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Abstract

This Article presents an empirical examination of the theory that judges with a technical background are better at patent claim construction than their non-technically trained peers. In order to test this hypothesis, the instant study compares the claim construction reversal rates of technically trained judges to that of the population of judges at large. Surprisingly, the collected data does not support the generally accepted premise that technically trained judges are better at claim construction than their non-technically trained peers.

This conclusion contributes to current policy debates regarding means to lower reversal rates of patent claim constructions. Specifically, no longer is it sufficient to assume that technical training is a strong proxy for competence at construing patents. As such, this Article establishes a necessity to reevaluate the traditional concept of claim construction proficiency. Moreover, proposals for specialized patent courts and (technically trained) patent judges may need to be reconsidered.
I. Introduction

A prime issue in modern intellectual property scholarship is the inefficiencies created by the high reversal rate of patent claim constructions conducted by United States District Court

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Judges. In addressing this topic, many scholars have proposed solutions premised upon the commonly accepted belief that judges with both experience in patent law and a technical background would excel in this field. However, recent scholarship has disproved the expected positive correlation between experience in conducting patent cases and a proficiency in claim construction. This Article presents the first empirical study to test the latter assumption. Surprisingly, the collected data does not support a positive relationship between technically trained trial judges and a low rate of reversal in their claim construction opinions.

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This study was conducted in three phases. Initially, district judges with a technical background had to be identified. As is commonly accepted in patent law, an undergraduate degree in science or engineering was accepted as a proxy for a technical background. Since the undergraduate majors of United States judges has not previously been collected, a survey of over 900 judges was conducted to gather this information. The second step in the study was to evaluate the claim construction reversal rates of judges with a technical background. Finally, the aggregate rate of reversal for technically trained judges was compared with that of the judiciary at large. That comparison did not support the hypothesis that a technical background correlates with a proficiency at claim construction.

This finding significantly contributes to current policy debates regarding means to lower the reversal rates of patent claim constructions. Specifically, no longer is it sufficient to assume that technical training is a strong proxy for competence at construing patents. As such, this Article establishes a necessity to reevaluate the traditional concept of claim construction proficiency. Moreover, proposals for specialized patent courts and (technically trained) patent judges may need to be reconsidered.

This Article begins with a review of the history and policy underlying the present study. Specifically, Part II of the Article provides background information on claim construction and the importance of technical training in patent law. Part III sets forth the methodology behind the instant study. In particular, this section describes the means utilized to ascertain the undergraduate majors of United States District Judges and the claim construction reversal rates for judges with technical backgrounds. Part IV presents and analyzes the findings of this study. This discussion statistically evaluates the collected empirical data and addresses any potential sources of error associated therewith. The fifth and final substantive section proffers various
conclusions that may be drawn from the present study. Part V also describes future studies that may advance the knowledge within pertinent fields of study. An appendix further describing the study is also included.

II. Background: Claim Construction, Patent Law, and Technical Training

This section provides background information associated with claim construction and technical training in patent law. Initially, claim construction is addressed with regard to its history, modern problems associated with reversal rates, and scholarship that is pertinent to the present study. Further, the use of technical training as a proxy for proficiency in the scientific arts is discussed with regard to the practice of patent law.

a. Claim Construction

The scope of a patent’s protection is set forth in numbered paragraphs called claims, which are located at the end of the patent’s specification.\(^3\) Claim construction is the determination of the exact meaning of a patent’s claims.\(^4\) This process is conducted by the trial court as a matter of law\(^5\) and, on appeal, is reviewed \textit{de novo} by the Federal Circuit.\(^6\) Patent claim construction is of primary importance because the trial court’s findings on the issue are often outcome determinative with regard to infringement litigation.\(^7\)

The reversal rate of claim constructions is abnormally high, with estimates of the rate of reversal approximated at 34.5% to 40%.\(^8\) This state of affairs creates significant inefficiency in

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\(^4\) Schindler Elevator Corp. v. Otis Elevator Co., 593 F.3d 1275, 1281 (Fed. Cir. 2010) (quoting Markman v. Westview Instruments, Inc., 52 F.3d 967, 976 (Fed. Cir. 1995)).
the patent system. The following subsection will address this problem by briefly recounting the history of claim construction, describing several hypotheses pertaining to the high reversal rate in this area of patent law, and reviewing prior empirical studies on the subject.

i. The History of Claim Construction

While patent claims were used before 1870, it was not until this point that claim practice became statutorily mandated. Claim usage benefited the patent practitioner by allowing him to particularly identify the outer limits of the patent’s scope (known as peripheral claiming), as opposed to the earlier practice of describing specific embodiments of an invention (known as central claiming).

Since the 1800s, judges—to the exclusion of juries—have undertaken claim construction. However, while the modern Federal Circuit adheres to this precedent, in its

Gordon & Victor G. Hardy, After the Markman Hearing—Practical Guidance to the Problems Caused by the Timing, Lack of Finality and Preclusive Effect of Claim Construction Rulings, 873 PLI/PAT 251, 265 (2006) (“De novo review has led to a surprisingly high number of claim construction reversals (and modifications), with studies showing reversal rates ranging from 33% to 50%.” (citing Cheryl L. Johnson, Judges Were Tasked with Claim Construction to Bring Necessary Certainty: But Where Is It?, P.L.I. Patents, Copyrights, Trademark and Literary Property Course Handbook Series—How to Prepare & Conduct Markman Hearings, 714 PLI/PAT 7, 13)).


10 N.J. BRUMBAUGH, HISTORY AND PURPOSE OF CLAIMS IN UNITED STATES PATENT LAW, 4 in UNITED STATES PATENT OFFICE, PATENT OFFICE PAPERS, VOLUME 4 (1912).


12 This patent claims regime was described in one 1920 text on patents as such: [An inventor] must ask for a patent to receive one, and his request is the claim. Without any claim he asks for nothing; what he does ask for is what he has included in his claim. Only that which he claims, therefore, is granted to him by the patent. The descriptive part of the application may set out with clarity and exactness a device which constitutes an invention and would be patentable, but the patentee does not acquire by that particular part a monopoly of the described device unless he has claimed it.

JOHN BARKER WAITE, PATENT LAW 187 (1920).


early years the court held that fact issues may be intertwined with legal issue during claim construction.\textsuperscript{16} As such, the Federal Circuit established claim construction to be an issue “of mixed law and fact.”\textsuperscript{17} This led to a doctrinally confused state of affairs, as described by Federal Circuit Judge Paul R. Michel in 1994:

In the jury verdict appeals I have reviewed, I cannot recall even one in which the trial judge defined the literal scope of the claim for the jury in clear, comprehensive, and mandatory instructions, despite the fact that this seems to be the duty strongly implied in our precedent. Instead, judges routinely delegate the tasks of claim construction, as well as infringement findings, to the jury. By acquiescence, however, the Federal Circuit has condoned this practice, apparently on the assumption that the issue of claim construction is somehow necessarily bound up with issues of historical fact.\textsuperscript{18}

The Supreme Court addressed this issue in 1996 in \textit{Markman v. Westview Instruments, Inc.}\textsuperscript{19} Specifically, the Court answered the question of “whether the interpretation of a [patent claim] is a matter of law reserved \textit{entirely} for the court . . . “\textsuperscript{20}

In dealing with this topic, Justice Souter initially turned to the Seventh Amendment and its guarantee of the preservation of the right to a jury trial.\textsuperscript{21} Under this standard, the Court recognized that if a cause of action (or an analogous cause of action) warranted a jury trial at the founding of the nation, then the right to a jury trial was preserved under the Bill of Rights.

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\textsuperscript{16} \textit{Id.} (citing \textit{In re Donaldson Co.}, 16 F.3d 1189 (Fed. Cir. 1994)); \textit{see also Judin v. United States}, 27 Fed. Cl. 759, 774 n.8 (1993) (“Claim construction presents a question of fact only when ‘there is a genuine evidentiary conflict created by the underlying probative evidence pertinent to the claims interpretation.’” (quoting \textit{Johnston v. I.V.A.C. Corp.}, 885 F.2d 1574, 1579 (Fed. Cir. 1989))).
\textsuperscript{17} William N. Hulsey, III et al., \textit{Recent Developments in Patent Law}, 4 TEX. INTELL. PROP. L.J. 99, 113 (1995); \textit{see also Morton Int'l, Inc. v. Cardinal Chem. Co.}, 5 F.3d 1464, 1468 (Fed. Cir. 1993) (“Although claim interpretation is a question of law, subject to \textit{de novo} review on appeal, the district court's ultimate finding on infringement, as well as subordinate findings relating to proper claim construction, are issues of fact, reviewed under a clearly erroneous standard.”).
\textsuperscript{19} 517 U.S. 370, 372 (1996).
\textsuperscript{21} \textit{Id.} at 376 (quoting U.S. CONST. amend. VII).
\end{flushleft}
While patent infringement suits had traditionally been tried to a jury, claim practice was not utilized at the passing of the Seventh Amendment.\(^22\) As such, the Court looked to the analogous practice of “construction of specifications” and found that, at the time the Bill of Rights was adopted, there was “no established jury practice sufficient to support an argument . . . that today’s construction of a claim should be a guaranteed jury issue.”\(^23\)

Finding no constitutionally mandated answer, the Court next considered then-existing precedent, the relative capacities of judges and juries with regard to claim construction, and policy implications of deeming the issue one of fact, law, or a mixture thereof.\(^24\) Regarding competency to construe claims, Souter stated that “[t]he construction of written instruments is one of those things that judges . . . are likely to do better than jurors unburdened by training in exegesis.” Further, looking to efficiency considerations, the Court held that treating claim construction as a matter of law would further uniformity in patent law (due to the application of issue preclusion).\(^25\) Pursuant these arguments, the Court deemed claim construction a matter of law to be addressed solely by the court.

\(^{22}\) Id. at 379.
\(^{24}\) Id. at 384 (footnote omitted).
\(^{25}\) Id. Specifically, with regard to uniform application of individual patents, Markman stated:

> Finally, we see the importance of uniformity in the treatment of a given patent as an independent reason to allocate all issues of construction to the court. As we noted in General Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 369, 58 S.Ct. 899, 902, 82 L.Ed. 1402 (1938), “[t]he limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public.” Otherwise, a “zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field,” United Carbon Co. v. Binney & Smith Co., 317 U.S. 228, 236, 3 S.Ct. 165, 170, 87 L.Ed. 232 (1942), and “[t]he public [would] be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights.” Merrill v. Yeomans, 94 U.S. 568, 573, 24 L.Ed. 235 (1877). It was just for the sake of such desirable uniformity that Congress created the Court of Appeals for the Federal Circuit as an exclusive appellate court for patent cases, H.R.Rep. No. 97-312, pp. 20-23 (1981), observing that increased uniformity would “strengthen the United States patent system in such a way as to foster technological growth and industrial innovation.” Id., at 20.

Id. at 390 (1996); see also Rachel Marie Clark, Note, Collateral Estoppel of Claim Interpretation After Markman, 86 MINN. L. REV. 1581 (2002).
Shortly after *Markman*, the Federal Circuit held that, since claim construction was an issue of law, it was subject to *de novo* appellate review.\textsuperscript{26} This ruling did away with the use of the clearly erroneous standard that was previously applied to factual findings “incident to the judge’s construction of patent claims.”\textsuperscript{27}

As discussed below, in conducting these legal analyses, trial judges—and the Federal Circuit judges reviewing their work—have traditionally applied specific rules to construe patent claims. The hope behind this methodology was to create the consistency and uniformity in patent law imagined by Justice Souter in *Markman*.\textsuperscript{28}

ii. Claim Construction Methodology

As previously mentioned, the metes and bounds of the limited monopoly granted under a patent are defined by its claims.\textsuperscript{29} In order to give public notice of these rights, objective rules of claim interpretation are utilized to define the meaning of a claim (and its constituent parts known as limitations).\textsuperscript{30} This practice is meant to “impart consistency, predictability, and guidance to patent claiming, whereby the patent-user community can rely on a . . . legally consistent interpretation of patent claims.”\textsuperscript{31} In this spirit, courts commonly apply several oft-repeated canons when undertaking claim construction.\textsuperscript{32}

Two primary rules are: “(a) one may not read a limitation into a claim from the written description, but (b) one may look to the written description to define a term already in a claim

\textsuperscript{26} *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1451 (Fed. Cir. 1998).
\textsuperscript{27} *Id.* at 1454. The Federal Circuit premised its ruling on *Markman*, in which the Supreme Court had stated that “treating interpretive issues as purely legal will promote (though not guarantee) intrajurisdictional certainty through the application of stare decisis on those questions not yet subject to interjurisdictional uniformity under the authority of the single appeals court.” *Id.* at 1455 (quoting *Markman*, 517 U.S. at 391).
\textsuperscript{28} 517 U.S. 370, 390–91.
\textsuperscript{29} *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1348 (Fed. Cir. 2009).
\textsuperscript{30} *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).
limitation, for a claim must be read in view of the specification of which it is a part.\textsuperscript{33} Accordingly, the attributes disclosed in the specification may not—absent explicit claim language—be imposed on the claimed invention.\textsuperscript{34} However, in understanding express claim limitations, a trial judge must define terms based upon the meaning given to them in the specification.\textsuperscript{35}

Furthermore, similar to contract interpretation, the entire patent must be considered as a whole,\textsuperscript{36} with a distinct meaning given to each constituent term.\textsuperscript{37} Likewise, each claim should be construed to have a distinct meaning relative to all other claims, pursuant the doctrine of claim differentiation.\textsuperscript{38} Moreover, in the presence of an ambiguity, the claim should be construed to preserve the patent’s validity.\textsuperscript{39}

Unfortunately, as described below, application of these maxims of claim construction has fallen well short of the goals of consistency and predictability in claim construction. This shortcoming has led to an elevated rate of reversal of trial courts’ claim constructions.


\textsuperscript{34} \textit{Bausch & Lomb Inc. v. Coopervision, Inc.}, No. 04-CV-6485T, 2008 WL 4890245, at *8 (W.D.N.Y. Nov. 12, 2008) (citing \textit{Arlington Indus., Inc. v. Bridgeport Fittings, Inc.}, 345 F.3d 1318, 1327 (Fed. Cir. 2003); \textit{Resonate Inc. v. Alteon Websystems, Inc.}, 338 F.3d 1360, 1367 (Fed. Cir. 2003)).

\textsuperscript{35} \textit{Elekta Instrument S.A. v. O.U.R. Scientific Int’l, Inc.}, 214 F.3d 1302, 1307–08 (Fed. Cir. 2000) (“[O]ne may look to the written description to define a term already in a claim limitation, for a claim must be read in light of the specification of which it is a part.” (quoting \textit{Renishaw}, 158 F.3d at 1248); \textit{see also Schoenhaut v. Genesco, Inc.}, 440 F.3d 1354, 1358 (Fed. Cir. 2006) (“The patentee is free to act as his own lexicographer, and may set forth any special definitions of the claim terms in the patent specification or file history, either expressly or impliedly.” (citing \textit{Irdeto Access, Inc. v. Echostar Satellite Corp.}, 383 F.3d 1295, 1300 (Fed. Cir. 2004)).

\textsuperscript{36} \textit{Pause Tech., LLC v. TiVo, Inc.}, 419 F.3d 1326, 1331 (Fed. Cir. 2005).


\textsuperscript{38} \textit{Versa Corp. v. Ag-Bag Int’l Ltd.}, 392 F.3d 1325, 1329–30 (Fed. Cir. 2004).

\textsuperscript{39} \textit{DSW, Inc. v. Shoe Pavilion, Inc.}, 537 F.3d 1342, 1347 (Fed. Cir. 2008).
iii. Claim Construction Reversals Rates—The Problem and Prior Scholarship

The reversal rate of claim constructions at the Federal Circuit is significantly higher than the court’s overall rate of reversal. As claim construction is often an outcome determinative issue in patent litigation, this elevated rate creates uncertainty throughout the entire case. In addition, reversal introduces additional costs into patent litigation because a complete infringement case may be tried under a claim construction, only to be retried after the initial construction is reversed on appeal.

This state of affairs has led many commentators to express frustration in a system they believe is not working. For example, with regard to the current claim construction regime, Judge Paul Michel (formerly the Chief Judge of the Federal Circuit) has stated that:

[F]our practical problems have emerged under the [present] regime: (1) a steadily high reversal rate; (2) a lack of predictability about appellate outcomes, which may confound trial judges and discourage settlements; (3) loss of the comparative advantage often enjoyed by the district judges who heard or read all of the evidence and may have spent more time on the claim constructions than [the Federal Circuit] ever could on appeal; and (4) inundation of [the Federal Circuit] with the minutia of construing numerous disputed claim terms (in multiple claims and patents) in nearly every patent case.

In addition to these concerns, the significant likelihood of reversal on appeal incentivizes appeals of adverse claim constructions, which consume time and money. This abundance of problems

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40 Burk & Lemley, supra note 9, at 1751 (citing Moore, District Court Judges supra note 9, at 12).
45 See Swain, supra note 2, at 321–22. Swain further argued that:
associated with an elevated rate of reversal in claim construction has led many researchers to address the issue.

A common explanation of the reversal rate is that “district court judges lack[] both technical expertise and frequent exposure to patent claim construction.” As described below, several studies have been conducted on this issue, but no analysis has specifically addressed whether technical training positively correlates with claim construction prowess.

1. Patent Experience and Claim Construction

In 2008, Professor David Schwartz published an empirical study investigating whether district judges with greater experience in patent law were reversed at a lower rate (on claim construction issues) than their less experienced counterparts. His study concluded that no such correlation existed.

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High reversal rates impose costs upon both the court and litigants; patent suits frequently cost each litigant more than $2 million. The high probability of Federal Circuit reversal encourages litigants to appeal, inflating this figure almost fivefold along the way. In addition to the impressive costs, the de novo nature of claim interpretation in patent infringement appeals has the effect of making the trial level a near formality. As Judge Rader noted:

Because patent trial practitioners understand the distinct prospect of overturning trial court results on appeal, the trial arena loses some of its luster as the center stage of the dispute resolution drama. Instead the trial court becomes a ticket to the real center stage, the Court of Appeals for the Federal Circuit.

Indeed, a district court patent trial can seem like a mere “weigh-in” where the two sides size each other up before the real boxing match begins. The diminished role of the trial-level outcome is a variable in the settlement equation as well as an additional factor to consider before sending the first cease and desist letter.

Id.


47 Schwartz, Practice Makes Perfect, supra note 2, at 245–56. Schwartz’s article addressed multiple other hypotheses, but, for the purposes of this discussion, only this hypothesis is of importance. See also Brooke Terpening, Comment, Practice Makes Perfect? An Empirical Analysis of H.R. 5418, 4 FIU L. REV. 287 (2008) (concluding that there is no correlation between the number of patent cases a trial judge hears and his claim construction reversal rate).
To conduct his research, Schwartz collected two sets of data. Initially, he compiled a database consisting of all Federal Circuit claim construction opinions or Rule 36 affirmances released between the issuance of the Markman opinion (April 24, 1996) and June 30, 2007 (the “Appellate Dataset”). A review of this database found that 32.0% of appealed claim constructions were reversed, 38.0% of appealed cases had at least one wrongly construed claim, and 29.7% of appealed cases were reversed, vacated or remanded because of an erroneous claim construction. Additionally, Schwartz determined the aggregate number of patent cases handled by every district judge who had presided over a case included in the Appellate Dataset. This information—while speaking only to patent experience in general—was intended to serve as a proxy for claim construction experience.

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48 Federal Circuit Rule 36 allows a unanimous panel to summarily enter a judgment of an affirmance without authoring an opinion. Precision Pine & Timber, Inc. v. U.S., 83 Fed. Cl. 544, 547 (2008). This type of disposition is used in situations where “no useful purpose would have been served by our writing an opinion.” Sparks v. Eastman Kodak Co., 230 F.3d 1344, 1345 (Fed. Cir. 2000). A Rule 36 affirmance indicates that an appeal lacked merit, but not necessarily that it was frivolous. Id. Rule 36 provides in full:


The court may enter a judgment of affirmance without opinion, citing this rule, when it determines that any of the following conditions exist and an opinion would have no precedential value:

(a) the judgment, decision, or order of the trial court appealed from is based on findings that are not clearly erroneous;
(b) the evidence supporting the jury’s verdict is sufficient;
(c) the record supports summary judgment, directed verdict, or judgment on the pleadings;
(d) the decision of an administrative agency warrants affirmance under the standard of review in the statute authorizing the petition for review; or
(e) a judgment or decision has been entered without an error of law.

FED. CIR. R. 36.

49 Id. at 240. These statistics excluded claim construction performed by magistrate judges. These results were consistent (over the pertinent time range) with a study conducted by Judge Kimberly Moore pertaining to claim construction reversal rates from 1996–2003. Id. at 238–39.

50 Id. at 240–41.

51 Id. at 241. On this topic, Schwartz noted that:

Using the aggregate number of patent cases handled by each judge is not a perfect proxy for the number of patent claim constructions performed by a judge. Some cases may settle early, requiring little or no attention by a judge. Other patent cases may proceed for years and focus on issues unrelated to claim construction. Nevertheless, overall, the total number of patent cases handled by a particular judge is a useful surrogate for the number of cases in which the court performed claim construction.

Id.
Utilizing the two datasets, Schwartz examined the reversal rates of claim construction with regard to how many patent cases the judge had handled.\textsuperscript{52} To this end, he divided the judges into six groups (each covering a range of patent cases handled) and then calculated the claim construction reversal rates for each group. The rates of claim construction error requiring the case to be reversed, remanded or vacated varied from 26.3\% to 32.9\%.\textsuperscript{53} Through this data, Schwartz concluded that “district judges reversal rates [do not] decrease as they handle more patent cases.”\textsuperscript{54}

2. Specialized Patent Judges – the English Model

In 2009, Professor Donna Gitter addressed the question of whether “designation of specialist patent trial judges among the federal district court judiciary is likely to reduce the high appellate claim construction reversal rate.”\textsuperscript{55} To this end, Gitter analyzed the reversal rates of specialist patent judges in England, some of which “possess a technical degree, and ‘all [of which] have technical experience.’”\textsuperscript{56} As described in her article, the US and English patent regimes bear tremendous similarities, such that empirical data from the English system could yield worthwhile information regarding the U.S. system.

Initially, Gitter created a database of all appellate decisions on claim construction issues from the specialized English patent courts from 1996 to 2007. The dataset consisted of 58 cases (consisting of 153 construed claims) and yielded the following data: 15.7\% of all claim terms were wrongly construed (as evidenced by reversal on appeal); 27.6\% of appealed cases

\begin{footnotesize}
\textsuperscript{52} Id. at 255–56.
\textsuperscript{53} Id. at 255. The specific rates of reversal were: Judges with 1–10 patent cases assigned to them between April 24, 1996 to June 30, 2007 were reversed 26.3\% of the time; 11–25 were reversed 26.9\%; 26–50 were reversed 30.0\%; 51–100 were reversed 32.9\%; 101–150 were reversed 29.9\%; and 151+ were reversed 27.1\%. Id.
\textsuperscript{54} Id.
\textsuperscript{55} Gitter, supra note 2, at 169.
\textsuperscript{56} Id. (quoting an E-mail from Elaine Harbert, Senior Personal Secretary to The Chancellor of The High Court, The Right Honorable Sir Andrew Morritt, Royal Courts of Justice, to author (Feb. 28, 2008, 04:43 E.S.T.) (on file with Professor Gitter)).
\end{footnotesize}
comprised at least one erroneously construed term; and 25.9% of the appealed cases required reversal due to an error in claim construction.\textsuperscript{57} Gitter then compared this data to domestic claim construction reversal rates collected in a previous study.\textsuperscript{58} From this comparison, it was concluded that the specialized English patent courts were, by each of the three metrics, reversed less often. Specifically, Gitter’s dataset evidenced that U.S. district courts were reversed 19.8% more often with regard to individual construed terms, had at least one erroneously construed term in a case 9.9% more often, and were 3.8% more likely to have a case reversed on a claim construction issue.\textsuperscript{59}

From this data, Gitter concluded that specialized patent courts may lead to a lower rate of reversal on claim construction issues.\textsuperscript{60} She then pondered “what sort of experience the judges on the specialist court must have in order to make accurate claim construction decisions; for example, technical education or prior experience with patent law may be required.”\textsuperscript{61} However, Gitter did not significantly address this second issue.

\textsuperscript{57} \textit{Id.} at 189.
\textsuperscript{58} See Moore, \textit{Markman, supra} note 8, at 238.
\textsuperscript{59} Gitter, \textit{supra} note 2, at 189 (citing Moore, \textit{Markman, supra} note 8, at 238). The statistics cited above compare the overall results of Gitter’s research (1996–2007) to Moore’s research (1996–2003). Gitter also compared her data from 1996–2003 to Moore’s data. The results were similar to those cited above.

Gitter further compared the overall appellate reversal rate in the U.S. to the overall reversal rate in English courts. The data showed that a trial court’s ruling the England was more than four times more likely to be reversed than a comparable ruling in the U.S. Accordingly, these statistics cannot be attributed to an English propensity to affirm lower tribunals.
\textsuperscript{60} \textit{Id.} at 195.
\textsuperscript{61} \textit{Id.} at 195–96. It is of note that Gitter asserts that:

\begin{quote}
It would seem that, even more important than technical training, is the fact that English patent judges hear numerous patent cases and in this way enhance their expertise. In the United States, it appears that technical education and prior patent expertise are uncorrelated with claim construction reversal rates, based upon scholarly research demonstrating that the rate at which a Federal Circuit judge reverses district court claim construction decisions is entirely unrelated to the district judge’s technical education and prior patent expertise.
\end{quote}

\textit{Id.} at 196 (citing Moore, \textit{District Court Judges, supra} note 9, at 26–27). However, neither Gitter, nor Moore have empirically addressed whether a technical background benefits a patent trial judge.
b. Technical Training and Patent Law

The instant study attempts to determine whether a positive correlation exists between a technical education and claim construction prowess. However, the connection between a proficiency in patent law and technical education is anything but new. The following subsections describe the presence of technical education requirements in U.S. patent law and attempt to discern the underlying goals to be achieved by these requirements.

i. The Technical Training Requirement Before the USPTO

Dating back to the 1800s, the bar has recognized the importance of technical knowledge in the practice of patent law. With this in mind, the United States Patent and Trademark Office (the “USPTO”) ensures that patent attorneys maintain the “necessary qualifications to render . . . valuable service, advice, and assistance . . . .” To this end, no party can practice before the USPTO unless they have the “legal, scientific, and technical qualifications” necessary to give valuable service in the realm of patent law. The specific qualifications necessary to satisfy this standard are set forth in the USPTO’s “General Requirements Bulletin for Admission to the Examination for Registration to Practice in Patent Cases Before the United States Patent and Trademark Office.” This publication promulgates three manners in which a party can satisfy the technical education requirement to practice before the USPTO: 1. obtaining a bachelor’s degree in a technical subject; 2. obtaining a bachelor’s degree in a non-technical subject, but

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63 35 U.S.C § 2(b)(2)(D); see also Lacavera v. Dudas, 441 F.3d 1380, 1383 (Fed. Cir. 2006) (“Under 35 U.S.C. § 2(b)(2), the PTO has broad authority to govern the conduct of proceedings before it and to govern the recognition and conduct of attorneys.”).
64 37 C.F.R. § 10.7(a)(2)(ii).
66 For the purposes of the Requirements Bulletin, “technical subjects” include: Biology, Pharmacology, Electrochemical Engineering, Biochemistry, Physics, Engineering Physics, Botany, Textile Technology, General
still maintaining a technical educational background; and having practical engineering or scientific experience. The instant study will utilize the first and second means of qualification to determine whether a judge has a technical education (for present purposes).

ii. Technical Training as a Proxy in Patent Law

From the above discussion, it is evident that satisfaction of the USPTO’s technical education requirement is meant to serve as a proxy for possession of the technical knowledge “necessary for [a practitioner] to render [patent] applicants valuable service.” However, upon a more thorough examination, this proxy must be separated into two distinct “sub-proxies”: (1) technical training in field X (e.g. biology) serving as a proxy for proficiency to practice in field X; and (2) training in any technical field serving as a proxy for proficiency to practice in all technical fields. While this distinction is obvious and seemingly important, there is no explicit

An applicant can qualify under Category B by showing one of four things:

i. Option 1: 24 semester hours in physics. Only physics courses for physics majors will be accepted.

ii. Option 2: 32 semester hours in a combination consisting of the following:
   8 semester hours of chemistry or 8 semester hours of physics, and
   24 semester hours in biology, botany, microbiology, or molecular biology.
   The 8 semester hours in chemistry or 8 semester hours of physics must be obtained in two sequential courses, each course including a lab. Only courses for science or engineering majors will be accepted.

iii. Option 3: 30 semester hours in chemistry. Only chemistry courses for chemistry majors will be accepted.

iv. Option 4: 40 semester hours in a combination consisting of the following:
   8 semester hours of chemistry or 8 semester hours of physics, and
   32 semester hours of chemistry, physics, biology, botany, microbiology, molecular biology, or engineering. (For Computer Science, see other acceptable course work.)
   The 8 semester hours of chemistry or 8 semester hours of physics must be obtained in two sequential courses, each course including a lab. Only courses for science or engineering majors will be accepted.

An applicant can qualify under Category B by showing one of four things:

i. Option 1: 24 semester hours in physics. Only physics courses for physics majors will be accepted.

ii. Option 2: 32 semester hours in a combination consisting of the following:
   8 semester hours of chemistry or 8 semester hours of physics, and
   24 semester hours in biology, botany, microbiology, or molecular biology.
   The 8 semester hours in chemistry or 8 semester hours of physics must be obtained in two sequential courses, each course including a lab. Only courses for science or engineering majors will be accepted.

iii. Option 3: 30 semester hours in chemistry. Only chemistry courses for chemistry majors will be accepted.

iv. Option 4: 40 semester hours in a combination consisting of the following:
   8 semester hours of chemistry or 8 semester hours of physics, and
   32 semester hours of chemistry, physics, biology, botany, microbiology, molecular biology, or engineering. (For Computer Science, see other acceptable course work.)
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statutory or administrative requirement that a patent practitioner possess technical training within the technological field that he is working in.

The first proxy bears a more intuitive appeal than the latter. Specifically, it can be expected that a practitioner trained in the technical field that he practices in will become acquainted with, and acquire a nuanced understanding of, the technology at hand more quickly than an untrained counterpart. However, the USPTO does not utilize this proxy and, due to an insufficient data set, this study cannot address this correlation.

The second proxy (connecting a technical training in any field with a proficiency to practice in all technical fields) has been broadly accepted as valid. However, this correlation is not without its detractors. In example, Professor Robin Feldman has stated that “[f]or those without a science background, it is easy to assume that training and expertise in one scientific field confers wisdom in all scientific fields. Other than perhaps creating a lack of fear, however, knowledge in one scientific area does not necessarily translate into knowledge in another.” While not resolving this issue, the instant study does not support the validity of this proxy.

III. The Empirical Study

As previously described, the present study was designed to test the hypothesis that technically trained judges are better at claim construction than their non-technically trained peers. To this end, data pertinent to two distinct aspects of the present question was collected: (1) the technical training (or lack thereof) of individual federal district judges; and (2) the claim construction reversal rates of technically trained judges. This information was compiled into two databases—one comprising the undergraduate majors of federal trial judges (the “Undergraduate Database”) and a second collection consisting of all appellate decisions relating to claim

71 See, e.g., Gitter, supra note 2, at 172; Schwartz, Courting Specialization, supra note 2, at 1731; Maida, supra note 2, at 1794.

constructions conducted by technically trained judges (the “Appellate Database”). The Appellate Database did not include decisions reviewing claim constructions by non-technically trained judges, as this study consists of a comparison of the reversal rate of technically trained judges to the same rate in the general population of judges (as published an earlier study). The following subsections describe the construction of the databases and present the raw data collected in the study.

a. The Undergraduate Database

The first step in testing the present hypothesis was creating the Undergraduate Database. This database comprises the undergraduate majors of 617 United States district judges and senior district judges. The dataset was created though: (a) an email survey sent to 939 district judges, which was met with a 61.0% response rate; and (2) use of Westlaw’s Profiler feature, which served to determine the undergraduate majors of 146 district judges (44 of which had not been previously ascertained).

The email survey of trial judges was conducted in two basic steps: (1) collecting the names of all current and senior district judges (collectively referred to as “district judges”); and (2) sending an email survey to these judges. The list of judges to be contacted was amassed by visiting the websites for each judicial district in the United States. This method of collection

73 The email survey sent to the judges read, in full:

Dear Judge ______,

My name is Mike Schuster and I am currently clerking for Judge Kenneth Hoyt (S.D. Tex., Houston Div.). At present, I am conducting an empirical study pertaining to the undergraduate majors of federal judges.

I would greatly appreciate it if you would please respond to this email and indicate what your major was during your undergraduate studies (e.g. chemical engineering, history, biology, etc.). If you had multiple majors, please indicate as such.

Thank you for your help,

Mike Schuster

74 To this end, the following Westlaw search was conducted in Westlaw’s Profiler tool: “major! & judge & "united states district court" & "hon." & [State].” This search ensured that a “major” was indicated in the search results. Further, only “judge[s]” for the “United States District Court” within a particular “state” would appear in the results.

75 See generally 28 U.S.C.A. § 133 (describing the federal judicial districts).
limited the database to then-serving district judges. No attempt was made to include former district judges in this database for two reasons. First, there is no database containing the undergraduate majors of these judges. Second, there is no reliable manner of finding contact information for former judges.

After the list of district judges was compiled and the judges’ emails were ascertained, an individualized survey was transmitted to each judge. The surveys were sent between 10/9/2009 and 1/20/2010, and survey responses were accepted until 2/8/2010. As described above, Westlaw searches using the “Profiler” database were conducted concurrently to augment the survey results.

The survey yielded 573 responses out of 939 surveys sent out, a 61.0% response rate. In addition, the Westlaw research yielded undergraduate major data for 146 judges (44 of which had not responded to the survey). Combining all of the collected data yielded undergraduate majors for 617 of 939 judges included in the list of judges, a 65.7% capture rate.

The collected data was incorporated into the Undergraduate Database, along with the judges’ names, judicial districts, undergraduate majors as indicated in a survey response, and undergraduate majors as determined via a Westlaw search. After compilation of this information, majors collected via survey response or Westlaw search (or by both means) were treated the same.

The collected data established that 28 of 617 federal district judges included in the undergraduate database (4.5%) had a technical background. As described below, identification of these judges was subsequently used to determine the reversal rate of technically trained judges with regard to claim construction issues.

76 See supra note 73.
77 Any subsequent reference to “the 28 judges” or the “28 technically trained judges” is referring to this group of judges.
b. The Appellate Database

After compilation of the Undergraduate Database, a Westlaw search was utilized to locate every claim construction opinion drafted by the 28 technically trained judges. The subsequent history of each case was reviewed, and, if the claim construction was appealed to the Federal Circuit, the case was included in the “Appellate Database.” This collection included all reported opinions, unreported opinions, and (summary) Rule 36 affirmances of claim constructions by technically trained judges.

In constructing the Appellate Database, the following information was recorded: the trial judge’s name and field of technical training, the trial and appellate citation, caption and case number, the number of the patents in dispute, the U.S. patent class (both number and name) of the patent(s) in dispute, the claim terms under appellate review, whether the construction of each claim limitation was affirmed or reversed, and whether the case was reversed on claim construction grounds. If the claim construction was summarily affirmed under Rule 36, the appellate briefs were reviewed to capture the required information.

After review of all pertinent cases, the appellate database consisted of 46 reviewed claim limitations from 19 patent cases authored by 8 district judges. Of the reviewed claim limitations, 20 of 46 were reversed (43.5%). Of the 19 claim construction opinions reviewed by the Federal Circuit, 9 contained at least 1 erroneous claim construction (47.4%) and 7 were reversed on a claim construction issue (36.8%).

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78 This data compilation was achieved through a search of the Westlaw ALLFEDS database for “ju([JUDGE’S LAST NAME] & patent /s infringement” for each respective technically trained judge. The compiled set of cases was then reviewed to determine which opinions included claim construction.
79 See supra note 48.
80 Appellate briefs were either obtained from Westlaw or ordered directly from the Federal Circuit.
IV. Analysis of the Collected Data

Section IV presents a statistical evaluation of the collected data. The first subsection analyzes the data with regard to whether technically trained judges are better at patent claim construction than non-technically trained judges. The analysis does not support the proffered hypothesis. The second subsection describes potential sources of error and the actions that were taken to correct for such error.

In order to test the theory that technically trained district judges are better at claim construction than the judiciary at large, this study contrasts the data collected in the Appellate Database with the overall reversal rate of claim construction opinions, as previously determined by Professor Schwartz.\textsuperscript{81} The following chart compares the reversal rates of technically trained judges to the rates of all federal judges with regard to three metrics: (1) the reversal rate of individual claim limitations; (2) the percentage of cases with at least one claim reversed on a claim construction issue; and (3) the percentage of cases that were reversed, vacated, and/or remanded due to a claim construction issue. These comparisons are broken into two timeframes: 4/24/96 to 6/30/7 (the period over which Schwartz conducted his study) and 4/24/96 to 2/12/10 (the period over which this study was conducted).\textsuperscript{82}

\textsuperscript{81} See Schwartz, Practice Makes Perfect, supra note 2, at 249.
\textsuperscript{82} In order to maximize the size of the present data sample, this study will compare the data collected from 4/24/96–2/12/10 to Schwartz’s data, which was collected from 4/24/96–6/30/7. The Author is not aware of any events that occurred after 6/30/7, which would significantly skew the data collected during that timeframe (and adversely affect the reliability of the present study).
The most obvious conclusion to be drawn from the above chart is that the reversal rates of technically trained judges were, with regard to claim constructions in the present sample set, higher than that of the general population of judges. However, absent further statistical analysis, this raw data cannot properly be evaluated.

a. Statistical Conclusions from the Data

Confidence intervals account for statistical uncertainty created by estimating a value from collected data. This information is conveyed by “constructing an interval that, under repeated random sampling in identical conditions, would contain the true percentage of the [measured attribute some specified percentage] of the time.” The specified percentage range is referred to as the confidence level. Researchers commonly utilize the 95% confidence interval, such that the true value of the measured parameter is 95% likely to be within the stated range.

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83 Michael Smithson, Confidence Intervals 1 (2003).
84 Id.
85 Id.
For present purposes, confidence intervals are being computed for the collected data in hopes of comparing the presently calculated ranges to the reversal rates calculated by Professor Schwartz. Specifically, confidence intervals add more information to the claim limitation reversal rates ascertained in this study.

In order to achieve these goals, the research is modeled as a binomial experiment. This type of experiment has the following attributes:

1. The experiment consists of \( n \) identical trials.
2. Each trial results in one of two outcomes. For lack of a better nomenclature, the one outcome is called a success, \( S \), and the other a failure, \( F \).
3. The probability of success on a single trial is equal to \( p \) and remains the same from trial to trial. The probability of failure is equal to \( (1 – p) = q \).
4. The trials are independent.
5. We are interested in \( x \), the number of successes observed during the \( n \) trials.\(^{87}\)

For present purposes, \( n \) is equal to 46 (the number of claim limitations construed by technically trained judges and reviewed by the Federal Circuit in the instant study). Furthermore, \( S \) (success) is defined as reversal of the trial court’s construction and \( F \) (failure) is defined as affirmance.\(^{88}\) With regard to the first, second, and fifth attributes of a binomial experiment, none seem problematic. Each appellate review of a claim construction is identical (with regard to the standard applied) and yields one of two outcomes (reversed or affirmed).


\(^{88}\) Note that associating reversal or affirmance with “success” or “failure” is of no matter. The terms are, for present purposes, essentially interchangeable.
The third attribute is satisfied if \( n/N \leq 0.05 \), where \( N \) equals to number of elements in the population and \( n \) is the sample size.\(^{89}\) This standard is satisfied here. The current study is interested in the overall capacity of technically trained judges to correctly construe patent claims. Thus, the present empirical data is a subset of a potentially infinite population (\( N \)).\(^{90}\)

For immediate purposes, the fourth attribute will be considered satisfied. There is no direct relationship between reversals of particular limitations. However, it is of note that many of the limitations reviewed in the study have a common attribute, namely the trial judge that construed the patent claims. To the extent that this may create any sort of interdependence between claim limitations, this potential correlation is discussed subsequently.

Where, as here, a dataset satisfies the requirements of a binomial system, the following attributes can be calculated:

\[
\text{Variance} = \sigma^2 = pq / n
\]

\[
\text{Standard deviation} = (pq / n)^{0.5}
\]

where \( n \) is the number of claim limitations in the study (i.e. the sample size), \( p \) is the calculated probability of reversal (43.5%), and \( q \) is the probability of an affirmance (1 – \( p = q = 54.5\% \)).

To calculate the 95% confidence interval for the present study, we approximate the binomial distribution by assuming a normal distribution.\(^{91}\) Under this premise, the confidence interval associated with the reversal rate of technically trained judges can be estimated by applying the following relationship:

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\(^{89}\) Mendenhall, supra note 87, at 167. This estimation is required because, in a small population, the probability of reversal or affirmation will not remain constant as cases are randomly selected for inclusion in the sample set. However, in a situation where the sample is relatively small relative to the overall population, the change in probability of reversal or affirmation for subsequently selected members of the sample set is negligible.

\(^{90}\) This stands in contrast to a study that attempts to estimate some attribute of a finite population by sampling a subset of that population. See Mendenhall, supra note 87, at 167. (describing the applicability of this element when trying to ascertain the occurrence of a particular attribute in a 1,000,000 element set by evaluating a 1,000 element sample.)

\(^{91}\) Mendenhall, supra note 87, at 284. Such an estimation can be justified pursuant to central limit theorem. Id.
\[ p \pm z_{1-\alpha/2} \ast (p \ast (1 - p) / n)^{\frac{1}{2}} \]

where \( z_{1-\alpha/2} \) is the “z value” associated with a particular level of confidence.\(^{92}\) For a 95% confidence interval \( z_{1-\alpha/2} \) equals 1.96.\(^{93}\)

Thus, with regard to individual claim limitations, the present study finds that, with a 95% confidence interval, the actual rate of reversal is 43.5% plus or minus 14.3% (or 29.2% to 57.8%). This confidence interval envelopes that associated with Schwartz’s study, which found (to a 95% confidence interval) that claim limitations were reversed 38.0% plus or minus 2.1%.\(^{94}\) A comparison of these ranges does not support the contention that technically trained judges are reversed at a lower rate than the judiciary at large.\(^{95}\)

b. Potential Sources of Error

This subsection describes potential sources of error associated with this study and the actions taken in order to account for the effects of these errors.

i. Small Data Set

An initial source of error associated with the instant study arose from the less than optimally sized dataset included in the Appellate Database. Specifically, only 46 claim

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\(^{92}\) Mendenhall, supra note 87, at 285.

\(^{93}\) Mendenhall, supra note 87, at 286.

\(^{94}\) Schwartz’s study does not state the number of claim limitations that were reviewed in his study, but rather, it notes that 952 cases were reviewed. However, estimating that 2,000 limitations were construed in the study leads to a 95% confidence interval of reversal of claim limitations of 38.0% plus or minus 2.1%. Further, were we to assume that Schwartz’s study reviewed 1000 limitations, the 95% confidence interval would be 38% plus or minus 3.0%, which, for the present purposes, is not a significant difference. Accordingly, the estimation of 2,000 reviewed limitations seems sufficient.

\(^{95}\) Calculation of the 95% confidence interval for each of the three currently applied metrics of claim construction reversal rates leads to the below figures:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Judiciary at Large (Schwartz)</th>
<th>Technically Trained Judges (Schuster)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term reversal</td>
<td>38.0% ± 2.1%</td>
<td>43.5% ± 14.3%</td>
</tr>
<tr>
<td>At least one claim reversed</td>
<td>29.7% ± 2.9%</td>
<td>47.4% ± 22.5%</td>
</tr>
<tr>
<td>Reversed on claim construction issue</td>
<td>32.0% ± 3.0%</td>
<td>36.8% ± 21.7%</td>
</tr>
</tbody>
</table>

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limitations from 19 patent cases were found and reviewed. This problem was addressed in two manners: (1) attempts to expand the scope of the data collected to include claim constructions by United States Magistrate Judges; and (2) by including confidence intervals with the studies’ conclusions to account for the suboptimal size of the dataset.

In an attempt to increase the size of the Appellate Database, the expansion of this study to include all claim constructions conducted by magistrate judges was considered. To this end, research into the undergraduate majors of current magistrate judges was undertaken and, similar to the actions taken with regard to district judges, the reversal rates of technically trained magistrate judges was determined for claim construction issues. The intent of this expansion was to include all claim constructions that were appealed directly from the magistrate judge to the Federal Circuit (avoiding all intermediate reviews by district judges).

This is because inclusion of claim constructions conducted by the magistrate judge and reviewed by the district judge would skew the reversal rate by allowing for a review (by the district judge) prior to the Federal Circuit appeal. Specifically, only “correct” magistrate claim constructions (as established by a reviewing district judge) could be entered as a (reviewable) final order by the district judge, which would (in theory) lead to a lower reversal rate of these opinions. This would bias the data.

Inclusion of this data in the Appellate Dataset and subsequent comparison of this data to the collection of district court-only information collected by Professor Schwartz would have been proper, as Schwartz found that “there did not seem to be a significant difference between the performance of magistrate judges and district court judges” in his study. However, after

96 Pursuant to 28 U.S.C. § 636(c), “[u]pon the consent of the parties, a full-time United States magistrate judge or a part-time United States magistrate judge who serves as a full-time judicial officer may conduct any or all proceedings in a jury or nonjury civil matter and order the entry of judgment . . . .”
97 See Schwartz, Practice Makes Perfect, supra note 2, at 249.
creation of an undergraduate and an appellate database for magistrate judges, the results (a few pertinent appellate reviews) did not warrant expansion of the study relative to any potential error that might be introduced. It is of note that, with regard to that minimal sample of magistrate judges’ claim construction, no significant deviation was found from the reversal rates of technically trained district judges.

The second action taken to account for a suboptimal sample size was the calculation of confidence intervals associated with the collected data. Such intervals take into consideration the size of the sample, such that a larger sample would be expected to have a narrower confidence interval. As discussed above, calculation of the confidence intervals associated with the reversal rates of individual limitations yielded a range that enveloped the range calculated using Professor Schwartz’s data pertaining to the judiciary at large (i.e. 38.0% ± 2.1% for the judiciary at large, and 43.5% ± 14.3% for technically trained judges). As discussed above, this data is consistent with the overall conclusion of this study: the collected data does not support the conventional wisdom that technically trained judges are better at claim construction than the judiciary at large.

ii. Systemic Influence of Individual Judges

Another source of error to be considered arises from the fact that individual judges have different numbers of cases included in the Appellate Dataset. As set forth below, the 8 judges who conducted claim constructions included in the Appellate Dataset had between 1 and 7 cases included in that database. Those cases correspond to judges’ who were responsible for construction of between 1 and 18 limitations.

From this data, it must be questioned whether individual judges’ relative capacities for claim construction have skewed the data set. Restated, it needs to be determined if one judge (e.g. the judge responsible for the first or second most claim constructions) had a
disproportionate impact on the data set, such that the data is skewed. To this end, the reversal rates of claim limitations were calculated without including the data associated with the judge with the largest number of claim limitations (18) and then, in a separate calculation, without the data associated with the judge with the second largest number of claim limitations (11). These calculations yielded claim limitation reversal rates of 35.7% and 48.6%. Neither of these reversal rates differ significantly from that attributable to the judiciary at large (38.0%), nor from that attributable to the judges with technical backgrounds (43.5%). Accordingly, this potential bias does not present a reason to deviate from the conclusion that the collected data does not support the theory that technically trained judges are better at claim construction than the judiciary overall.

iii. Survey Error

Inherent in any study premised on survey data is the potential for bias to be introduced through inadvertent error in survey design and execution. One common error is introduced by selecting a sample set (here judges) that does not appropriately represent the population of interest. This type of error is referred to as “sampling error.” The instant survey was sent to every district judge in the United States, and accordingly, the survey recipients necessarily represent the population of interest. Thus, other types of error (such as nonsampling errors including nonresponsiveness, inaccurate responses and selection bias) must be evaluated.

Nonresponsiveness to a survey can introduce error into a dataset. Specifically, if a recipient’s likelihood of response to a survey is a function of an attribute that also bears some

99 Id. at 33.
100 See Id.
101 Id.
correlation to the attribute that is the subject of the survey, then a bias will be introduced.\textsuperscript{102} In example, if a survey pertaining to computer savviness is conducted via email, a bias will be introduced because the likelihood of response to the survey is higher for parties who commonly communicate via email, which is an attribute that would positively correlate to computer savviness. Fortunately, no evidence of such an error is present in the instant study. The survey emails were intentionally worded in a generic manner that would not induce biased responsiveness because the recipient did not know the subject matter of the study.\textsuperscript{103} Moreover, there is no indication that responsiveness to a survey (in general) correlates with a proficiency in claim construction. Therefore, there is nothing to indicate that a nonresponsiveness bias is present in this study.\textsuperscript{104}

Likewise, there is no evidence of a second type of nonsampling error, namely inaccurate responses. Specifically, there was no reason to believe that any of the surveyed judges responded in anything less than a truthful manner, and therefore, the likelihood of a bias being introduced via inaccurate response is slim.

Good survey practice mandates that follow up correspondence be sent to initially nonresponsive parties.\textsuperscript{105} This was not done in the current study out of respect for the judiciary

\textsuperscript{102} \textit{Id.}
\textsuperscript{103} See supra note 73. It is of note that some (less than 10) judges requested to know the subject of the study before they would answer. Out of respect, these judges were given a brief description of the study, and their responses were included in the collected data (if they chose to respond). This small number parties that were told of the subject matter of the study prior to their response (or non-response) is insignificant relative to the total number of responses, and therefore is very unlikely to have introduced any error into the study. It is of note that almost all recipients of the survey that responded were told of the subject matter of the study after they responded.
\textsuperscript{104} It is of note that it is theoretically possible for litigants to have actually skewed the present data set. Specifically, if litigants properly perceived which trial judges were likely to correctly construe patent claims, then the losing party would have less reason to appeal the claim construction by judges with a proficiency in the area. Were one to assume that: (a) this phenomena occurs; and (b) technically trained judges are better at claim construction, then it is possible that some of the best, technically trained claim constructionists are not included proportionately in this study. While this situation (and the introduction of bias associated therewith) is unlikely, the possibility is worth noting.
\textsuperscript{105} \textsc{Louis M. Rea & Richard A. Parker, Designing and Conducting Survey Research: A Comprehensive Guide} 69 (2d ed. 1997).
(and their busy schedules) and because the initial survey produced a high rate of response (over 60%). Since a survey response rate of 50 to 60 percent is considered sufficient to analyze and report collected data, it is unlikely that this introduced error into this study.106

Lastly, with regard to the data collected through Westlaw (representing 44 of 617 entries in the Undergraduate Database), no sources of error are immediately recognizable. As with the survey, this data collection was done for all district court judges, so sampling error is unlikely. Moreover, the inclusion of a judge’s undergraduate major in the Westlaw Profiler database is unlikely to bear any correlation to their proficiency at claim construction. Therefore, nonsampling error is also unlikely. Thus, upon a review of the present sampling methodology, it seems that minimal sources of error were introduced through design and execution of the data collection.

V. Potential Conclusions to be Drawn from the Present Study

This section presents several conclusions to be drawn from, or explanations for, the current findings. A final subsection further discusses future studies that may be of benefit to the pertinent areas of intellectual property scholarship.

a. Specialized Patent Courts

In addressing the high reversal rates of district court claim constructions, some commentators have supported the creation of a specialist patent court that would have jurisdiction over all patent cases.107 Proponents of this plan commonly argue that, in order to increase

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106 Rea & Parker, supra note 105, at 69.
efficiency through specialization, technical training should be a prerequisite to serving as a “patent judge.” The present study brings this assertion into question.

At first blush, use of the current study to undermine the appropriateness of specialized patent courts (consisting of technically trained judges) may seem to be questionable. This is because the present study solely addresses claim construction, which is but a single aspect of a patent trial. In contrast, the hypothesis underlying proposals for specialized patent courts is that technically trained judges can better handle patent infringement trials as a whole (including, but not limited to, claim construction). However, this distinction is superfluous when further analyzed.

A patent infringement analysis consists of two steps: (1) claim construction; and (2) application of the properly construed claims to the allegedly infringing device to determine if infringement is present. The present study does not support the contention that technical training helps with the first step in the analysis. Furthermore, the second step merely applies the previously-construed patent claims to (allegedly infringing) devices, an act that would appear to require no education beyond that necessary during claim construction. Restated, if a judge is proficient at construing claims, then there is no logical reason why he or she could not apply that knowledge to ascertain if infringement has occurred. Thus, as the present study does not support a correlation between technical training and claim construction prowess, it would seem illogical to attempt to correlate technical training and the capacity to preside over a patent case in its due to the increasingly technical and complex nature of patent cases, the United States will soon be forced to follow suit or continue to endure high reversal rates."

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109 See also Schwartz, Courting Specialization, supra note 2, at 1702 (noting that “an empirical comparison between the ITC and general district courts suggests that specialized patent judges would not yield any more certainty than the more generalist district court judges.”).

entirety. Accordingly, with regard to the instant study, the idea that technical training should serve as a requirement to be a judge on a specialized patent court is unsupported.

b. Technical Training as a Proxy within Specific Technological Fields

One explanation for the present results is that technical training is that—contrary to the collected data—technical training is a strong proxy for claim construction proficiency, but this proxy is only valid within the specific technical field that the judge is trained in. As discussed above, the gathered empirical data does not support the hypothesis that technically trained judges are better at claim construction than the judiciary at large. However, this data solely pertains to the theory that training in any field of technology necessarily prepares a judge for claim construction in all fields of technology. The study does not address the question of whether training in a specific technical field prepares a judge for claim construction in that specific field.

The results of this examination were reviewed for a correlation between proper claim construction and a judge being trained in the technical area of the patent, but the collected data was insufficient from which to draw conclusions on this issue. Therefore, if data is to be collected on this issue, further studies need be performed. Such a study might be of interest because, if trial judges were shown to be better a claim construction within the specific realm of technology that they were trained in, efficiency might be increased through assignment of patent cases depending on the subject matter in question.

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111 The present study yielded 4 claim constructions by patent judges with a training in the same technical field as the patent(s) in question. These 4 cases consisted of 9 contested terms. While not statistically significant, the claim construction reversal rates of these cases did not differ tremendously from those for other claim construction cases by technically trained judges.

112 If such a correlation were established, it would seem logical that judges who expect to deal with many patent cases should hire law clerks from varied technical areas, allowing themselves to utilize technical expertise from a wide range of topics.
c. Impossible to Properly Construe Claims?

Another possible explanation for the results of this study is that the present difficulty in claim construction arises not from a lack of technical training within the judiciary, but rather from problems inherent in the present claim construction methodology. Specifically, if the present claim construction regime yields patent claims that have no specific, objective meaning, then it would be no surprise that trial judges are commonly reversed on the issue.

In support of this theory, one party has argued that claim construction is “inherently indeterminate,” such that, even in the presence of “a clear legal standard” for claim construction, a high rate of reversal is likely.\textsuperscript{113} Consistent with this position, another party has proffered the hypothesis that indeterminacy abounds because no common understanding exists with regard to the terms utilized in a patent, and it is impossible to come to a “correct” construction absent some objective framework upon which to build.\textsuperscript{114} Under this theory, absent some intrinsic definition, “[t]here are multiple plausible claim constructions, and . . . it is unsurprising that [even] experienced patent adjudicators disagree with each other.”\textsuperscript{115} The present \textit{de novo} standard of review of claim construction matters would seem to further this problem because, in the presence of no objective definition of patent terms, an appellate judge is free to substitute his own preference for the trial judge’s construction.\textsuperscript{116}

However, not all commenters support this theory. In example, Federal Circuit Judge Jay Plager has suggested that, while some level of indeterminacy may exist in patent claim construction, “no insurmountable doctrinal or statutory barriers to reducing this area of . . .


\textsuperscript{116} See Zeuli, \textit{supra} note 113, at 53.
indeterminacy [are present.]” Judge Plager states that a solution exists in the manner in which claims are drafted, and no legal reform is necessary. Specifically, he states that “[b]ecause claims in U.S. patents are written using words and phrases that purport to be in the English language, it might help if the rest of English language practice was used: short declarative sentences, careful and precise phrasing, and so on.” Thus, under Judge Plager’s theory, indeterminacy does not arise from a lack of objective meaning for claim terms, but simply through historically mandated, but unnecessary, poor use of the English language in claim drafting.

The present study cannot pass judgment on the validity of the instant hypothesis or its counter-argument. However, were one to accept this theory in lieu of the (presently unsupported) idea that a lack of technically trained judges is leading to high reversal rates, this would, as discussed above, support a deferential review of claim constructions. Further, this potentially supports an overhaul of the current claim construction process.

d. A Flawed Current Regime?

A final explanation of the present empirical data would be that technical training is beneficial during claim construction, but is equally necessary for proper appellate review of claim constructions. This hypothesis would explain that, since not all Federal Circuit judges are technically trained, correctly construed claims are being improperly reversed by appellate judges with insufficient technical backgrounds. Restated, the instant theory states that the high rate of reversal in claim construction cases is due to a failure to hire technically trained Federal Circuit judges.

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118 Id.
119 See also Kristen Osenga, Linguistics and Patent Claim Construction, 38 RUTGERS L.J. 61, 61–62 (2006) (asserting that through judges can arrive at a consistent claim construction through the application of specific interpretive rules).
judges, as opposed to any shortcoming of trial judges. This conjecture might initially seem possible because, in example, in 2009 a majority of Federal Circuit judges lacked a technical degree. However, this hypothesis comes into doubt when thoroughly examined.

As previously discussed, the present study assumes that a technical training can be used as a proxy for “technical” knowledge. The present theory relies upon the assumption that, in the absence of technical knowledge (e.g. during appellate review by non-technically judges), claim construction issues are likely to be improperly ruled upon. Recognition of this assumption exposes the questionable premise upon which the theory rests, namely the idea that a Federal Circuit judge without a technical training does not have access to technical knowledge. This is incorrect. Most Federal Circuit judges are surrounded by a technically trained staff, including law clerks and advisors. As such, while not all Federal Circuit judges are technically trained, they are supported by technical advisors. Therefore, an assertion that the present appellate review process for claim construction is flawed because the reviewing judges lack a technical background seems unsubstantiated, since—despite not personally having a technical education—these judges have access to technical knowledge.


122 In example of this argument, Professor Schwartz questions whether that International Trade Commission’s administrative law judges (“ALJs”) “may be more accurate at reaching [claim constructions] than the Federal Circuit. The ALJs may have more patent experience than the Federal Circuit judges. Consequently, their claim construction may be correct and the Federal Circuit may be incorrect.” Schwartz, Courting Specialization, supra note 2, at 1732 (citing Steven Andersen, International Trade Commission Sees Surge in Patent Cases, CORP. LEGAL TIMES, Oct. 2004, at 24, 29) (footnotes omitted).

123 It is worth noting that previous literature has empirically determined that, with regard to claim construction issues, technically trained appellate judges are not statistically significantly different from nontechnically trained appellate judges in their reversal patterns. Moore, District Court Judges, supra note 9, at 26–27. However, while this finding is of interest, it is not germane to the present discussion. Judge Moore determines that only Federal
e. Further Study

It is of interest to consider the present study in light of the (above-described) work of Professor Gitter (Should The United States Designate Specialist Patent Trial Judges? An Empirical Analysis of H.R. 628 In Light of the English Experience and the Work of Professor Moore). Specifically, Gitter determined that specialized patent courts in England maintain a lower reversal rate on claim construction issues (relative to trial judges in the United States) despite not maintaining any significant differences in the applicable patent laws.¹²⁴ This would lead to the conclusion that the elevated reversal rates found in the United States are a function of some attribute held by the trial judge. However, the two attributes historically expected to be associated with a strong patent judge (technical training and experience in patent cases) are of questionable importance in light of the present study and the work of Professor Schwartz.¹²⁵

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¹²⁴ See Gitter, supra note 2, at 186–96.
¹²⁵ See Schwartz, Courting Specialization, supra note 2 (finding no correlation between the number of patent cases a judge has presided over and that judges’ rate of reversal on claim construction issues).
While investigation into the attributes of “good” patent judges is beyond the purview of this article, the issue warrants further study.\textsuperscript{126}

VI. Conclusion

A prime concern in recent intellectual property scholarship is the high reversal rate of patent claim construction opinions. As previously discussed, a common explanation for this phenomena is that—in contrast to most district court judges—technically trained trial judges are necessary to properly construe patent claims. However, the instant study does not substantiate this contention.

While these unexpected results could be understood in several ways, this study is most relevant to current policy debates regarding proposed methods to reduce patent claim construction reversal rates. In particular, some commenters have advocated the creation specialized patent trial courts consisting of (technically trained) patent judges. However, the present data does not support the assumption underlying these proposals, namely that a technical training is a strong proxy for a trial judge’s proficiency at claim construction (specifically) and conducting a patent infringement trial (generally). Accordingly, proposals of this nature may need to be reconsidered in light of the results presented in this Article.

\textsuperscript{126} Might proficiency in the area of claim construction positively correlate to a judges’ will to be presiding over a patent case? The will to preside over a patent case could be manifested, in the English system, by the simple fact that a judge chooses to serve on England’s specialized patent court. This correlation would explain why, pursuant to Gitter’s study, English patent judges maintain a lower reversal rate on claim construction issues (despite the seeming unimportance of technical training and experience in patent cases).
VII. Appendix

a. Collection of Judges’ Undergraduate Majors

As discussed above, in order to amass the data comprising the Undergraduate Database, two steps were taken: (a) an email survey was sent to 939 district judges, which was met with a 61.0% response rate; and (b) Westlaw’s Profiler feature was used to determine the undergraduate majors of 146 district judges (44 of which had not been previously ascertained). Further, in hopes of enlarging the database, a similar collection of data was undertaken for United States Magistrate Judges. Upon review of the results for magistrate judges, insufficient data was obtained that would be included in the Appellate Dataset, and accordingly, this data was not utilized. However, in order to disseminate the data collected, the results of both the district and magistrate judge undergraduate studies are contained below. Specifically, the data is contained in three charts (district judges’ undergraduate data, magistrate judges’ undergraduate data, and district and magistrate judges’ undergraduate data combined). A brief explanation of the charts is included below.

In the following charts, the undergraduate majors of the judges studied are divided into ten mutually exclusive categories. In order to allow comparison to the body of attorneys at large, this study adopted categories similar to those used in a prior study of the undergraduate majors of attorneys. See R. Kim Craft & Joe G. Baker, Do Economists Make Better Lawyers? Undergraduate Degree Field and Lawyer Earnings, 34 J. Econ. Educ. 263, 277 (2003). That study found the following undergraduate majors for attorneys at large.

<table>
<thead>
<tr>
<th>Major</th>
<th>127</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>S&amp;E</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>22.2%</td>
<td></td>
</tr>
<tr>
<td>Prelaw</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>8.1%</td>
<td></td>
</tr>
</tbody>
</table>


Id. at 270.
1. Science & Engineering (S&E) - All engineering fields, life and physical sciences, and mathematics. It is of note that not all majors included in S&E are considered technical training for the purposes of this paper. In example, mathematics degree holders cannot sit for the USPTO patent bar (outside of certain extenuating circumstances), and therefore judges with mathematics degrees are not considered to be technically trained for present purposes.

2. Social Sciences (SS) - All social sciences (including psychology), excluding political science and economics

3. Political Science - All political science degrees

4. Education, Arts, and Letters (EAL) – All humanities, education, philosophy, religion, art, and music majors

5. History – all history majors

6. Business – all business degrees including business administration, business management, and industrial management

7. Accounting – all accounting majors

8. Economics – all economics degrees

9. Prelaw – all express prelaw degrees

10. Other – any degree not included in any other category, including general studies, journalism, and communications

Further, the collected data is presented in several categories:

1. “WL – Raw” – the total number of judges who have a degree in a specific field, as determined in the Westlaw research

2. “WL - %” – the percentage of judges who have a degree in a specific field, as determined in the Westlaw research

3. “Survey – Raw” – the total number of judges who have a degree in a specific field, as determined though the email survey

4. “Survey - %” – the percentage of judges who have a degree in a specific field, as determined though the email survey

5. “Total – Raw” – the total number of judges who have a degree in a specific field

6. “Total - %” - the percentage of judges who have a degree in a specific field
### District Court Judges (Data Collected on 617 Judges)

<table>
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<tr>
<th>Major</th>
<th>WL - Raw</th>
<th>WL - %</th>
<th>Survey - Raw</th>
<th>Survey - %</th>
<th>Total - Raw</th>
<th>Total - %</th>
</tr>
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<tbody>
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<td>6.3%</td>
</tr>
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<td>9</td>
<td>1.5%</td>
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<td>8.9%</td>
<td>53</td>
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<td>573</td>
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<td>617</td>
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### Magistrate Judges (Data Collected on 404 Judges)

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<th>WL - %</th>
<th>Survey - Raw</th>
<th>Survey - %</th>
<th>Total - Raw</th>
<th>Total - %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
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</tr>
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</tr>
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</tr>
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<td>8.9%</td>
</tr>
<tr>
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<td>Survey - %</td>
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<tr>
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<td>958</td>
<td></td>
<td>1021</td>
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</tr>
</tbody>
</table>

Research Conducted Between 10/9/9 and 2/8/10

Lastly, several points regarding the above charts must be noted:

- The columns representing percentages may add up to greater than 100%. This is because each cell represents the number of judges that have that degree, and many judges have more than one degree. Accordingly, a judge may be included in the percentage represented in multiple cells in a column, leading to a summation greater than 100%.
- The “Total – Raw” column represents the summation of data collected between the survey and the Westlaw study. However, the data collected in the survey and the data collected in via Westlaw was not mutually exclusive. In example, a judge whose major was found both by survey response and a Westlaw search would be included in both columns. This repetition of data in the two studies leads to the “Total – Raw” column not being the summation of the “WL – Raw” and the “Survey – Raw” columns.