions. Given that this is many more decisions than we could ever hope to review individually<sup>9</sup>, we must rely on sampling methods to estimate accuracy and attempt to isolate false-positives (misses). After determining that a 90 percent confidence level ( $\pm 10\%$ ) was an acceptable threshold, we used the pair of equations below to calculate statistically valid samples, based on the size of the subpool being queried<sup>10</sup>.

**Sample size, based on 90% confidence level ( $\pm 10\%$ )**

$$ss = \frac{Z^2 * (p - p^2)}{c^2}$$

**Sample size, adjusted for population size**

$$corrected\ ss = \frac{ss}{1 + \frac{ss - 1}{population}}$$

**where:**

**Z = Z score (1.70 for 90% confidence level)**

**p = 0.5 (a constant, used to determine sample size)**

**c = confidence interval, expressed as a decimal ( $\pm 10\% = 0.10$ )**

From: [www.surveysystems.com/ssformu.htm](http://www.surveysystems.com/ssformu.htm)

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number also includes approximately 80 references to unidentifiable decisions (an error rate of 0.46 percent).

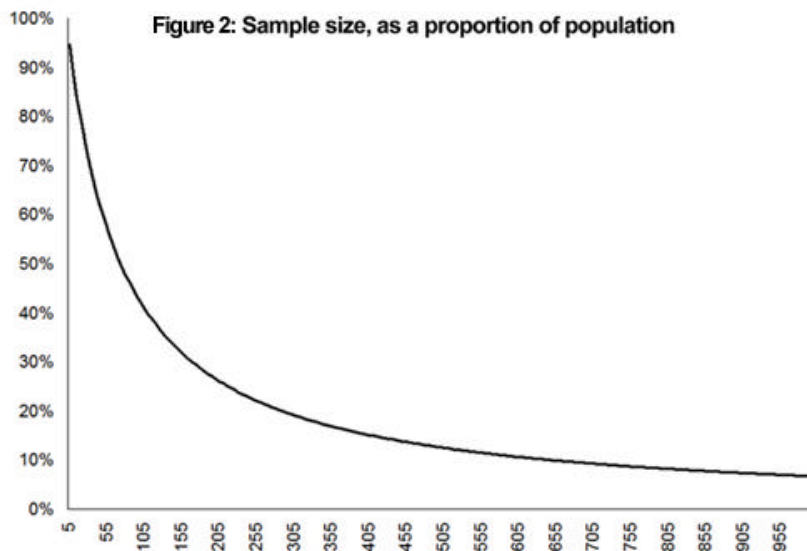
<sup>9</sup> Recall also that this is only the first acquisition phase of a dataset that will ultimately include all federal and state supreme court RTDs since 1900.

<sup>10</sup> Because of the complexity of this project, we found it useful to distinguish between *searches* (used in acquiring the initial dataset from Westlaw) and *queries* (used to probe our local database). The distinction relates entirely to

An initial, random sample of the entire dataset produced a HIT rate of 68 percent – that is, we estimate that 1,890 of the 2,780 decisions in our overall pool are “true” RTDs. While we believe this is a respectable score (especially given our overly inclusive search strategy), we felt it was both desirable and possible to improve the accuracy of the pool (i.e., further reducing BSE within the dataset). The most direct means of achieving this is to attempt to split the dataset into two non-overlapping subpools: one with a high HIT rate, the other a high MISS rate. If we were somehow able to generate the “perfect” query (or combination of queries), sorting the dataset without any error, this would result in one subpool of 1,890 HITS, and another of 890 MISSES. Since this clearly unrealistic, our goal instead is to generate a HIT subpool that statistically “ought” to include all RTDs, calculated as the number of RTDs in the overall pool (1,890), divided by the sampled accuracy of the HIT subpool. For instance, for an accuracy rate of 90 percent, we would need a HIT subpool of 2,100 decisions, for 85 percent accuracy, a HIT subpool of 2,224 decisions<sup>11</sup>.

#### 4.1 QUERY STRATEGIES

In addition to striving for a high degree of accuracy, we are concerned that our approach be both tractable and generalizable. Since the pool of decisions bearing on a particular area of law may number in the thousands, we are constantly mindful of the impossibility of reading every decision to verify their relevance. There are a number of ways by which we might attempt partitioning the pool into HITS and MISSES, but since the minimal statistically valid sample increases slower than the size of the population being sampled (see Figure 2), it is clearly most efficient to begin with the largest subpools with the highest (or lowest) expected HIT rates.

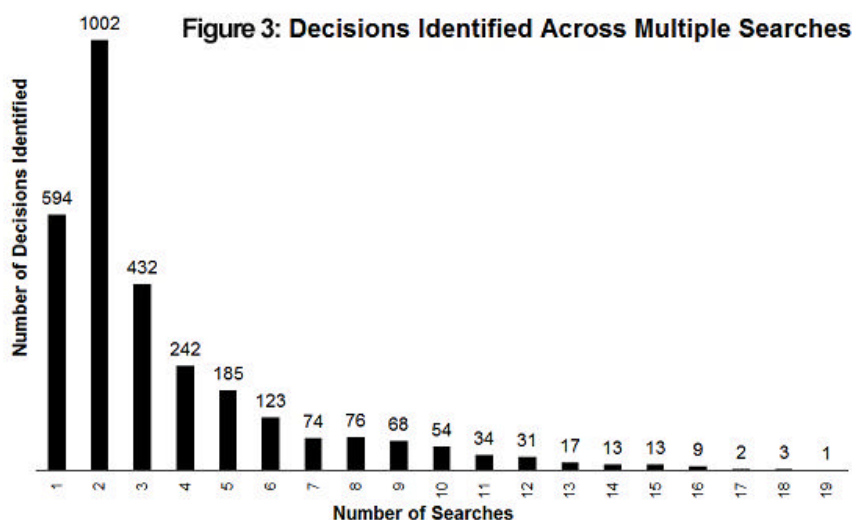



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the phase of research, rather than specific differences in logic or content (e.g., a few search strategies were also useful queries).

<sup>11</sup> We realize that this may also be an elusive goal: as the size of our HIT subpool approaches the target value, we are likely to face difficult trade-offs between increasing the size of the subpool, and maintaining (or increasing) its accuracy. Still, a moving target is better than no target at all; at the very least, we believe it provides a useful framework for assessing the utility of one sampling approach against another.

While we continue to experiment with new strategies and tools, through much trial-and-error, we have identified several approaches likely to produce large subpools with large (or very low) HIT rates. Generally, we believe the most productive approach is to triangulate across *multiple, similar-strategy* approaches. The logic here is simple: if two or more searches, pursuing the same goal (e.g., isolating HITS) but employing different means (e.g., structural vs. textual features) happen to intersect, we would generally expect that overlap to have a higher rate than any of the searches in isolation. For instance, we find that 1,377 decisions were identified by three or more searches (see Figure 3). If our expectations bear out – that such intersections are likely to have very high HIT rates – this simple strategy could produce nearly half our target HIT population in only one query. Of course, we could strengthen and fine-tuned this technique by adding queries based on different logic, and sampling the new intersections (again, beginning with the largest intersections first).



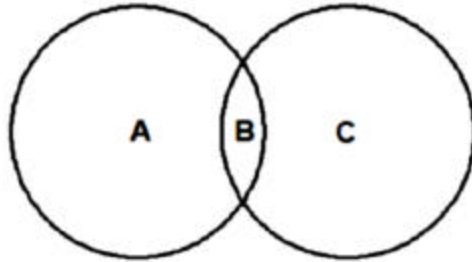
Alternately, we could attempt to populate the MISS subpool by querying the dataset for decisions with very few IN-CITES or OUT-CITES – the logic being that we expect RTDs to be more structurally interconnected than false-positives. While proving a negative is notoriously difficult, the lack of structural connections – in a system sustained by them – is likely to be somewhat more productive than attempting to identify keywords or phrases associated with false-positives.

An important caveat – while triangulation may indeed produce “most likely” subpopulations, this also means that decisions are unlikely to be evenly distributed throughout any given subpool. For example, subpools AB and BC (see Figure 4) might each have HIT rates of 80 percent, but because the intersection of these two approaches is more likely to produce HITS, subpools A or C would be likely to have lower rates in isolation than when they include the overlap (B). In effect, this means if a subpool that has been queried and sampled is found to intersect with a newly developed query strategy, the researcher must decide how to treat the intersection. If she chooses to consider it a new query, it – and all residual parts of the original subpool<sup>12</sup> – *must be re-sampled*. Of course, the statistical significance of this effect is based on the proportion of the

<sup>12</sup> In fact, the impact of new, overlapping queries would likely require the re-sampling of *all* subpools connected – directly or indirectly – to the original subpool.

original subpool (e.g., AB) that intersects with the second query (BC). Where this overlap is small, she might modify the later query, such that it excludes the intersection (e.g., C NOT B). Where it is nearly coterminous with an earlier query, she might combine the two (e.g., ABC). Since a random sample of the new *union* query would likely include decisions that had already been spot-checked (from the initial query, AB), the efficiency loss of repeated sampling is somewhat reduced, proportional to the degree of overlap with the initial query. In general, this suggests that researchers need not necessarily fear “re-entering” their datasets, in pursuit of increased accuracy.

**Figure 4: Methodological triangulation and subpopulation distribution**



## 4.2 ESTIMATING ERROR

To facilitate the query and spot-check processes, our programmers created Java-based software (see Figure 5) to enable us to query the dataset, to create subpools for manual verification, and to manage and track the results of our spot-checking team. These tools enable us to tag individual decisions, based on real observations (i.e., those actually spot-checked), or *estimated* HIT rates, based on the spot-check results for that queried subpool. Decisions that are directly observed are tagged either “1” or “0,” depending on whether they are determined to be a HIT or a MISS, respectively. After the spot-checkers have sampled sufficient decisions to achieve statistical validity<sup>13</sup>, our spot-check manager instructs the software to automatically calculate an estimated HIT rate, assigning that value to all decisions in the subpool that were not directly assessed. We can then determine the cumulative expected HIT rate of all queried decisions from the mean of all non-null<sup>14</sup> decisions in the total population. However, since our overarching query strategy is to sort decisions into either HIT or MISS subpools, we need to calculate the accuracy of these pools separately. Accordingly, we exclude decisions tagged “0” or with very low estimated HIT rates (e.g., < 10 percent) from the HIT subpool, which has the effect of slightly increasing its expected accuracy.

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<sup>13</sup> The spot-checking tool includes safeguards to ensure that sample size is sufficient (before accuracy estimates are calculated), and to assess inter-coder agreement (multiple coders are able to review the same decisions separately).

<sup>14</sup> In this sense, “nulls” are decisions that have not been tagged (i.e., have not belonged to any spot-checked queries).

Figure 5: Query-builder and Spot-check tools

The screenshot shows a Mozilla Firefox browser window titled "How to use the Query Builder - Mozilla Firefox". The main page content includes the heading "How to use the Query Builder" and introductory text: "The query builder allows you to define a set of cases and rank them. It uses broken down into pieces." It explains two primary types of expressions: selectors and valutors. A "Selector" is defined as a case name followed by a number (e.g., #26), and a "Valutor" is a mathematical expression (e.g., #1 or #2).

Two tool windows are overlaid on the page:

- CITE-IT Expression Builder:** A table with columns "Name", "Type", and "Expression".
 

Name	Type	Expression
x	?	#5
y	?	0.3 * verified
b1	?	#24 or #25 or #27 or #28
keyCite	?	#1 or #2 or #3 or #4 or ...
boolean	?	#24 or #25 or #26
boolean	?	(#24 or #25 or #26) an...
y2	?	2 * keyCite + 3 * boolean
all	?	#1 or ! #1
- CITE-IT Database Display:** A table with columns "cite", "date", "venue", and "hit". It shows a list of cases with their respective dates and venues.
 

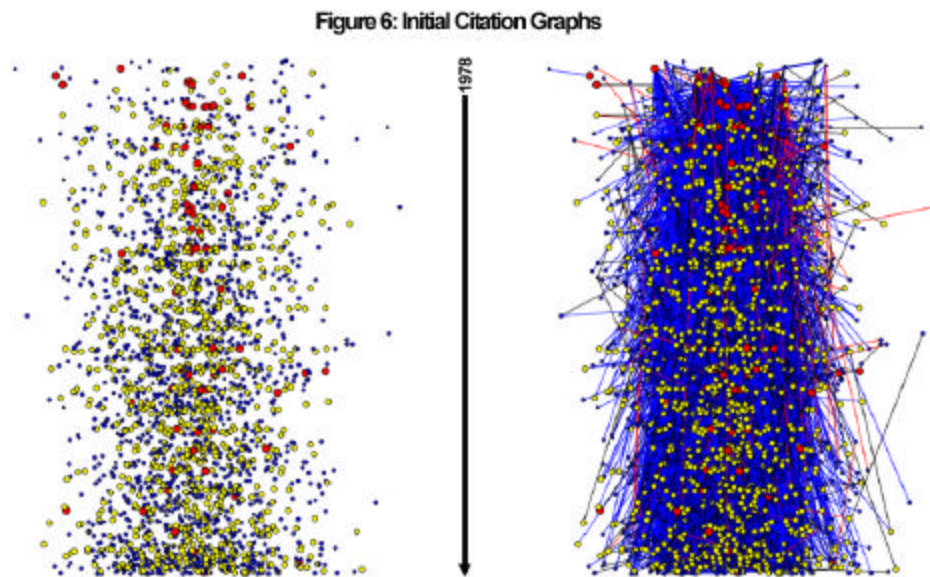
cite	date	venue	hit
106 S.Ct. 1018	Feb 26, 1986	Supreme	unknown
260 B.R. 174	Mar 12, 2001	Bankruptcy	unknown
1990 WL 37700	Mar 22, 1990	District	unknown
108 S.Ct. 849	Feb 24, 1988	Supreme	unknown
2000 WL 246607	Mar 3, 2000	District	unknown
121 F.3d 695	Aug 13, 1997	Appeals	unknown
38 B.R. 859	Jun 22, 1984	Bankruptcy	unknown
640 F.Supp. 474	Jun 10, 1986	District	unknown
627 F.2d 1068	Jul 2, 1980	Claims	unknown
14 F.3d 44	Jan 7, 1994	Appeals	unknown
981 F.Supp. 996	Dec 31, 1997	District	unknown
998 F.2d 1073	Dec 13, 1993	Appeals	unknown
1984 WL 120	Jul 5, 1984	District	unknown
179 B.R. 226	Feb 27, 1995	Bankruptcy	unknown
673 F.Supp. 224	Nov 4, 1987	District	unknown
104 S.Ct. 2982	Dec 28, 1984	Supreme	unknown
853 F.2d 904	Aug 10, 1988	Appeals	unknown
107 S.Ct. 2076	Dec 18, 1987	Supreme	unknown
170 F.3d 961	Dec 30, 1999	Appeals	unknown
752 F.2d 1554	Jan 9, 1995	Appeals	unknown
6 F.3d 1573	Dec 10, 1993	Appeals	unknown
47 Fed.Cl. 821	Oct 6, 2000	Federal Claims	unknown
771 F.2d 707	Aug 26, 1985	Appeals	unknown
749 F.Supp. 348	Oct 3, 1990	District	unknown
691 F.Supp. 973	Sep 30, 1987	District	unknown

## 5 PRELIMINARY RESULTS

While it appears that virtually all past citation analyses have been based on data organized as sociomatrixes (see Wasserman and Faust 1999, p 70-71), managing networks with languages such as Java both simplifies this task and provides greater analytical flexibility. Rather than maintain static maps of the (presence or absence of) relationships between each pair of actors, we need only record the various links from each case. With all files stored on our local computer, it is a trivial programming task<sup>15</sup> to identify the full set of links to any decision (or set of decisions), information which can be appended to each file as meta-data, or exported in a variety of forms (including sociomatrixes) for additional analysis.

<sup>15</sup> We describe this technique in McIntosh, W., K. Cousins, et al. (2005). *Using Information Technology to Examine the Communication of Precedent: Initial Findings and Lessons From the CITE-IT Project*. Annual Meeting of the Midwest Political Science Association, Chicago, IL.

Once we have identified all of the references contained within each decision, we use the open-source Java Universal Network Graph framework<sup>16</sup> to graph those citations. JUNG provides us virtually unlimited control over how we visually present our network, including filtering and optimization tools, enabling us to explore networks interactively (Huisman and van Duijn 2004). Thus, we can organize and color-code<sup>17</sup> decisions (nodes) and citations (links), highlighting (for instance) communication between geographical or hierarchical jurisdictions, or those connected with a specific decision, court, or court level. While the decisions from 1978 onward are more than sufficient to support statistical testing, the rightmost graph in Figure 6 shows the overwhelming volume of citations (again, there are over 17,000 direct links).



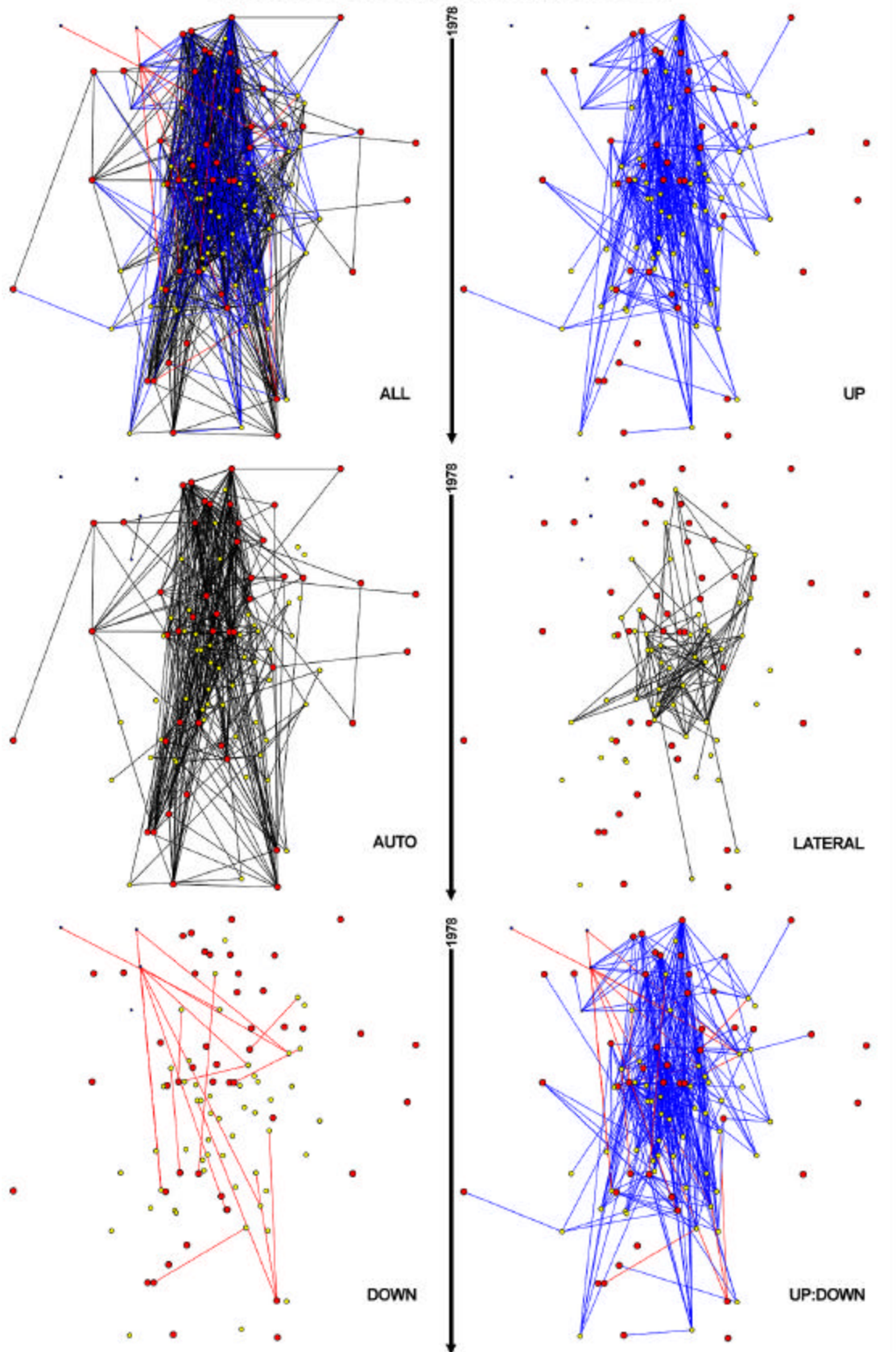
To make it easier to see broad differences in citation “directionality” (see Figure 1), we rendered several graphs based on the most-cited decisions in the pool (see Figure 7).

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<sup>16</sup> We chose JUNG because it is compatible with our other Java-based tools and supports a broad range of analytical and visualization approaches, but also because this rapidly evolving tool promises to become even more useful in the near future (Huisman and van Duijn 2004). With JUNG, we are able to annotate any graph element (e.g., providing metadata about nodes or links) and dynamically link it to its source data (i.e., the decision text). Finally, JUNG can also be embedded into other applications (e.g., Internet browsers), greatly facilitating our ability to communicate our data and results to a larger audience. JUNG also supports a wide range of algorithms for quantitative network analysis. See <http://jung.sourceforge.net> for source files and further information.

<sup>17</sup> Larger, full-color graphics are available on the CITE-IT website: [www.bsos.umd.edu/CITE-IT/DATA](http://www.bsos.umd.edu/CITE-IT/DATA).

Figure 7: Decisions with more than 25 IN-CITES



In these figures, the largest (red) circles represent decisions handed down by the US Supreme Court, slightly smaller (yellow circles) represent US Circuit Courts. The smallest (blue) dots are decisions issued by the various US District Courts. The lines connecting decisions depict citations. While position along the x-axis is (currently) arbitrary, we have ordered decisions temporally along the y-axis, with 1978 cases appearing at the top of each graph and more recent cases towards the bottom. This feature is especially critical: *all* OUT-CITES<sup>18</sup> originate from cases nearer the bottom. For instance, while the tendency may be to interpret lines in the DOWNWARD CITATIONS graph (bottom left of Figure 7) as “moving” from top to bottom, the actual relationship is in fact the opposite – *all* IN-CITES “arrive” from below, in each of these graphs.

Within this subset, we are able to observe interesting patterns in the data. Perhaps the most obvious (and least surprising) is the importance of appeals to authority (i.e., upward citations). Even though the graph may mask differences between appeals to the US Supreme Court or the US Circuit courts,<sup>19</sup> it is clear that binding authority is far more common in this decision sub-pool than “downward citations” (those to decisions from lower courts). Yet reflexive (“auto-citations”) linkages are even more evident, due in large part to the High Court’s propensity to cite itself (an appeal to its own authority). However, it is important to keep in mind that these graphs are only preliminary, as we are still spot-checking to estimate the proportion of true RTDs in the pool. Moreover, such patterns may (or may not) be artifacts of our selection and graphing parameters.

## 6 NEXT STEPS

These preliminary observations, as well as the scholarship we touch on, raise questions about relationships among courts (especially *lateral* citing) as legal principle develops. We believe that regulatory takings litigation offers an excellent window through which we can observe the larger system and address important issues. The way in which the law developed over the course of the 20th century should allow us to compare the relative value of the “team” model against “principal-agent” frameworks. In addition, we will be able to evaluate the flow of precedent and citation patterns across a century of legal development under varying conditions. And, finally, we can assess expansion and geographic dispersal in the advocacy network.

In the coming months, we plan to repeat these steps to identify the full corpus of RTDs dating back to 1900 (at both federal and state supreme court levels), adapting our searches as necessary (e.g., adjusting to historical changes in legal language). Considering that our methods will likely vary somewhat, we plan to sample each segment (i.e., post- and pre-1978 federal courts, and state supreme courts) separately for overall accuracy. By early 2006, we plan to have added all regulatory takings decisions that have been issued by state supreme courts during that period, as well (including any lower-level decisions that cite, or are cited by, those decisions). With this accomplished, we believe we will have gone further than any other researchers to identifying and acquiring a complete record of state and federal decisions relevant to a single question of law, from courts at multiple levels.

As we expand our pool of cases to include the pre-*Penn Station* decisions from 1922 to 1978, we will ask questions specifically about lower court behavior absent High Court guidance. Such

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<sup>18</sup> Please refer back to Figure 1 and the associated discussion in Section 2.

<sup>19</sup> We will use formal network models to test this (and other) hypothesis once the accuracy of the population has been estimated.

questions have broader implications for the connections between law and politics, as well as relational dynamics among political institutions. How have courts reacted to the explosion of political attention given to regulatory takings since the High Court reentered the field in the 1970s? Did lower courts comply immediately, or not at all? Or, rather, have lower courts come on board more gradually? Assuming that a network of attorneys and organized interests have mined this area of law to engineer legal development, how closely does such legal mobilization track decision-making across the court system? Do competing networks emerge? Does the network radiate from a single core, or is it regional, with multiple centers? To what extent have different layers of the judicial system used legal doctrine to expand or limit their involvement in policy-making?<sup>20</sup> Ending its half-century holiday, did the Court engage primarily in self-reference to fit its old principles to dramatically different political and economic conditions? Or, did the Court follow new developments from below—e.g., from prestigious circuits or states, from better-known or experienced judges, when more than one circuit and/or state had adopted a common standard? Other important questions concern the manner in which appellate courts may use pronouncements of doctrine as signals to lower courts as a means of regulating the flow of certain kinds of cases into the federal court system.

Finally, to investigate these structural influences (and others), we are also in the planning stages of creating a dynamic, interactive map of this corpus, which will highlight the spatial distribution of regulatory takings cases at any given time, helping us to identify zones of influence<sup>21</sup> across both temporal and geographic dimensions. Using formal network analysis, quantitative linguistics, and other manual and computer-supported techniques, we will generate graphical and statistical representations of linkages and correlations between cases and contextual variables (e.g., concepts, jurists, locales). We believe these tools will not only facilitate our ability to investigate the corpus and generate new hypotheses, but may enable us to identify (and verify) patterns that may otherwise have been impossible to detect.

## BIBLIOGRAPHY

- Ackerman, B. A. (1977). Private Property and the Constitution. New Haven, CT, Yale University Press.
- Baum, L. (1978). "Lower Court Response to Supreme Court Decisions: Reconsidering a Negative Picture." Justice System Journal 3: 208-19.
- Caldeira, G. A. (1983). "On the Reputation of State Supreme Courts." Political Behavior 83.
- Caldeira, G. A. (1985). "The Transmission of Legal Precedent: A Study of State Supreme Courts." American Political Science Review 79(1): 178-94.
- Caldeira, G. A. (1988). "Legal precedent: Structures of communication between state supreme courts." Social Networks 10(1): 29-55.
- Cameron, C. M., J. A. Segal, et al. (2000). "Strategic Auditing in a Political Hierarchy: An Informational Model of the Supreme Court's Certiorari Decisions." American Political Science Review 94(1): 101-16.

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<sup>20</sup> Harrison (1982) observes, for example, that state courts may calibrate their level of activity in issues concerning exclusionary zoning according to "how broadly they define due process requirements, equal rights guarantees, and eligibility for standing" (p 59).

<sup>21</sup> Using opinion citations as a proxy for judicial influence originates with the work of Landes and Posner (1976), who assessed the subsequent citations generated by 1000 Supreme Court opinions from the 1960s and 70s. Landes, Lessig, and Solimine (1998) similarly gauged the influence of circuit judges by the number and patterns of citations to their opinions. In addition, Kosma (1998) analyzed citations to the more than 24,000 opinions produced by Supreme Court justices over the entire expanse of history (1793-1991).

- Chandler, S. J. (2005). The Network Structure of Supreme Court Jurisprudence. Public Law and Legal Theory Series. Report 2005-W-01. Houston, TX, University of Houston Law Center: 26. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=742065](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=742065)
- Fowler, J. H. and S. Jeon (2005). The Authority of Supreme Court Precedent: A Network Analysis. Davis, CA: 32. [http://jhffowler.ucdavis.edu/authority\\_of\\_supreme\\_court\\_precedent.pdf](http://jhffowler.ucdavis.edu/authority_of_supreme_court_precedent.pdf)
- Frank, O. (1978). "Sampling and estimation in large social networks." Social Networks 1(1): 91-101.
- Frank, O. (1999). Estimating Hidden Population Sizes by Using Sampled Ego Networks. 52nd Session of the International Statistical Institute, Finland, Bulletin of the International Statistical Institute.
- Gerson, K. (1999). "Evaluating legal information retrieval systems: how do the ranked-retrieval methods of WESTLAW and LEXIS measure up?" Legal Reference Services Quarterly 17(4): 53-67.
- Haire, S. B., S. A. Lindquist, et al. (2003). "Appellate Court Supervision in the Federal Judiciary: A Hierarchical Perspective." Law & Society Review 37: 143-68.
- Harris, P. (1982). "Structural change in the communication of precedent among state supreme courts, 1870-1970." Social Networks 4(3): 201-212.
- Harris, P. (1985). "Ecology and Culture in the Communication of Precedent among State Supreme Courts, 1870-1970." Law & Society Review 19(3): 449-86.
- Harrison, R. S. (1982). State Court Activism in Exclusionary Zoning Cases. State Supreme Courts: Policymakers in the Federal System. M. C. Porter and G. A. Tarr. Westport, CT, Greenwood Press.
- Huisman, M. and M. A. J. van Duijn (2004). Software for Social Network Analysis. Models and Methods in Social Network Analysis. P. J. Carrington, J. Scott and S. Wasserman. Cambridge, Cambridge University Press: 1-54.
- Johnson, C. A. (1985). "Citations to Authority in Supreme Court Opinions." Law and Policy 7: 509.
- Johnson, C. A. (1986). "Follow-up Citations in the US Supreme Court." Western Political Quarterly 39: 538.
- Johnson, C. A. (1987). "Law, Politics, and Judicial Decision Making: Lower Federal Court Uses of Supreme Court Decisions." Law and Society Review 21: 325-40.
- Johnson, C. A. and B. C. Canon (1984). Judicial Policies: Implementation and Impact. Washington, DC, Congressional Quarterly Press.
- Klein, D. E. (2002). Making Law in the United States Courts of Appeals. New York, Cambridge University Press.
- Knight, J. and L. Epstein (1996). "The Norm of Stare Decisis." American Journal of Political Science 40(4): 1018-35.
- Kornhauser, L. A. (1995). "Adjudication by a Resource-Constrained Team: Hierarchy and Precedent in a Judicial System." Southern California Law Review 68: 1605-29.
- Landes, W. M., L. Lessig, et al. (1998). "Judicial Influence: A Citation Analysis of Federal Courts of Appeals Judges." Journal of Legal Studies: 82. [www.law.uchicago.edu/Lawecon/WkngPprs\\_51-75/51.Landes.Judicial.pdf](http://www.law.uchicago.edu/Lawecon/WkngPprs_51-75/51.Landes.Judicial.pdf)
- Landes, W. M. and R. A. Posner (1976). Legal Precedent: A Theoretical and Empirical Analysis. NBER Working Paper. Report 146. [www.nber.org/papers/w0146.pdf](http://www.nber.org/papers/w0146.pdf)
- Liebert, T. (1999). New Shepard's v. KeyCite: How Do We Compare? Austin, TX, Law Library Resource Xchange. 2005.
- MacLeod, D. (1996). The Internet, Lexis and Westlaw: a Comparison of Resource for the Legal Researcher. Database Magazine. 19.
- Manwaring, D. R. (1962). Render unto Caesar: The Flag-Salute Controversy. Chicago, IL, University of Chicago Press.
- Marsden, P. V. (2005). Recent Developments in Network Measurement. Models and methods in social network analysis. P. J. Carrington, J. Scott and S. Wasserman. New York, NY, Cambridge University Press: 8-30.
- McIntosh, W., K. Cousins, et al. (2005). Using Information Technology to Examine the Communication of Precedent: Initial Findings and Lessons From the CITE-IT Project. Annual Meeting of the Midwest Political Science Association, Chicago, IL.
- McIntosh, W. V. and C. L. Cates (1997). Judicial Entrepreneurship: The Role of the Judge in the Marketplace of Ideas. Westport, CT, Greenwood.

- Merryman, J. H. (1954). "The Authority of Authority - What the California Supreme Court Cited in 1950." Stanford Law Review 6: 613-73.
- Merryman, J. H. (1977). "Toward a Theory of Citations: An Empirical Study of the Citation Practice of the California Supreme Court in 1950, 1960, and 1970." Southern California Law Review 50: 381-428.
- Mott, R. L. (1936). "Judicial Influence (in Judicial Affairs)." American Political Science Review 30(2): 295-315.
- Peltason, J. W. (1961). *Fifty-Eight Lonely Men: Southern Federal Judges And School Desegregation*. New York, Harcourt, Brace and World.
- Phelps, G. A. and J. A. Gates (1991). "The Myth of Jurisprudence: Interpretive Theory in the Constitutional Opinions of Justices Rehnquist and Brennan." Santa Clara Law Review 31: 567-96.
- Salganik, M. J. and D. D. Heckathorn (2005). "Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling." Sociological Methodology Forthcoming: 28. [www.columbia.edu/~mjs2105/respondent-driven-sampling.pdf](http://www.columbia.edu/~mjs2105/respondent-driven-sampling.pdf)
- Scott, J. (2004). Social network analysis: a handbook. London, Sage.
- Segal, J. A. and H. J. Spaeth (1996). "The Influence of Stare Decisis on the Votes of United States Supreme Court Justices." American Journal of Political Science 40(4): 971-1003.
- Segal, J. A. and H. J. Spaeth (2002). The Supreme Court and the Attitudinal Model Revisited. New York, Cambridge University Press.
- Smith, T. A. (2005). The Web of Law. San Diego, CA: 57. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=642863](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=642863)
- Songer, D. R. (1988). "Case Selection in Judicial Impact Research." Western Political Quarterly 41(3): 569-82.
- Songer, D. R., J. A. Segal, et al. (1994). "The Hierarchy of Justice: Testing a Principal-Agent Model of Supreme Court-Circuit Court Interactions." American Journal of Political Science 38(3): 673-96.
- Songer, D. R. and R. S. Sheehan (1990). "Supreme Court Impact on Compliance and Outcomes: Miranda and New York Times in the United States Courts of Appeals." Western Political Quarterly 43: 297-316.
- Spriggs II, J. F. and T. G. Hansford (2000). "Measuring Legal Change: The Reliability and Validity of *Shepard's Citations*." Political Research Quarterly 53(2): 327-41.
- Spriggs II, J. F. and T. G. Hansford (2002). Explaining the Overruling of US Supreme Court Precedent. Berkeley, CA, Center for the Study of Law and Society: 45. <http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1030&context=csls>
- Topf, M. A. (1992). "Communicating Legitimacy in US Supreme Court Opinions." Language and Communication 12: 17-29.
- Uchida, C. D. and T. S. Bynum (1991). "Search Warrants, Motions to Suppress and 'Lost Cases': The Effects of the Exclusionary Rule in Seven Jurisdictions." Journal of Criminal Law and Criminology 81: 1034-66.
- Walsh, D. J. (1997). "On the Meaning and Pattern of Legal Citations: Evidence From State Wrongful Discharge Precedent Cases." Law and Society Review 31: 337-60.
- Wasserman, S. and K. Faust (1999). Social Network Analysis: Methods and Applications. New York, Cambridge University Press.