# Expertise, Experience, and Ideology on Specialized Courts: The Case of the Court of Appeals for the Federal Circuit

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What roles do prior expertise and accumulated experience play in shaping ideologically consistent voting on a specialized court? Using a dataset of obviousness patent cases from the Court of Appeals for the Federal Circuit spanning 1997–2007, we show that prior expertise enhances the influence of ideology on judicial decisionmaking, but that accumulated experience does not. In addition, we build on previous work and show that ideology is a factor in decisionmaking in technical areas of law, contrary to the received wisdom on patent cases.

Whether it be business, education, health care, or a host of other settings, it is clear that American society has become increasingly specialized—and the legal world is certainly no exception to this trend. As the caseloads of state and federal courts have ballooned, governments have increasingly turned to specialized courts to relieve the workload pressures on generalist judges (see, e.g., Posner 1983), a trend that is unlikely to slow in the coming decades. A parallel development has occurred within both law firms and the legal academy, as lawyers and law professors develop increasingly narrow areas of expertise (Legomsky 1990). Unfortunately, as this specialization of both the law and the federal judiciary has taken root, scholars have collectively failed to respond with a commensurate level of investigation into the implications of such developments. In particular, with several notable exceptions (e.g., Unah 1998; Hansen et al. 1995; Baum 1977), scant attention has been paid to the role that technical specialization may play in

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influencing the relevance of ideological factors to judicial decisionmaking. This is rather surprising, given the vast array of other background characteristics that have been subjected to scholarly analysis (e.g., Hettinger et al. 2003, 2004; Songer et al. 1994; Gryski & Main 1986; Walker & Barrow 1985; Goldman 1975; Ulmer 1970; Goldman 1966).

In light of the increasing specialization of U.S. law and courts, we believe it is promising and, indeed, necessary to examine the potential influence of individual-level subject matter specialization on judicial decisionmaking. In our view, that need is particularly acute with respect to relatively technical legal issues such as patent rights. As detailed below, a particularly technical (and critical) aspect of patent law requires judges to determine whether a patent should be invalidated for "obviousness"—that is, judges must establish whether a new invention is different *enough* from preexisting technology to merit the legal protections against infringement that a U.S. patent provides. It is this question—the question of patent obviousness—that we rely upon in our investigation of the ways in which technical training may influence judicial decisionmaking.

An equally important question in contemporary research on judicial behavior concerns the notion of consistency in judicial decisionmaking. Specifically, much scholarly interest exists with regard to the factors that influence the ideological consistency of individual judges—i.e., that judges vote the way our theories predict that they should. Collins (2008) persuasively argues that consistency in judicial decisionmaking is affected by a variety of factors, including one's length of judicial service and ideological extremism. Of particular relevance to our present inquiry is his finding that ideologically consistent voting behavior is especially likely when judges view cases as salient (Collins 2008:868). Cases are salient, then, when a judge or justice is interested in and cares deeply about the legal issue at hand (e.g., L. Epstein & Segal 2000). We believe that, when it comes to highly specialized, technical areas of law, the ideological consistency of judicial decisionmaking may also be influenced by a judge's familiarity with the intricacies of abstruse legal subject matter. As noted below, judges possessing greater familiarity with the technical area of patent law, as evidenced by expertise and/or greater experience, will be likely to view such cases as more salient than will their counterparts. Given Collins's finding that ideology's effects on judging are magnified in the presence of salient cases, an investigation of the relationship between experience, expertise, and ideology is warranted.

In this project, then, we examine decisionmaking on the Court of Appeals for the Federal Circuit (hereafter, the "Federal Circuit") and ask: What roles do prior expertise and accumulated experi-

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ence play in shaping ideologically consistent voting by judges in patent obviousness cases?[1] Put somewhat differently, to what extent does greater familiarity with this rather technical area of law lead judges to see obviousness cases as salient and thereby enhance their propensity to decide those cases in ideologically consistent ways? As detailed more fully in "Patent Law and Determinations of Obviousness" below, under the law of obviousness no invention may be patented if it would have been obvious to one skilled in the relevant field. Obviousness cases, then, often force judges to grapple with exceedingly complex case facts. In sum, we seek to determine whether the highly technical nature of decisionmaking in this important legal area elevates the impact of two background characteristics—prior expertise and accumulated experience—in structuring judicial decisionmaking.

This research represents an extension of scholarly investigations into the consistency of judicial choice as well as the role played by background characteristics in a technical area of law on a specialized court. Most fundamentally, we posit that expertise and experience may play different roles in cases that require high levels of technical or specialized knowledge than they do in the less technical criminal and civil cases decided by other federal circuit courts. If this is indeed the case, then the extent to which a judge possesses a background of technical training and expertise in a specialized issue area may be consequential for judicial behavior. It is also possible that, given their narrowed jurisdiction, judges on the Federal Circuit acquire high levels of competency in deciding obviousness cases as a result of encountering those cases repeatedly over time, whether they ascend to the bench as experts or not. A subsidiary question, then, is whether prior expertise is separable from accumulated experience when it comes to the isolation of factors that may influence judicial decisionmaking.

Congress itself appears to view judicial expertise within technical issue areas as a critical attribute, since these areas have received unique treatment in the federal judiciary in the form of specialized courts. That is, Congress has, among several motives, created courts to deal with these technical issues exclusively (or semi-exclusively) in the belief that allowing judges to specialize in them will increase the efficiency with which those cases are handled as well as improve consistency in the law (Baum 1990; Seron

[1] The obviousness doctrine is codified at 35 U.S.C. 103 (a) and says that no patent can be granted when the invention to be patented would be obvious to one skilled in the art. More specifically, 35 U.S.C. 103 (a) states that a claimed invention is obvious if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." Here, prior art refers to other patents and technical materials (such as journal articles) that speak to the patent at issue's subject matter.

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1978).[2] Examples of these kinds of specialized federal courts include bankruptcy courts, the Court of International Trade, the U.S. Tax Court, and the Court of Appeals for the Federal Circuit. Among these specialized courts, the Court of Appeals for the Federal Circuit is unique because it is the only specialized Article III appellate court in the judiciary.

Even within specialized courts, however, individual levels of expert knowledge about the cases at hand will necessarily vary. In this study, we investigate the ways in which technical proficiency in patent law and the law of obviousness may be consequential in structuring judicial decisionmaking on the Federal Circuit.[3] As part of that analysis, we also consider how such expertise may interact with ideological considerations to affect judicial decisionmaking. Ultimately, we extend the work of others (Sag et al. 2009; Howard 2005) by showing that decisionmaking in patent cases, as in some other technical areas of law, can be ideological.

The article proceeds as follows. We begin by discussing the background variables of policy expertise and experience generally, and the ways in which they may be relevant to judicial decisionmaking in technical areas of law. Second, we discuss the role of ideology in judicial decisionmaking, giving special attention to its influence within the context of specialized courts. Third, we discuss the technical legal area examined in our analysis—patent law and the law of obviousness. There, we operationalize and discuss the attributes of "expertise" and "experience" as they pertain to the law of obviousness. Then we explain our data and hypotheses. Next we present our results. Finally, we conclude with a discussion of the possible applications of this research for the federal judiciary in general and patent law in particular. We also speculate about the broader potential implications of our findings.

[2] Indeed, the technicality of patent law was one of the major factors that motivated the Federal Circuit's establishment (Unah 2001; Baum 1990).

[3] There is some debate about the proper terminology when defining the Federal Circuit as a specialized court. In reality, the Court is a multispecialty court hearing not only patent cases, but also international trade cases, the appeals of veterans, personnel decisions within the U.S. government, and non-tort claims against the U.S. government. We refer to the Federal Circuit as a specialized court throughout, where we intend that term to mean that the Federal Circuit has a jurisdiction limited by subject matter and not by geographic area. According to the Federal Circuit, patent cases consumed more of the Court's time than any other issue area in 2007. Patents took about 35 percent of the judges' time; the next closest category included cases involving personnel issues in the federal government, with 29 percent (see http://www.cafc.uscourts.gov/pdf/ChartAdjudications07.pdf; accessed 30 Dec. 2008). In addition to comprising the largest share of the Court's workload, patent cases are also widely viewed as being the most important part of the tribunal's work.

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## Judicial Background and Notions of Expertise

Investigations of expertise among governmental actors are scattered throughout the scholarly literature, and those analyses tend to highlight similar themes. Krehbiel (1991), for example, contends that policy expertise is a major determinant of modern congressional organization. Specifically, he argues that the committee system allows legislators to develop policy expertise in a given area. Colleagues who lack such policy expertise, in turn, rely upon the views of those more expert legislators. Several scholars have also explained congressional delegations of power to the bureaucracy as a way for legislators to utilize bureaucratic policy expertise in the implementation of various programs (e.g., Bawn 1995; D. Epstein and O'Halloran 1994). For a variety of reasons, however, judicial scholars have not given sufficient consideration to the ways in which expertise might be relevant to judicial decisionmaking in certain contexts (but see Unah 1998). Chief among these reasons is a focus in the literature on decisionmaking in generalist courts.

Despite this lack of attention, we believe expertise may play an important role in judicial decisionmaking, at least under some theoretically meaningful conditions. When considered in tandem with the construct of ideology in particular, expertise's function in judicial decisionmaking may be somewhat analogous to political sophistication's role in the formation of public opinion. For example, public opinion scholars have noted that individuals who possess higher levels of political knowledge demonstrate higher levels of ideological constraint (Judd & Krosnick 1989; Kinder & Sears 1985; Zaller 1992). Such ideological constraint is typically thought of in terms of ideological coherence, meaning that those who possess higher levels of political knowledge tend to demonstrate more ideologically consistent opinions (e.g., Converse 1964).

Because federal judges are undoubtedly highly knowledgeable political elites, their ideological worldviews should already be rather advanced. That is, whether they possess technical expertise in a particular legal area or not, these individuals likely have well-developed ideological schema that they can apply across a range of issue areas. However, as McGraw and Pinney (1990:9–10) have noted, general sophistication and domain-specific expertise are typically independent constructs. Thus, in order for ideology to structure judicial decisionmaking, those judges must arguably possess more than elevated levels of political sophistication generally—they must also be able to superimpose that ideological schema upon a particular legal controversy. Put differently, they must be able to *apply* that preexisting ideological framework to the set of facts currently before them (see Federico & Schneider 2007; Posavac et al. 1997).

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In cases that speak to the central concerns of politics in the twenty-first century, such as those involving civil liberties, civil rights, and criminal law, the imposition of one's ideological worldview is oftentimes straightforward. No technical expertise is likely to be required in order for a conservative judge who encounters a highly salient case involving criminal procedure or religious establishment to discern the "correct" ideological outcome. But in more technical areas of law, such as the law of intellectual property or international trade, that same conservative judge would arguably encounter greater difficulty in determining what substantive result would most closely approximate a "conservative" outcome.

Note that individuals who possess domain-specific expertise tend to be particularly well-equipped to apply ideological principles to decisionmaking. Although one might think that objective, professional training would act to depress the influence of ideology, psychological research seems to suggest otherwise. In part, this is due to the fact that "experts are characterized by more knowledge (nodes) about the domain, as well as more and stronger links among the nodes" than are non-experts (McGraw & Pinney 1990:11). Most fundamentally, compared to nonexperts, experts tend to think about encountered information more systematically (e.g., Krosnick 1990). Indeed, "the development of consistency between . . . attitudes among those who are relatively expert in the domain is presumed to follow from the fact that such individuals . . . [think about issues] in a relatively systematic or principled manner" (Judd & Downing 1990:104). Thus, multiple studies have identified expertise as a "primary determinant" of attitudinal consistency (Judd & Downing 1990:104; Hagner & Pierce 1983; Judd & Milburn 1980; Nie, with Anderson 1974; Nie et al. 1979; Pierce & Hagner 1980).

In light of the research noted above, we believe that specialized expertise in technical areas of law should, in fact, lead judges to assess cases in more ideological terms. In a sense, a judge who is an expert in a particular field possesses more extensive knowledge about the relevant legal minutiae than a similarly situated nonexpert and, perhaps more important, should be better equipped to apply his or her ideological schema to each individual case. In more psychological terms, judges with expertise in patent law should "invoke [the] relatively abstract ideological principles that organize their thoughts and . . . this sort of systematic thought [should lead] to increased attitude consistency" (Judd & Downing 1990:117; Krosnick 1990:3). However, before explicitly conceptualizing expertise and its close cousin experience, we turn our attention to the idea that there is an underlying ideological structure to decisionmaking in obviousness cases.

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## The Role of Ideology in Judicial Decisionmaking

Despite the fact that ideology is a robust predictor of judicial decisionmaking in many areas of law (e.g., Segal & Spaeth 2002; Hettinger et al. 2004; Pacelle et al. 2007; Pritchett 1954),[4] in other, more technical areas ideological considerations do not seem to be of much relevance. The prototypical technical case is one involving the intricacies of tax law, in which judges must apply jargon-heavy statutes to highly complex fact situations on issues with only limited appeal. This is often offered as an explanation for the Supreme Court's reluctance to hear tax cases (Richards 2001). Underscoring this point, an analysis of the Supreme Court's tax decisions finds that ideology does not help explain the justices' decisionmaking (Staudt et al. 2006; but see Howard 2005).

Perhaps not surprisingly, detailed empirical analysis of decisionmaking on the Federal Circuit in patent validity cases has failed to find much of a role for judicial ideology (Allison & Lemley 2000). Indeed, one review of the literature on ideology's impact on decisionmaking in the larger field of intellectual property law (which encompasses patent law) concludes that the "marginalization of questions of ideology is so substantial in the IP literature that there are very few articles where the question is even raised" (Sag et al. 2009:117). Indeed, a study by the most recent appointee to the Federal Circuit, Judge Kimberly Moore, finds no differences in the ways Republican and Democratic district court judges construe patent claims (Moore 2001).

What might explain this apparent absence of ideological considerations from the decisionmaking of judges on the Federal Circuit in this area of law? There are at least two possible explanations. First, it is possible that disputes in patent law simply do not adhere to normal partisan or ideological divides. Instead, perhaps the cleavage is between those who hold rights and those who do not, and the Federal Circuit has been "captured" by those who favor a strong patent system. Put differently, perhaps only those with a concentrated interest in the patent system will care much about the creation and staffing of a specialized appellate court that deals with issues in patent law.

This is essentially Baum's conclusion (1990, 1994), based on an extensive review of the debates surrounding the Federal Circuit's establishment and with respect to the Supreme Court's control of the Federal Circuit. He finds that patent attorneys, and presumably their clients, favored the creation of the Federal Circuit because

[4] To a lesser extent, studies have also confirmed that ideology is a major factor in decisionmaking in economic cases (Rohde & Spaeth 1976; Sunstein et al. 2004; Lindquist & Spill Solberg 2007; Unah 1997; Ducat & Dudley 1987; Dudley & Ducat 1986).

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they believed it would save them from having to face more hostile generalist circuits. Perhaps, then, judges who favor patent rights holders are especially likely to be appointed to the Federal Circuit, be they liberal or conservative. By contrast, the interests of those who might favor less rigorous protections for patents may be too diffuse for them to hold great sway over who is or is not tapped to serve on the Federal Circuit. Further evidence that pro-patent interests may hold such disproportionate legal influence comes from an analysis of the amicus curiae behavior of parties in Supreme Court cases dealing with patent law. Landes and Posner (2003:411) note that in the 11 patent cases considered by the Court between 1980 and 2003, there were 82 briefs filed in favor of patent protection and only 48 filed against. Thus, pro-patent interests may be well positioned to defeat any less organized anti-patent interests arrayed against them in the area most important to them—the protection of patents. There may be some ideological diversity with respect to the degree of protection patents deserve. However, if a general predisposition toward supporting patent rights represents a prerequisite to being appointed to the Federal Circuit, such ideological diversity may be difficult to detect.

Second, as a highly technical area of law, perhaps ideology's relationship to judicial decisionmaking on questions of patent obviousness is moderated by an individual judge's adeptness at analyzing and adjudicating those cases. As previously noted, Congress's action within the area of judicial oversight strongly suggests that investigating the roles of expertise and experience in tandem with ideology may be useful for understanding judicial decisionmaking in this area. Though we develop more specific hypotheses on this point in "Data and Hypotheses," we note here that scholars have only undertaken limited research examining the relationships between ideology, judicial expertise, and experience. It is especially pertinent that no such examination currently exists with respect to decisionmaking by the Federal Circuit generally or in patent obviousness cases in particular. Finally, as we note in the next section, it may also be that more nuanced definitions of liberal and conservative outcomes are required in order to discern the true impact of policy preferences in patent law decisionmaking.[5]

[5] One explanation for ideology's general lack of influence in specialized courts centers on how scholars have defined the ideological outcomes in certain highly technical areas of law. For example, with respect to tax law, Staudt et al. (2006) argue that the traditional coding of ideological outcomes in the Spaeth Supreme Court database may misclassify the underlying policy preferences of the justices. Thus, it may be that the traditional underdog/upperdog analysis for coding case outcomes in economic areas does not fully capture the underlying ideological structure inherent in judicial decisionmaking.

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## Patent Law and Determinations of Obviousness

As previously noted, certain areas of law are viewed as technical, in that they require specialized knowledge or professional training to understand properly. While patent law itself may not be highly complicated, determining the validity of a patent (or whether it has been infringed) is widely believed to require specialized knowledge because the *facts* involved in individual patent cases are typically intricate and highly technical.[6] The complexity of these fact patterns is underscored by the federal requirement that attorneys must possess some sort of technical degree before they are allowed to practice before the U.S. Patent and Trademark Office (USPTO).[7]

### Conceptualizing Expertise

While one of our study's central aims is to investigate the notion of expertise within the domain of patent law cases, it is not entirely clear how expertise should be operationalized. This is an important issue, as "the lack of consistency in operationalizing the construct [of expertise] has resulted in some theoretical and empirical confusion" (McGraw & Pinney 1990:9).[8] In the purest sense, a judge might be described as either possessing or not possessing expertise in a technical legal area upon ascent to the bench. In this static view, if individuals possess expertise in an area of law at the time of their appointment, they cannot lose it. In contrast to the construct of experience, which we describe below, individuals who do not possess expertise cannot acquire it over time. Here, then,

[6] For instance, in *Eli Lilly v. Zenith Goldline Pharmaceuticals*, 471 F.3d 1369 (2007), the Federal Circuit was called upon to decide whether Zenith could defend itself against an infringement claim by showing that a Lilly patent for a schizophrenia drug was invalid in some way. Therefore, the court was required to consider whether previous patents anticipated and made obvious Lilly's patent. This, in turn, required the court to review a number of other chemical patents and to compare the chemical structures of the drugs in those patents with the structure of Lilly's drug. To wit: "olanzapine [Lilly's drug] differs structurally from flumezapine, by substitution of a hydrogen atom (H) for the fluorine atom (F) in flumezapine at the 7-position of the benzene ring" (471 F.3d at 1375). Having reviewed the prior art extensively, the court determined that Lilly's patent was neither anticipated nor obvious and thus that Zenith had infringed Lilly's patent. Moore (2001) has an extensive discussion of the difficulties involved in determining the facts in many patent cases.

[7] 37 C.F.R. 11.7(a)(2)(ii). In relevant part, no individual may register to take the patent bar exam unless that individual: "[P]ossesses the legal, scientific, and technical qualifications necessary for him or her to render applicants valuable service . . . ."

[8] McGraw and Pinney also refer to distinguishing expertise along two dimensions—a "mode of acquisition dimension" and a "frequency of use dimension" (1990:11). Broadly considered, we believe that what we operationalize as "expertise" correlates with their mode of acquisition dimension, whereas our "experience" construct is closer in character to their frequency of use dimension.

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we conceptualize expertise in two reinforcing ways. An expert is a judge who (1) possesses the background technical skills (i.e., undergraduate or graduate degree) that will be necessary to evaluate the obviousness of a patent upon ascension to the bench (see footnote 7), and (2) has previously been a member of the patent bar.

First, as noted, the USPTO requires that lawyers have some sort of technical background degree in order to sit for the patent bar and to practice before the USPTO. Second, after satisfying this requirement of technical ability, we count as experts only those who have served as patent attorneys prior to their ascension to the bench. Of course, prior knowledge alone is not enough to distinguish patent experts from other judges on the court. To the contrary, nonexpert judges may acquire the skills necessary to evaluate patents effectively by being repeatedly exposed to cases involving questions of patent validity (something we address below and conceptualize as experience). Though these nonexperts may acquire an enhanced ability to sift the intricate facts of patent cases as a result of their service on the Federal Circuit, none will have been members of the patent bar.

## Conceptualizing Experience

Alternatively, the acquisition of expertise in technical areas such as patent law might be conceptualized as a function of experience, or an acclimation effect. Such effects are well known to students of judicial behavior, with the most notable example being the so-called Freshman Effect (e.g., Hagle 1993). Scholars who have examined the existence of this acclimation effect have reached mixed conclusions, but there is some evidence that, as judges become accustomed to their new position, their voting behavior stabilizes (Snyder 1958; but see Heck & Hall 1981), they become increasingly adept at opinion writing (e.g., Greenhouse 2005; Wood et al. 1998), and they grow less deferential to positions espoused by a majority of their colleagues (Yarbrough 2005; Hettinger et al. 2003, 2006).

Similarly, as judges on specialized courts gain greater judicial experience, those judges are likely to become more skilled at disposing of the technical cases that regularly appear before them. In this view, then, even if a particular judge possesses no prior expertise in a specialized area of law, repeatedly encountering such cases may act to increase that judge's familiarity with those technical matters and bestow him or her with an added measure of competence in that legal area over time.

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## Conceptualizing Ideology

In order to accurately assess the relationship between expertise, experience, and ideology, we must precisely define liberal and conservative outcomes in patent obviousness cases. Simply relying on the underdog/upperdog distinction that is prevalent in the coding of economic case data is likely to lead to an increased chance of making a Type II error in our analysis. That is, if we specify that ideology is manifested in patent cases based on which party a judge favors in any given case, we are likely to overlook the role of ideology in those cases. That is because the parties in a case challenging the validity of a patent are frequently both upperdogs. Though there is no prototypical patent validity case, these disputes often occur between large corporations with large patent portfolios.[9] Thus, coding outcomes based on which party is favored by the decision is likely to be a primrose path for finding any ideological influence on decisionmaking in this area of law.

Instead, we approach defining the ideological outcomes in these cases on the basis of the traditional economic stances of Republicans and Democrats. As Sag et al. (2009) note, it is highly unlikely that judges do not have policy preferences with respect to the outcomes in intellectual property (and thus patent) cases because they raise "questions regarding property rights . . . " (Sag et al. 2009:119). Indeed, in attempting to define the political economy of intellectual property law, Landes and Posner (2003) note that free market capitalists have frequently favored greater protection for patent rights.

With respect to the validity of patents, an analogy can also be made to antitrust law. Typically, liberals (and Democrats) are thought to favor more vigorous trust-breaking activities, whereas conservatives (and Republicans) tend to protect monopolistic enterprises (Landes & Posner 2003). The possession of a patent essentially amounts to a government-sanctioned monopoly on that piece of technology for a limited period of time. In this sense, we can see those who favor greater protection for patents as also favoring greater monopoly rights.[10]

[9] Indeed, the most recent Supreme Court case concerning the law of obviousness in patent law, *KSR v. Teleflex*, 550 U.S. 398 (2007), involved large corporations suing one another over a patent for an adjustable gas pedal in automobiles.

[10] Alternatively, this potential ideological cleavage might be thought of in terms of possible social costs. For example, government patent rights can be seen as promises from society to an inventor that if the invention is novel, useful, and non-obvious, then the inventor will be able to recoup the cost of creating the invention as well as make a profit. However, granting monopolistic patent rights to an inventor who creates an invention that is obvious will create unnecessary social costs and may foster patent races. A patent race occurs when two firms invest heavily in the creation of the same invention. This is viewed as an unnecessary societal cost, in the sense that the patented invention was roughly twice as expensive to create as it should have been. As Landes and Posner note, this is the

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This division in patent law is not only present in the judicial branch. In 2007, the U.S. House of Representatives considered the Patent Reform Act of 2007, which was designed to alter the evaluation of the validity of patents. Though the Senate has not yet voted on the bill, in the House the vote was largely along ideological lines, with 73 percent of the Democrats voting in favor of making it easier to find a patent invalid and 66 percent of Republicans voting against making patents easier to invalidate.[11] Therefore, these divisions on the validity of patents seem to be fairly robust in other areas of ideological politics, as we have suggested.

To summarize, then, we have proposed two overlapping dimensions on which to define liberal and conservative outcomes in patent validity cases. With respect to basic property rights, we would expect conservative judges to favor patent rights on the grounds that they are equivalent to other private property that stimulates economic activity in a free market system. Reinforcing this potential ideological characterization is the fact that patents can be equated with monopolies, wherein there are (or at least were)[12] relatively well-defined partisan and ideological divisions with Republican conservatives tending to favor monopoly holders.

These potential cleavages are more likely to be apparent in cases that deal with obviousness than in other patent cases. Though this is only one prong in the determination of whether a patent should be granted, it is perhaps the most important obstacle and has been called the "core" requirement when deciding whether or not to grant a patent (Mandel 2006). Indeed, the standards to which an invention should be held on the obviousness issue have sparked a good deal of controversy within the patent bar, as it is on the obviousness question that the validity of a patent is most likely to turn (Allison & Lemley 1998).

Thus, in analyzing obviousness cases in the Federal Circuit, we are proposing a relatively easy test with respect to the role of ideology in decisionmaking. If judges' policy preferences play a role in their decisionmaking, either directly or in combination with expertise and/or experience, we will be more likely to find it in obviousness cases than in other areas of patent law.

primary economic motivation for an obviousness requirement—if properly used, it prevents patent races (2003:302–5). We might then expect that liberal judges will be more likely to see an invention as obvious than will conservative judges, based on the notion that society deserves protection from non-useful patents.

[11] See http://clerk.house.gov/evs/200/roll863.xml (accessed 17 Jan. 2009).

[12] At least one study has noted that the typical ideological divisions that defined antitrust law may have disappeared. Sullivan and Thompson (2004) note that after the Nixon appointees to the Supreme Court, the divisions in antitrust law seem to have leveled off.

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## Data and Hypotheses

We began by creating a dataset of cases litigated in the Federal Circuit from 1997 to 2007 involving the obviousness of patents.[13] We compiled this dataset by searching in both LexisNexis and Westlaw for citations to the relevant portions of the U.S. Code, namely 35 U.S.C. § 103 (Conditions for Patentability). This process ultimately yielded 108 cases and 324 individual votes from 21 different judges. Our unit of analysis was each judge's vote in the case on the issue of obviousness.[14]

For each case we coded several variables thought to potentially affect judicial decisionmaking in each case. The dependent variable in our analysis was whether a judge on the Federal Circuit voted to invalidate a patent by finding it obvious (coded 1 if yes, 0 otherwise). Table 1 lists the variables we included in the model and some descriptive information about them. One of the central constructs we examined in our analysis of decisionmaking on the Federal Circuit is the role that expertise in the area of patent law plays in judicial decisionmaking. To that end, we included the variable *expertise* to capture whether or not the judge had previous expertise with respect to patent law.[15] For the reasons noted in the first section of this article, we expected that those judges with patent expertise would be more likely to evince ideologically consistent decision-making—that is, expert liberal (Democratic) judges should vote to invalidate patents for obviousness at higher rates than their nonexpert counterparts, and expert conservative (Re-

[13] We used the time period from 1997 to 2007 because it offers a good number of votes from both Republican and Democratic appointees. Prior to 1994, only Republican presidents had made appointments directly to the Federal Circuit. Thus, the start date of 1997 gave the initial Clinton appointees ample time to accumulate votes in obviousness cases. While our dataset contained the votes of three Democrat holdovers from the previous courts that were consolidated into the Federal Circuit in 1982, none of those Democrats are patent experts, and their presence provided few votes.

[14] We treated as one vote cases in which more than one patent was at issue. This is a conservative coding strategy in the sense that it does not inflate our number of observations. Furthermore, as others have pointed out, there are very few cases in which more than a single patent is at issue (Allison & Lemley 1998). We also excluded cases where there was a close call as to the obviousness of an invention based on the interpretation of several claims in the patent. Thus, if a patent application made four relevant claims and the panel split by saying that two of the claims were obvious and two were not, we excluded the case. Alternatively, we kept the case if three of the claims were determined to be obvious and one was not—and coded such a case as a vote for obviousness. Again, these cases were rare, occurring in only five of the 108 included cases.

[15] We coded as patent experts those individuals who possessed technical degrees (e.g., a Ph.D. in chemistry or a B.S.E.E.) before their ascension to the bench *and* who were also members of the patent bar. Those judges in our dataset who were counted as experts included Pauline Newman (nominated by President Ronald Reagan), Alan Lourie (nominated by President George H. W. Bush), Arthur Gajarsa (nominated by President Bill Clinton), Richard Linn (nominated by President Clinton) and Giles Rich (nominated by President Dwight D. Eisenhower). See also Moore (2001: fn. 93).

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**Table 1.** Descriptive Statistics

| Variable | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|
| Vote for Obviousness | 0.54 | 0.49 | 0 | 1 |
| Ideology | 0.37 | 0.54 | − 0.68 | 0.85 |
| Panel Ideology | 0.51 | 0.41 | − 0.53 | 0.74 |
| Expertise | 0.26 | 0.44 | 0 | 1 |
| Experience | 11.04 | 5.12 | 0 | 25 |
| Ideology∗Expertise | 0.04 | 0.30 | − 0.53 | 0.74 |
| Ideology∗Experience | 5.16 | 6.38 | − 16.95 | 17.02 |
| Lower Court Decision | 0.52 | 0.50 | 0 | 1 |
| Summary Motion | 0.39 | 0.49 | 0 | 1 |
| Combined References | 0.67 | 0.47 | 0 | 1 |

Year dummy variables for 1997–2007 are excluded here, but the modal year is 1997.

publican) judges should vote to invalidate patents at lower rates than nonexpert conservatives.

The *experience* variable captured the number of years that a judge had been on the Federal Circuit at the time the case was decided.[16] This variable was continuous and ranged from 0 to 25. We believe that it captured previous exposure to patent validity cases well, since there is little variation from year to year in the number of patent appeals heard by the court; put differently, a judge is likely to hear similar numbers of these appeals in any given year. We did not count experience accrued before the Federal Circuit was formed in 1982. Experience changes over time within judges—i.e., judges may accumulate experience over time within our dataset.

We used the ideological position of each judge's appointing president, as measured by their DW-NOMINATE score (Poole & Rosenthal 1997; McCarty & Poole 1995), as a proxy for the likely policy preferences (or *ideology*) of each judge in our dataset.[17] Higher values of this score indicated more conservative policy preferences. Though this was a rough proxy for ideology, it was the

[16] As an astute reviewer pointed out, experience and ideology were somewhat collinear given the fact that for the first 10 years of its existence Federal Circuit court appointees were Republicans. The data showed only a slight positive correlation between our ideology scores and experience ($\rho = 0.38$). Partially this is because those serving on the courts that were combined to create the Federal Circuit court included some long-serving Democrats who had votes in our data, and partially because Presidents Reagan and George H.W. Bush did not have the same ideology scores. Finally, the most recent Bush appointees (President George W. Bush) have comparatively little experience. What is more, a model of just Republican appointees' votes on the obviousness of patents suggested that experience has no statistically significant effect on the vote.

[17] We had DW-Nominate scores for all presidents through President George W. Bush. See "Legislator Estimates" at http://www.voteview.com/dwnomin.htm (accessed 7 May 2009). The scores for presidents are estimated based on presidential positions taken on bills voted on by Congress, allowing McCarty and Poole to treat the president as though he voted on the legislation and to scale him in a space similar to the space used to characterize members of Congress (McCarty & Poole 1995).

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best measure available for judges on the Court of Appeals for the Federal Circuit for several reasons. First, we have argued that potential ideological disputes over patent validity are economic in nature, and general economic policy preferences are captured by the first dimension of these NOMINATE scores.[18] More fundamentally, however, other approaches to measuring judicial ideology are inapposite when it comes to tapping the policy preferences of judges on the Federal Circuit. Home state senators make up a critical component of the measurement strategy pioneered by Giles et al. (2001). However, home state senators are not involved in the nomination process for judges to the Federal Circuit because the Federal Circuit sits in Washington, D.C. Similarly, neither the Judicial Common Space scores (L. Epstein et al. 2007) nor Howard and Nixon's (2003) coding of judicial ideology for judges on the U.S. Courts of Appeal are available for judges serving on the Court of Appeals for the Federal Circuit. Given that larger NOMINATE scores signify conservative presidential ideology, we expected that judges with higher ideology scores, appointed by Republicans, should be less likely to strike down a patent for obviousness than should their more liberal Democratic brethren. Ideology is fixed within judges; in other words, it does not change over time.

In order to move beyond a simple investigation of the independent influence that ideology, expertise, and experience may exert on a judge's decision to invalidate a patent for obviousness, our analysis also contained two interaction terms. We interacted *ideology* ∗ *expertise* and *ideology* ∗ *experience*, hypothesizing that the coefficients on each interaction term would be negative. If, as we have asserted, expertise and/or experience raised the prominence of policy preferences in obviousness decisions, conservative judges with expertise or experience would be particularly unlikely to invalidate a patent for obviousness.

Several recent studies of judicial decisionmaking have also noted the presence of panel effects (Farhang & Wawro 2004; Sunstein et al. 2004; Revesz 1997). Fundamentally, panel effects can be defined as the impact that the composition of a three-judge panel has on the voting behavior of an individual judge. For instance, Farhang and Wawro (2004) find that adding a woman to an appellate panel increases the likelihood that a male judge will vote in favor of the plaintiff in discrimination cases. Further, with respect to international trade cases, one scholar has found that the partisan composition of the panel can have a significant effect on the de-

[18] The DW-Nominate scores are scaled along two dimensions. The first of these dimensions represents "government intervention in the economy or liberal-conservative in the modern era." The second dimension represents racial issues that became largely irrelevant after 1980 with the political realignment of the South (see http://www.voteview.com/dwnomin.htm (accessed 7 May 2009); McCarty & Poole 1995).

cisionmaking behavior of individual judges on the Federal Circuit (Unah 1998). Consequently, we included the variable *panel ideology median* to capture the median ideology of the three-judge panel that hears each case. We expected that variable to be negative because positive values of our ideology measure signified conservatism and, all else being equal, judges on Republican-dominated panels should be more likely to uphold the validity of a challenged patent.

We also included several variables to capture the factual context in which the review of an invention for obviousness occurs. These variables, which we believe are broadly analogous to what other studies term the "legal content" (Hettinger et al. 2003) or "legal complexity" of the case at hand (Hettinger et al. 2004), were included because it is conceivable that they may affect a judge's propensity to find a patent obvious. Put somewhat differently, it may be that the fact patterns in a case dictate a certain decision irrespective of other considerations. Unfortunately, in contrast to other areas of law that have been subjected to more rigorous quantitative analysis, including search and seizure (Segal 1984, 1986) or the death penalty (Hall & Brace 1994), the legal variables that may be relevant to obviousness determinations are less well established in the literature. However, as noted below, there is reason to suspect that three variables related to legal considerations may exercise independent influence on judicial decisionmaking in obviousness cases.

In light of past research (Moore 2000; Greenfield 1992:1053), we included the variable *summary motion*[19] in the model to control for the depth of the district court's fact-finding analysis. When the court decides a case on the basis of a summary motion, it is expected that the decision reflects the idea that the facts presented allow a reasonable person to reach only one conclusion.[20] Indeed, in *KSR v. Teleflex*, the 2007 decision that represents the Supreme Court's most recent statement on the law of obviousness, the central issue in the case was the Federal Circuit's reversal of the District Court's granting of a summary judgment motion. Because of evidence that the Federal Circuit may be more likely to defer to the lower court's obviousness determinations when there is a combi-

[19] This variable is equal to 1 when the case has been decided on either a summary judgment motion or a judgment as a matter of law (JMOL) motion. A summary judgment motion is granted before much evidence is presented. A JMOL motion may be filed by either party after the other party has presented its case, after a jury verdict, or both. A JMOL is also sometimes referred to as a Judgment Nothwithstanding the Verdict (JNOV) when the motion is filed after a jury has returned a verdict, but in federal civil procedure this motion is still technically referred to as a JMOL. This is because, under the 7th Amendment, it is required that a JMOL motion has been filed before the verdict if one is also to be filed after the verdict. See Rule 50, *Federal Rules of Civil Procedure*.

[20] *Adickes v. S. H. Kress & Co.*, 398 U.S. 144 (1970).

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nation of references (Mandel 2006), we also included a variable—*combined references*—coded 1 when the lower court combined references in its fact-finding inquiry on the obviousness of a patent claim.[21] When a court combines references, this suggests that an invention is not plainly obvious on the basis of just one piece of prior art (where "prior art" is broadly defined to include both prior patents and a multitude of reference works; see 35 U.S.C. § 103). In order to control for the possibility that the Federal Circuit's deference to the lower court's decision may be influenced by the direction of that decision, our model included a *lower court decision* variable. That variable was coded 1 if the lower court declared the patent obvious, and 0 otherwise. We expected the lower court decision variable to have a positive coefficient. Finally, we included dummy variables for each of the years 1998–2007 in our analysis in order to control for the possibility that the context in which the judges were operating changed over time, with the year 1997 set as the baseline.

## Results

Table 2 presents the results of our logit model predicting votes for the obviousness of a patent (in other words, to invalidate a patent). The standard errors were clustered around the judges to account for expected non-independence in the data (Zorn 2006)[22]; the standard errors for the interaction terms were calculated according to the prescriptions of Brambor et al. (2006). The results were largely as we predicted they would be, with the exception that experience did not appear to affect the decisionmaking of judges in patent obviousness cases. The model appeared to fit the data remarkably well. Both the percent reduction in error (PRE) and the area under the receiver operating curve measures (Area Under ROC) indicated a good fit.

Four of the variables reached statistical significance: the ideology * expertise interaction, ideology, summary motion, and lower court decision. Of these, the interaction was of most interest. The negative coefficient was as expected—as a judge becomes more conservative and is an expert, he or she becomes less likely to

[21] It should also be noted that, in *KSR v. Teleflex* (2007), the Supreme Court criticized the Federal Circuit for being overly rigid in discerning the existence of a "teaching" to combine references. In any case, given the relatively high profile of this variable in issues surrounding adjudications of obviousness, we felt the most appropriate course of action was to control for it as a potential confound.

[22] The other major source of non-independence was the clustering of errors within case. Alternative specifications of our model with the errors clustered by case instead of judge did not change any of the conclusions, either substantive or statistical, that we took from the model presented in Table 2.

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**Table 2.** Logit Model, Federal Circuit Patent Obviousness Cases, 1997–2007

| Variable | Coefficient | Robust S.E. |
|---|---|---|
| *Background Characteristics* | | |
| Ideology | **0.629** | 0.298 |
| Expertise | 0.082 | 0.111 |
| Experience | −0.052 | 0.015 |
| Ideology ✻ Expertise | **−1.538** | 0.387 |
| Ideology ✻ Experience | −0.011 | 0.790 |
| *Case Characteristics* | | |
| Panel Ideology Median | −0.561 | 0.385 |
| Summary Motion | **1.076** | 0.386 |
| Combined References | 0.068 | 0.323 |
| Lower Court Decision | **1.268** | 0.240 |
| Constant | −0.337 | 0.401 |
| *N* | 324 | |
| Likelihood Ratio Test | 111.38 ($p<0.000$) | |
| Area Under ROC | 0.81 | |
| PRE | 0.44 | |

*Notes:* Dummy variables for years 1998–2007 included, 1997 is the baseline.
Bolded coefficients are significant at $p<0.05$ (two-tailed).
Standard errors are clustered by judge.

vote to invalidate a patent on the grounds of obviousness. Figure 1 illustrates the interactive effect of ideology and patent expertise. Figure 1 demonstrates that expertise tends to amplify the effect of ideology on decisionmaking. The experts in the sample voted in the ways that we would expect given their ideology (the dashed line), whereas the nonexperts (solid line) tended to vote similarly regardless of their ideologies. Though the 95 percent confidence intervals overlapped for experts and nonexperts, the results were statistically significant and unmistakable: a conservative (or liberal) expert was more likely to uphold (or strike down) a patent than is

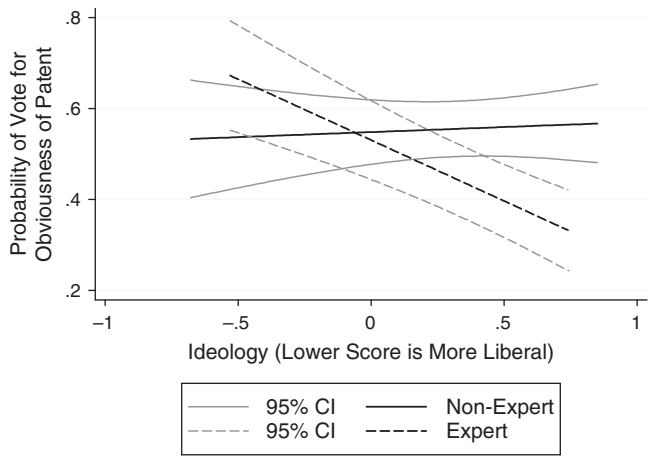


**Figure 1. Interaction Effect for Ideology and Patent Expertise**

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a conservative (or liberal) nonexpert peer. Another way to illustrate this effect is to look at judges appointed by particular presidents. A Clinton-appointed patent expert is predicted to vote for the obviousness of a patent about 55 percent of the time, whereas a Reagan-appointed expert will vote for obviousness only about 25 percent of the time. When comparing experts and nonexperts, the nonexperts vote much more similarly than do their expert counterparts: a Clinton-appointed nonexpert will vote to invalidate a patent 33 percent of the time, and a Reagan-appointed nonexpert will vote to invalidate a patent 49 percent of the time.

These predicted probabilities illustrated the effect of the ideology variable, which was positive and significant. This was against our expectation that more conservative judges in our data would be less likely to vote to overturn a patent. Recall that this variable represented the effect of ideology on nonexperts, given the inclusion of an ideology * expert interaction. We found, therefore, that nonexpert judges do not behave in an ideologically consistent manner.

Interestingly, it appeared that experience had virtually no effect on the decisionmaking of judges in patent obviousness cases. The ideology * experience interaction failed to even approach statistical significance. For this reason, we feel confident in asserting that, at least within the domain of patent law, experience and expertise are separable concepts. Furthermore, it appears that in this technical area of law expertise cannot be acquired by repeated exposure to difficult patent cases—there is still something unique about having been a patent attorney before ascension to the Federal Circuit that alters the decisionmaking dynamic. We explore this point further below.

The significance of the lower court decision variable indicated that when the lower court decides that a patent is obvious it increases the likelihood that the Federal Circuit will also find a patent obvious. Indeed, moving from a finding of non-obviousness to obviousness in the lower court increased the predicted probability of a vote for obviousness by 16 percentage points. This suggests that, overall, there is a fair amount of deference to nonexpert district court judges, but we leave for future investigation the question of whether patent experts and those with experience are more or less likely to defer.

The presence of a summary motion as the basis for a patent obviousness decision also increased the likelihood that a judge on the Federal Circuit will vote to invalidate a patent—by 25 percentage points. This does not mean that decisions to invalidate a patent that are based on a summary motion are more likely to survive scrutiny, but simply that lower court decisions based on a summary motion to either uphold or strike down a patent are

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more likely to garner a vote to overturn the patent at the appellate level. However, it is helpful to keep in mind that the district courts in our sample tended to use summary motions when the decision was to invalidate a patent for obviousness. Therefore, on some level, the increased likelihood of voting for obviousness in the presence of a summary judgment motion also indicated some degree of deference to the lower court; this finding is in accord with our belief that a summary motion is a good indication that the facts of the case tend to dictate only one outcome.

None of the other variables reached statistical significance, and only one variable came close: panel ideology median. The negative coefficient for this variable indicated that judges react rationally to the other judges on the panel: when the panel is ideologically conservative, an individual judge is less likely to vote for the obviousness of a patent, which is as we would expect given our belief that conservatives will generally favor the protection of property rights.

## Discussion

In this research project, it was our expectation that expertise would make ideology a more prominent factor in judicial decisionmaking. Indeed, our results demonstrate that experts are more ideological in their voting behavior in this technical area of law than are similarly situated nonexperts. On the other hand, the development of experience in adjudicating obviousness issues exerted no significant influence on judicial decisionmaking in this area. As we outlined in the first section, this heightened importance of ideology for judicial experts stems from more than solely the possession of greater factual knowledge. Rather, it is also the result of a motivation to apply ideological schemas to the complex case facts that often appear within this technical area of law.

We believe these results make several important contributions to the literature on judicial decisionmaking in specialized areas of law. First, in demonstrating the influence of expertise while finding no effect for experience on judicial decisionmaking in obviousness cases, we have provided important evidence that these are distinct concepts and should be assessed by researchers as such. While a number of prior studies from a variety of disciplines have conflated expertise and experience, in light of our results it is important to underscore the necessity of differentiating between the two.

In addition, we have shown that there is an underlying ideological component to decisionmaking in obviousness cases—and that the effect of ideological considerations is partially contingent upon expertise. This supports and extends the assertions of others

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(Sag et al. 2009; Howard 2005) in showing that otherwise complex or technical areas of law are not immune to ideological decision-making.

As for what this research means with respect to patent law itself and the specialization of courts more generally, we echo the sentiments of Landes and Posner: "What is more, it seems necessary to add political and ideological factors to the combination [of explanations of intellectual property law]" (2003:419). Moreover, apart from searching for ways in which constructs such as ideology and expertise may operate directly in specialized areas of law, we urge scholars to give greater consideration to the ways in which such characteristics may exercise more *conditional*, nuanced effects on decisionmaking.

In light of the findings presented here, scholars may also wish to reassess the potential for expertise to condition the operation of both judicial decisionmaking and the operation of legal institutions more generally. For example, legal sociologists and scholars of comparative legal institutions may wish to explore the extent to which the effects of technical expertise that we have reported here remain robust in the context of other legal and/or sociocultural traditions. Similarly, research on emerging judicial systems could consider the possible practical implications of our findings as new court systems, both domestic and international, are designed. More broadly, scholars in a variety of fields may wish to consider the general possibility that domain-specific expertise may have conditional effects (e.g., McGraw & Pinney 1990:13–14). Finally, as contemporary research increasingly recognizes the relevance of psychological principles to judicial decisionmaking (see Klein & Mitchell forthcoming; Baum 2006), we believe that further investigation of the "psychology of expertise"—the specific cognitive mechanisms by which expertise may influence judicial decisions—is warranted.[23]

Finally, we note several directions for future research. Most urgently, a closer study of the role that expertise and ideology play in structuring agency review is warranted. That is particularly true as President Barack Obama's administration brings a new ideological tenor to both governmental agencies and the federal courts. Scholars should probe the consequences of that ideological shift for patent law in particular and technical areas of law more generally. In that context, the Federal Circuit offers a unique opportunity to explore whether the review of expert agency decisions—from the Board of Patent Appeals and Interferences (BPAI)—as opposed to

[23] For example, as Simon has noted, "Though obviously central to the law, the mental processes for making decisions remain an opaque feature at the heart of legal discourse" (2004:511).

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the decisions of generalist district court judges, is affected by expertise. Put somewhat differently, perhaps ideology and expertise exert differential effects on decisionmaking by judges on the Federal Circuit when the informational source—the BPAI—is known to possess technical expertise and, hence, be perceived as particularly credible.

The Democratic Party's resurgence in Washington is also likely to demand further attention to the issues raised in this article. Given the comparatively low number of Democratic patent experts currently on the Federal Circuit, as such individuals are appointed to that tribunal in the years ahead, our results may require adjustment. We would also like to develop our understanding of the ways in which expertise, ideology, and source credibility may interact in other specialized courts at the international, federal, and state levels to determine the conditions under which expertise does and does not influence judicial decisionmaking. We hope to pursue answers to these questions in future research.

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## Statute Cited

Conditions for Patentability. 35 U.S.C. § 103.

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