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Not So Obvious after All: Patent Law's Nonobviousness Requirement, KSR, and the Fear of Hindsight Bias

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NOT SO OBVIOUS AFTER ALL: PATENT LAW'S NONOBVIOUSNESS REQUIREMENT, KSR, AND THE FEAR OF HINDSIGHT BIAS

Glynn S. Lunney, Jr. & Christian T. Johnson***

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I. INTRODUCTION

Over the three decades since the advent of the Federal Circuit in 1982, we have seen the slow demise of the nonobviousness requirement. Judicially created in the nineteenth century and codified in section 103 of the 1952 Patent Act,¹ the nonobviousness requirement seeks to limit the availability of patents to “those inventions which would not be disclosed or devised but for the inducement of a patent.”² While patent law’s novelty requirement requires that an invention be new—that it represent an advance over the existing art—nonobviousness requires something more.³ However phrased, whether as “invention” in the original, judicially created version or as “nonobviousness” since its codification, the requirement asks not whether some technological advance has occurred, but whether there has been sufficient technological advance to warrant the grant of a patent.⁴ The whole point of the doctrine is to separate trivial advances from more substantial advances and to ensure that only the latter receive patents.⁵

Before the creation of the Federal Circuit in 1982, nonobviousness served as the primary gatekeeper for patents. An empirical study of appellate patent litigation from the 1940s through 1982 reveals that when patent holders sued for infringement and lost, they lost approximately 65% of the time on the grounds that their patent was obvious.⁶ With the rise of the Federal Circuit, the height of the nonobviousness hurdle has steadily declined. From 1984 through 2001, obviousness represented the reason a patent holder lost in less than 15% of cases on average.⁷ By 2005, the doctrine had reached its nadir. In that year, when patent holders sued for infringement and lost,

¹ Act of July 14, 1952, Pub. L. No. 82-593, 66 Stat. 722, 798 (codified as amended at 35 U.S.C. § 103 (2006)).

² *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 11 (1966).

³ See discussion *infra* Part II.A.

⁴ See discussion *infra* Part II.A.

⁵ See *infra* notes 67–69 and accompanying text.

⁶ See *infra* notes 151–53 and accompanying text.

⁷ See *infra* notes 151–53 and accompanying text.

obviousness was the reason in less than 5% of the cases.⁸ While nonobviousness formally remained a requirement of patent protection, to the Federal Circuit, almost nothing was obvious.

A potential turning point arose in 2007, however, with the Court's decision in *KSR International Co. v. Teleflex Inc.*⁹ In its first substantive return to the nonobviousness requirement since the Federal Circuit's advent, the Court both rejected some of the key restrictions the Federal Circuit had placed on the obviousness doctrine¹⁰ and broadened the circumstances under which obviousness could be found.¹¹ Taken at face value, the Court's decision seemed poised to reinvigorate the nonobviousness requirement.

Both anecdotal and empirical analysis of the Federal Circuit's decisions after *KSR* suggest that the decision has had some impact. In finding patents obvious in individual cases, the Federal Circuit has cited extensively to the Supreme Court's holding and reasoning in *KSR*.¹² And since *KSR*, when a patent holder loses, obviousness is the reason in nearly 20% of the cases. This is somewhat above the 15% average for which obviousness accounted in the pre-*KSR* Federal Circuit era and well above the 5% level of losses for which obviousness accounted in 2005.¹³ The Court's decision in *KSR* thus seems to have helped the nonobviousness requirement recover, at least somewhat, from its near-death experience.

Even following *KSR*, however, the nonobviousness requirement remains a pale shadow of its former self. While the 20% of losses for which obviousness accounted since *KSR* is somewhat above the 15% average in the pre-*KSR* Federal Circuit era, it remains a far cry from the 65% of losses in the pre-Federal Circuit era.

When we look for reasons behind the nonobviousness requirement's diminished vitality, we find, *inter alia*, a fear of

⁸ See *infra* notes 151–53 and accompanying text.

⁹ 550 U.S. 398 (2007).

¹⁰ *Id.* at 415.

¹¹ *Id.* at 417, 419–20.

¹² See *infra* notes 145–50 and accompanying text.

¹³ See discussion *infra* Part II.C.

hindsight. As articulated by the Federal Circuit, in determining obviousness, it is not proper to use the inventors' own work against them.¹⁴ Having seen how the inventor solved a problem, it becomes trivial to use that solution as a roadmap to piece together the prior art and conclude that the solution was obvious.¹⁵ Over and over again, the Federal Circuit has reversed a district court's conclusion of obviousness and accused the district court of resorting to such improper hindsight.¹⁶ On those occasions when a majority of a panel concludes that an invention was obvious, we often find a dissent chiding the majority for resorting to improper hindsight.¹⁷ And when courts seek to justify existing doctrine or

¹⁴ See *In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000) (noting the importance of "casting the mind back to the time of invention" to avoid the "insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher" (citation omitted)); see also *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1092 (Fed. Cir. 1985) ("In deciding the obviousness question, the district court looked to knowledge taught by the inventor Caveney, in his patents and in his testimony, and then used that knowledge against its teacher."); *vacated*, 475 U.S. 809, 811 (1986) (per curiam) (vacating for failing to explain the proper standard of review in reviewing obviousness determinations).

¹⁵ See *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) ("It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious."); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138 (Fed. Cir. 1985) ("The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time.").

¹⁶ See, e.g., *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998) (concluding that in the absence of a "teaching or suggestion" to combine the prior art references, jury must have resorted to improper hindsight); *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998) ("Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness."); *Cont'l Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1271 (Fed. Cir. 1991) ("When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." (quoting *Interconnect Planning Corp.*, 774 F.2d at 1143)); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1054 (Fed. Cir. 1988) (holding "that the district court impermissibly used a hindsight analysis in determining that the claimed invention would have been obvious and did not properly analyze and consider secondary indicia of nonobviousness"); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448 (Fed. Cir. 1986) (reversing district court's conclusion of obviousness and declaring it the result of "improper hindsight analysis").

¹⁷ See, e.g., *Bayer Schering Pharma AG v. Barr Labs., Inc.*, 575 F.3d 1341, 1351 (Fed. Cir. 2009) (Newman, J., dissenting) ("The evidence in this case is a better measure of obviousness than is the hindsight science of judges . . ."); *Erico Int'l Corp. v. Vutec Corp.*, 516 F.3d 1350, 1360 (Fed. Cir. 2008) (Newman, J., dissenting) ("The district court considered the relative simplicity of the invention, a factor that appears to have influenced my colleagues, who with

some doctrinal innovation limiting the scope of obviousness, they often insist that the limitation is necessary to prevent the use of improper hindsight.¹⁸

This paralyzing fear of hindsight has received academic support as well. In a pair of articles, Professor Gregory Mandel has presented results from simulations that he believes demonstrate the potential for substantial hindsight bias in patent litigation.¹⁹ In his simulations, he presented one group of law students with a description of a problem to be solved, described the available prior art, and asked them if they thought a solution would be obvious (the “foresight” scenario).²⁰ To a second group, he presented the same problem and prior art and asked again if a solution would be obvious, but before asking, he added one thing: a brief description of the solution that had been discovered (the “hindsight” scenario).²¹ Finding a statistically significant and quite large difference between the percentages of respondents who found the invention obvious in the foresight and hindsight scenarios,

perfect hindsight find that it would have been obvious to make Erico’s J-hook by combining the OBO Betterment reference, the EIA standards, and Mr. Laughlin’s testimony.”); *In re Omeprazole Patent Litig.*, 483 F.3d 1364, 1381 (Fed. Cir. 2007) (Newman, J., dissenting) (“Hindsight is not an available analytical mechanism to show obviousness.”); *Para-Ordnance Mfg. v. SGS Imps. Int’l, Inc.*, 73 F.3d 1085, 1091 (Fed. Cir. 1995) (Archer, C.J., dissenting) (“The obviousness analysis in this case is a classic example of hindsight.”).

¹⁸ See, e.g., *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 36 (1966) (justifying relevancy of the secondary considerations on the grounds that they “may also serve ‘to guard against slipping into use of hindsight,’ and to resist the temptation to read into the prior art the teachings of the invention in issue” (citation omitted)); *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.”); *In re Rouffet*, 149 F.3d 1350, 1357–58 (Fed. Cir. 1998) (“[T]he suggestion to combine requirement stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.”).

¹⁹ Gregory N. Mandel, *Patently Non-Obvious: Empirical Demonstration That the Hindsight Bias Renders Patent Decisions Irrational*, 67 OHIO ST. L.J. 1391 (2006) [hereinafter Mandel, *Patently Non-Obvious*]; Gregory Mandel, *Patently Non-Obvious II: Experimental Study on the Hindsight Issue Before the Supreme Court in KSR v. Teleflex*, 9 YALE J.L. & TECH. 1 (2007).

²⁰ Mandel, *Patently Non-Obvious*, *supra* note 19, at 1408–09.

²¹ *Id.*

Professor Mandel proclaimed his results proof of an equally large hindsight bias in patent litigation.²²

If it exists, the risk of hindsight bias suggests the need for an easier-to-satisfy obviousness standard. If our obviousness decision makers are overly likely to find obviousness in any event because of hindsight bias, then we would need an easier-to-satisfy obviousness standard to even things out.

Yet before we give in to our fear, perhaps a closer look at hindsight is in order. By its express terms, section 103 of the Patent Act directs us to determine whether the advance at issue “would have been obvious at the time the invention was made.”²³ While this statutory language expressly states that obviousness is to be determined at the time the invention was made, it does not expressly forbid the use of facts arising after the date of invention in making that determination. Indeed, not even the Federal Circuit prohibits the use of hindsight altogether in making obviousness determinations. To the contrary, the Federal Circuit expressly requires the consideration of facts occurring after “the time the invention was made” in the context of so-called “secondary factors,” such as the commercial success of a patented invention, copying of the patented invention by others, or an invention’s widespread licensing.²⁴ These facts necessarily arise after the time of invention and thus represent hindsight, yet the Federal Circuit has emphasized that they may be some of “the most probative and cogent evidence available” on the obviousness issue.²⁵ Somewhat curiously, in some opinions, the Federal Circuit will insist that hindsight must not be used in one sentence, and then in the very next insist that after-arising facts, such as

²² *Id.* at 1393 (finding that “hindsight bias prejudices patent decisions far more than anticipated”).

²³ 35 U.S.C. § 103(a) (2006). For patent applications filed after March 16, 2013, the America Invents Act changes the critical date from “at the time the invention was made” to “before the effective filing date of the claimed invention.” Leahy–Smith America Invents Act, Pub. L. No. 112-29, § 3(c), 125 Stat. 284 (2011). This change does not affect the analysis in this Article, however. Courts will still use after-arising facts such as commercial success in evaluating obviousness, and they will still want to avoid inappropriately using the inventors’ own work against them.

²⁴ *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983).

²⁵ *Id.* at 1538.

commercial success, must be considered, without recognizing the apparent contradiction in the two statements.²⁶

Moreover, attaching the hindsight label to the patentee's own work seems literally inaccurate. Hindsight refers to the use of facts arising after the key date—here, the date of invention. Yet none of the patentee's work occurs after the date of invention; to the contrary, almost by definition, the patentee's work occurs before and leads up to the invention itself. How then does consideration of the patentee's invention represent the use of hindsight? The patentee's own invention does not arise after the date of invention, but simultaneously with it. Rather than serving a useful analytical role, the word "hindsight" seems more often to play the role of a rhetorical trump card, offered to justify a given outcome without the need for pesky reasoning.

Putting the hindsight label to one side, the key question is whether—and if so, when—a consideration of the patentee's own work can improve the accuracy of our obviousness determinations. From an efficiency perspective, the goal of the patent system is to provide an inventor with that set of exclusive rights that will enable the inventor to recover neither more nor less than a reasonable return on the research and development investment²⁷ in a desirable innovation that would not otherwise be recoverable through the ordinary workings of the market.²⁸ We do not want to

²⁶ For example, in his recent opinion in *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, Chief Judge Rader wrote: "Importantly, the great challenge of the obviousness judgment is proceeding without any hint of hindsight. Further, secondary considerations may often be the most probative and cogent evidence [of nonobviousness] in the record." 655 F.3d 1364, 1375 (Fed. Cir. 2011) (alteration in original) (citation omitted) (internal quotation marks omitted). He then proceeded to reverse a jury's verdict of obviousness based in part on the invention's widespread acceptance and commercial success in the relevant industry. *Id.* at 1379. The Supreme Court made the same mistake in *Graham v. John Deere Co. of Kansas City*, where it justified the relevance of secondary considerations on the ground that they "may also serve 'to guard against slipping into use of hindsight.'" 383 U.S. 1, 36 (1966) (quoting *Monroe Auto Equip. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (6th Cir. 1964)).

²⁷ This may include some portion of the investment in research paths that do not pan out. See Glynn S. Lunney, *Patent Law, the Federal Circuit and the Supreme Court: A Quiet Revolution*, 11 SUP. CT. ECON. REV. 1, 5 n.11 (2004) (acknowledging that proper patent protection must take costs of failed research into account).

²⁸ See *id.* at 5 (arguing that patent protection should be provided only if "necessary to

provide an inventor with an overbroad set of rights because providing a set of rights that would enable the recovery of more than a reasonable return would, among other things, impose unnecessary deadweight losses on society.²⁹ Nor do we want to provide the inventor with an overly narrow set of rights, because providing a set of rights that would provide less than a reasonable return may lead our inventor to decide not to make the necessary investment in the first place.³⁰ The task of matching a set of rights to the necessary economic return is made difficult by the fact that the set of rights necessary to bring forth innovation can vary considerably both across different industries and even for different innovations within a given industry.³¹ Some innovations may require very little extra incentive from the patent system; other innovations may require a great deal of extra incentive.

Given that the patent system provides a uniform term of twenty years³² and a uniform set of exclusive rights to “make[], use[], offer[] to sell, or sell[] any patented invention,”³³ patent law incorporates two principal levers or legal doctrines that we can use to match the financial rewards from a patent to an inventor’s otherwise unrecoverable investment. First, we can vary the scope of protection and the associated economic returns by narrowing or broadening claim scope.³⁴ Second, we can vary the expected

secure individual innovation’s *ex ante* expected profitability”).

²⁹ See, e.g., Tun-Jen Chiang, *The Levels of Abstraction Problem in Patent Law*, 105 NW. U. L. REV. 1097, 1138 (2011) (using example of AIDS treatment to illustrate the high social costs of overbroad patent rights).

³⁰ See, e.g., *id.* (noting that narrow patent protection at the time of the cotton gin’s invention meant that Eli Whitney received almost no reward).

³¹ Professors Mark Lemley and Dan Burk first identified the problem of using a uniform patent regime to promote innovation across industries. See Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1155 (2002) (arguing that new industries are not well-served by patent system because of fundamental shifts in technology); see also Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1577 (2003) (noting “deep structural differences in how industries innovate”). Professor Lunney first identified the problem of matching a uniform set of patent rights to provide varying levels of incentives for innovations within an industry. See Lunney, *supra* note 27, at 5 (arguing that a uniform patent system protects “those innovative products that would have been produced with no or less protection”).

³² 35 U.S.C. § 154(a)(2) (2006).

³³ *Id.* § 271(a).

³⁴ See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*,

economic returns by using the nonobviousness doctrine to create a higher or lower risk of invalidity for any given patented invention.³⁵ In either case, the goal is to ensure a match between the expected return on any given desirable innovation and the innovation's expected research and development costs.³⁶

This suggests, in turn, that for any given patented invention, there is some socially optimal risk of an obviousness result. This socially optimal risk is defined precisely as the risk of invalidity such that the expected revenue from the patent plus the expected revenue from the ordinary workings of the market exactly cover the expected research and development cost of any given desirable innovation.³⁷

For our purposes here, the key question then becomes whether any given evidence, hindsight or otherwise, will lead the judge or jury to make obviousness determinations closer to this social ideal. Under existing law, we permit the judge or jury to consider admitted hindsight evidence, such as commercial success, presumably because we believe that it improves the fit or accuracy of obviousness determinations, bringing actual outcomes closer to the social ideal.³⁸ That an invention became a commercial success after the date of invention may provide some evidence that an invention was hard and hence not obvious at the time it was made.³⁹ Commercial success is not, of course, infallible evidence of nonobviousness. As others have pointed out, the inferential chain from the fact of commercial success to the question of obviousness is long, complex, and easily broken.⁴⁰ Certainly, some nonobvious

90 COLUM. L. REV. 837, 839 (1990) (noting that the scope of a patent determines how many competing products are excluded and shows the patent's economic impact).

³⁵ See Lunney, *supra* note 27, at 72–73 (describing the economic effect of multiple obviousness verdicts on entities with many patents).

³⁶ See *supra* note 28 and accompanying text.

³⁷ See, e.g., Glynn S. Lunney, Jr., *E-Obviousness*, 7 MICH. TELECOMM. & TECH. L. REV. 363, 413–17 (2001) (describing how the creativity invested could quantify obviousness of invention).

³⁸ See *supra* notes 25–26 and accompanying text.

³⁹ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 35–36 (1966) (explaining relevance of secondary considerations).

⁴⁰ See Edmund W. Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293, 332 (identifying four inferential steps from commercial success to

innovations meet with commercial success, but it is equally true that some products meet with commercial success without any underlying innovation at all. Despite the potential to mislead, we nevertheless admit evidence of commercial success and leave to the fact-finder the choice of which inference to make.

Given that we expressly permit the use of some hindsight evidence in obviousness determinations, it is a little difficult to see why the fact-finder is forbidden to consider the patentee's own invention on that issue. If obviousness reflects a judgment as to whether an invention was substantial or trivial, difficult or easy, for a person having ordinary skill in the art, then whether the invention at issue was hard or easy for the patentee would seem relevant. Certainly, the inferential chain from the difficulty the invention presented for the patentee to the difficulty it would have presented to a person having ordinary skill in the art is far more direct and straightforward than the inferential chain for many of the secondary considerations.⁴¹ If it was easy for the patentee, that suggests that it would have been easy (and hence obvious) for a person having ordinary skill in the art. If it was hard for the patentee, then we may infer that it would have been hard for a person having ordinary skill in the art.⁴² Admittedly, the inferential chain is not foolproof. A fact-finder may mistakenly infer obviousness from the fact that it was easy for the patentee, when the ease was due to the patentee's exceptional skill in the art. Or a fact-finder may mistakenly infer nonobviousness from the fact that it was hard for the patentee, when the difficulty was due to the patentee's lack of skill in the art.⁴³

nonobviousness: (1) success is due to innovation; (2) success was perceived before the innovation's development; (3) efforts were made to improve the innovation after commercial success was perceived; and (4) that other men of skill in the art made similar efforts, but the patentee was the first to reduce his development to practice).

⁴¹ See *supra* note 40 and accompanying text.

⁴² See *Graham*, 383 U.S. at 35-36 (holding that evidence of competitors' difficulty in creating the patented product was viable evidence of nonobviousness)

⁴³ One of the co-authors has previously warned of this type of risk before. See Lunney, *supra* note 37, at 415-16 (explaining the need to consider inventor's skill and efficiency of investors in determining creative investment).

Yet, as with other evidence, the question is not whether admitting evidence of the difficulty of the invention for the patentee creates a risk of mistakes in a particular case here or there, but whether it introduces a systematic bias. We should thus ask whether the use of this evidence would tend to lead a fact-finder consistently astray—to find an invention obvious when it was really nonobvious, or to find it nonobvious when it was really obvious.⁴⁴ Unfortunately, on this question we do not have much in the way of answers.

Professor Mandel's work does not answer this question. He presents a foresight scenario to one group of respondents and a hindsight scenario to a second.⁴⁵ Finding a difference between the percentages of respondents who found the invention obvious in the two scenarios, he labels the difference "bias" without any further analysis.⁴⁶ There are several problems with this approach. Most fundamental is his implicit assumption that the foresight scenario represents the "correct" outcome. Assuming that the foresight scenario is correct, all he needs in order to pronounce the hindsight scenario "incorrect" is to find a difference between the two scenarios. But the relevant question is not whether the obviousness outcome is different in the hindsight scenario from the foresight scenario, but which obviousness outcome comes closer to the socially optimal risk of obviousness. Unless we know or can estimate the socially optimal risk of obviousness, we cannot meaningfully distinguish, based upon his work, whether the use of hindsight, as he defines it, leads to a risk of obviousness closer to or further from the socially optimal risk.⁴⁷

⁴⁴ Or, given patent law's presumption of validity, to find that obviousness was not proven.

⁴⁵ See *supra* notes 19–22 and accompanying text.

⁴⁶ See Mandel, *Patently Non-Obvious*, *supra* note 19, at 1408–11.

⁴⁷ For his scenarios, Professor Mandel used actual cases, one involving a patent on a baseball with marks on it to indicate finger positions for various pitches, and another with a patent for a fishing lure. We could, and will, look at how the courts resolved those cases as evidence of a socially optional obviousness standard. But that is not a complete answer, either. The results in those cases may themselves have been driven by either an insufficient or undue fear of hindsight bias. When we refer to a "correct" resolution of the obviousness issue, we refer to the decision that a judge would reach in order to maximize social utility given perfect information as to the costs and benefits to society of finding a given patented invention obvious or nonobvious. It is possible but unlikely that the actual

Disagreeing with Professor Mandel, we believe that allowing the decision maker to know the fact and nature of an invention can lead the decision maker to an obviousness outcome closer to the socially optimal outcome. Whether treated as an issue of law or fact, our decision maker on the nonobviousness issue necessarily has imperfect information. Moreover, we ask decision makers to judge whether the invention “would have been obvious . . . to a person having ordinary skill in the art,” when they are in fact not such persons themselves.⁴⁸ Given this background, it would seem that more information on the issue, rather than less, would necessarily improve our decision maker’s ability to get the obviousness issue right. Before we condemn the use of the patentee’s own activities as impermissible hindsight, we should consider whether such information plays a legitimate informational role—legitimate in the sense that it improves our decision makers’ ability to decide the obviousness issue consistently and correctly.

To try and answer that more difficult question, we have taken Professor Mandel’s approach and extended it.⁴⁹ As he did, we used a survey format and students as our subjects. We divided them into groups and presented each group with a different scenario. For the first two groups, we followed Professor Mandel’s format exactly. We presented the groups with foresight and hindsight scenarios, respectively, and asked if a given invention would have been obvious to a person having ordinary skill in the relevant art. As Professor Mandel did, we found a significant and large difference between the percentages of respondents who found the invention obvious between the two scenarios. In the foresight scenario, 48% of respondents found the invention obvious; in contrast, in the hindsight scenario, 70% of the respondents found the invention obvious. While not quite as large as the difference in obviousness Professor Mandel found, these initial results essentially duplicate his findings.

judicial decisions, made with necessarily imperfect information, achieved that result. For a discussion of this and related issues, see text accompanying notes 220–28, *infra*.

⁴⁸ 35 U.S.C. § 103(a) (2006).

⁴⁹ See *infra* Part IV.D.

Having replicated Professor Mandel's results, we then created two additional scenarios in an attempt to explore the informational role hindsight seems to play. In our third scenario, we presented the respondents with the same prior art and the same problem to be solved as in the first two scenarios. We then told the respondents that the problem had been solved, as in the hindsight scenario. However, rather than tell the respondents the solution directly, we offered the respondents four possible solutions and told them that only one of them was the real solution, while the other three were never developed or patented. After presenting the four possible solutions, of which only one was the real solution, we then asked if each solution would have been obvious. In this "imperfect hindsight" scenario, only 38% of the respondents found the correct solution obvious. This 38% is not statistically different from the 48% that found the invention obvious in the foresight scenario. Thus, mere knowledge that a solution was found, while a form of hindsight, does not appear sufficient to create the hindsight difference that Professor Mandel identified.

In our fourth and final scenario, we presented a fourth group of respondents with the same prior art and the same problem to be solved. We then asked the respondents to write a few lines to describe briefly how they thought the inventor might solve the problem. In other words, we tried to get the respondents to put themselves into the shoes of a person of ordinary skill in the art and think about the problem and how it might be solved. Rather than merely listen passively, we encouraged the respondents to engage actively with the problem. We then followed the pattern of the third scenario: present the respondents with four possible solutions, tell them that only one of them was the real solution while the other three were never developed or patented, and then ask if each was obvious. In this "imperfect hindsight with engagement" scenario, 58% of respondents found the correct solution obvious. Importantly, this 58% is statistically indistinguishable from the 70% who found the invention obvious in the hindsight scenario.

The results from this final scenario raise real questions regarding the very existence of Professor Mandel's supposed hindsight bias. Of all the scenarios, this final scenario, in our opinion, comes closest to the information set likely to be available at trial on obviousness issues, and given our attempt to encourage engagement, we believe it also comes closest to the socially optimal obviousness outcome. Given that the obviousness outcome in this final scenario is statistically indistinguishable from the outcome in the hindsight scenario, we find no basis for suggesting that the availability of hindsight information, as Professor Mandel defines it, biases obviousness outcomes. To the contrary, our results suggest that the availability of this sort of hindsight information helps our survey respondents make the obviousness determination more accurately by providing them with information that more closely parallels the information that would have been available to a person having ordinary skill in the art. This, after all, was the point of the fourth scenario: trying to get the respondents to engage with the problem and act as if they were persons of ordinary skill in the art. That the obviousness results are statistically indistinguishable between the hindsight and engagement scenarios suggests that perfect hindsight achieves the same effect as engagement. Under this interpretation, perfect hindsight does not create bias. Rather, it improves accuracy, bringing actual obviousness outcomes closer to the socially optimal outcome by enabling those without skill in an art to judge an invention's obviousness as if they had such skill.

While we find this to be a perfectly workable explanation for our results, we acknowledge that it is not the only possibility. Yet, at the very least, our results definitively reject Professor Mandel's conclusion that hindsight bias is invariably present in obviousness determinations. As a result, we need not embrace an easier-to-satisfy obviousness standard for fear that hindsight bias will lead, in any event, to over-enforcement of whatever obviousness standard we adopt.

This Article explores these issues in turn. We begin with a brief history of the nonobviousness doctrine and present the results from our analysis of the role obviousness has played in explaining

patentee losses in appellate patent litigation. As part of this, we examine the Supreme Court's decision in *KSR International Co. v. Teleflex, Inc.* and its impact on obviousness determinations. We then place obviousness into a policy framework and explain its role in a sensible patent system. Having done so, we then discuss the use of surveys and simulations to explore the role of hindsight in obviousness determinations. We begin with Professor Mandel's work, exploring his key conclusions and identifying some concerns we have with his approach. We then present our work in the same area, explain the reasons behind our additional scenarios, and explore what our results mean for the use of hindsight and the presence of hindsight bias in the patent system.

II. A BRIEF HISTORY OF OBVIOUSNESS

A. OBVIOUSNESS: ORIGINS AND DEVELOPMENT

Until the 1952 Patent Act, the patent statutes expressly required only novelty and utility for patentability. Nevertheless, in the middle of the nineteenth century, courts added a third requirement. Known as invention until its codification in 1952 and as nonobviousness since its codification, this third requirement asks that an invention represent not only some advance over the prior art but a substantial advance.

We usually trace the nonobviousness doctrine's genesis to the Supreme Court's decision in *Hotchkiss v. Greenwood*.⁵⁰ In that case, the plaintiffs sued for infringement of their patent on an improved door knob, where the improvement consisted of the use of potter's clay or porcelain for the knob rather than one of the theretofore traditional materials, such as wood or metal.⁵¹ Each of the elements of the invention—the clay knob, the shank and spindle, and the dovetail cavity used to connect the shank and spindle to the knob—was known in the prior art, but the patentees

⁵⁰ 52 U.S. 248 (1850).

⁵¹ *Id.* at 264.

were the first to combine those elements.⁵² In presenting the case to the jury, the plaintiffs requested the following jury instruction:

although the clay knob, in the form in which it was patented, may have been before known and used, and also the shank and spindle by which it is attached may have been before known and used, yet if such shank and spindle had never before been attached in this mode to a knob of potter's clay, and it required skill and invention to attach the same to a knob of this description, so that they would be firmly united, and make a strong and substantial article, and which, when thus made, would become an article much better and cheaper than the knobs made of metal or other materials, the patent was valid, and the plaintiffs would be entitled to recover.⁵³

The trial court rejected the plaintiffs' proposed instruction and instead instructed the jury that:

if knobs of the same form and for the same purposes as that claimed by the patentees, made of metal or other material, had been before known and used; and if the spindle and shank, in the form used by them, had been before known and used, and had been attached to the metallic knob by means of a cavity in the form of dovetail and infusion of melted metal, the same as the mode claimed by the patentees, in the attachment of the shank and spindle to their knob; and the knob of clay was simply the substitution of one material for another, the spindle and shank being the same as before in common use, and also the mode of connecting them by dovetail to the knob the same as before in common use, and no more ingenuity or skill required to construct the knob in this way than that possessed

⁵² *Id.*

⁵³ *Id.*

by an ordinary mechanic acquainted with the business, the patent was invalid, and the plaintiffs were not entitled to a verdict.⁵⁴

On these instructions, the jury returned a verdict for the defendant, and the plaintiffs appealed, arguing that the instruction inaccurately set forth the law. On appeal, the Supreme Court affirmed, holding that the substitution of one material, whether clay or porcelain, in the knob for the more traditional metal or wood, in the absence of something more, lacked the necessary ingenuity or invention to warrant a patent.⁵⁵ As the Court wrote:

[U]nless more ingenuity and skill in applying the old method of fastening the shank and the knob were required in the application of it to the clay or porcelain knob than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skilful mechanic, not that of the inventor.⁵⁶

Through the use of the word “inventor,” the Court tied this third requirement for patentability to the constitutional language in Article I, section 8, clause 8, authorizing Congress to grant exclusive rights “to Authors and Inventors.”⁵⁷ Following *Hotchkiss*, the courts for the next hundred years struggled to define whether an advance was sufficient in any case to constitute an invention and hence represented the constitutionally required work of an inventor.⁵⁸ In 1941, the standard reached its rhetorical

⁵⁴ *Id.* at 264–65.

⁵⁵ *Id.* at 266 (“The difference is formal, and destitute of ingenuity or invention.”).

⁵⁶ *Id.* at 267.

⁵⁷ U.S. CONST. art. I, § 8, cl. 8 (“The Congress shall have Power . . . [t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”).

⁵⁸ *See, e.g., Toledo Pressed Steel Co. v. Standard Parts, Inc.*, 307 U.S. 350, 356 (1939)

high point. In *Cuno Engineering Corp. v. Automatic Devices Corp.*,⁵⁹ the Court began by reiterating the invention requirement: "Under the [patent] statute, the device must not only be 'new and useful', it must also be an 'invention' or 'discovery'."⁶⁰ In an attempt to elaborate on the distinction between the work of the "skillful mechanic" and that of the "inventor," the Court then suggested an alternate verbal formulation: "the new device, however useful it may be, must reveal the flash of creative genius, not merely the skill of the calling."⁶¹

(denying a patent for improvements to an outdoor burner used for warning signals as merely combining two older devices); *Honolulu Oil Corp. v. Halliburton*, 306 U.S. 550, 562 (1939) (denying a patent for slight improvements to the method and apparatus for testing productivity of oil wells for want of invention); *Textile Mach. Works v. Louis Hirsch Textile Mach., Inc.*, 302 U.S. 490, 498 (1938) (holding that regardless of novelty or commercial success, a new addition to a knitting machine was foreseeable and therefore failed to meet the inventiveness requirement of patentability); *Altoona Publix Theatres v. Am. Tri-Ergon Corp.*, 294 U.S. 477, 486 (1935) (denying a patent for the addition of a fly-wheel to a phonogram as an improvement requiring mere skill and not invention, regardless of the improvement's utility); *Elec. Cable Joint Co. v. Brooklyn Edison Co.*, 292 U.S. 69, 79 (1934) (denying a patent for improvements to the protective covering on electric cable joints for want of inventiveness); *Saranac Auto. Mach. Corp. v. Wirebounds Patents Co.*, 282 U.S. 704, 713 (1931) (overturning a patent for a method for making box blanks that did not differ substantially from the prior art familiar in the field); *Powers-Kennedy Contracting Corp. v. Concrete Mixing & Conveying Co.*, 282 U.S. 175, 186 (1930) (holding certain improvements to the method and apparatus for concrete treatment and transportation as merely combining elements of prior art in the field and therefore not patentable); *Concrete Appliances Co. v. Gomery*, 282 U.S. 177, 185 (1925) (denying a patent for improvements resulting from the natural application of mechanical skill in the field of concrete); *Thompson v. Boisselier*, 114 U.S. 1, 13-14 (1885) (ruling that adding a new valve system to a water closet failed for lack of inventiveness to meet the standard for patentability); *Morris v. McMillin*, 112 U.S. 244, 248 (1884) (observing that improvements that are the natural and obvious advance in the natural progress of a product do not meet the standard required for a patent); *Phillips v. Detroit*, 111 U.S. 604, 608 (1884) (holding that minor changes to a well-known pavement construction method lacked the inventiveness required for a patent); *Slawson v. Grand St. R.R. Co.*, 107 U.S. 649, 654 (1883) (holding that the adding of an additional pane of glass to a fare-box lacked the requisite invention to satisfy the standard for a patentable improvement); *Reckendorfer v. Faber*, 92 U.S. 347, 356-57 (1875) (denying a patent for a slight improvement on the handle of a pencil that only slightly modified the form of the tool); *Hicks v. Kelsey*, 85 U.S. 670, 674 (1873) (denying a patent for the mere substitution of one material for another in the building of a wagon-reach axle).

⁵⁹ 314 U.S. 84 (1941).

⁶⁰ *Id.* at 90 (citation omitted).

⁶¹ *Id.* at 91.

In 1952, Congress enacted the present patent statute and, for the first time, codified this third substantive requirement.⁶² Rather than retain the “inventor” or “invention” language, however, Congress phrased the requirement in terms of whether the claimed invention “would have been obvious at the time [it] was made to a person having ordinary skill in the art to which said subject matter pertains.”⁶³ In the statutory language, Congress expressly stated that an invention could be obvious even though it was new⁶⁴ and also expressly directed courts to base the obviousness determination on “the differences between the subject matter sought to be patented and the prior art.”⁶⁵ In the final sentence, Congress seemed to step away from *Cuno Engineering’s* rhetorical flourish, stating: “Patentability shall not be negated by the manner in which the invention was made.”⁶⁶ Thus, even if the result of plodding and steady progress, rather than a flash of creative genius, an invention could be nonobvious.

In 1966, the Court gave the statutory nonobviousness requirement its first definitive interpretation in *Graham v. John Deere Co. of Kansas City*.⁶⁷ In interpreting the provision, the Court began by articulating the requirement’s purpose.⁶⁸ Patents are a form of monopoly, the Court explained, and so there is a need, as Thomas Jefferson once wrote, for “drawing a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not.”⁶⁹ In the Court’s view, “[t]he inherent problem was to develop some means of weeding out those inventions which would not be disclosed or devised but for the inducement of a patent.”⁷⁰ The *Hotchkiss* condition solved this problem by separating the trivial advances—the work of the

⁶² Act of July 14, 1952, Pub. L. No. 83-593, 66 Stat. 722, 798 (codified as amended at 35 U.S.C. § 103 (2006)).

⁶³ 35 U.S.C. § 103(a).

⁶⁴ See *id.* (“A patent may not be obtained *though the invention is not identically disclosed or described as set forth in section 102 of this title . . .*” (emphasis added)).

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ 383 U.S. 1 (1966).

⁶⁸ *Id.* at 14.

⁶⁹ *Id.* at 9 (internal quotation marks omitted).

⁷⁰ *Id.* at 11.

“skillful mechanic” that would be brought forth even without the inducement of a patent—from the substantial advances—the work of an “inventor” that would not occur but for a patent.⁷¹

The Court then rejected suggestions “that the first sentence of § 103 was intended to sweep away judicial precedents and to lower the level of patentability.”⁷² Instead of changing the level of patentability, the Court held that “the section was intended merely as a codification of judicial precedents embracing the *Hotchkiss* condition.”⁷³

Having set forth the purpose and background of the nonobviousness requirement, the Court then articulated a three-part inquiry for resolving the issue.⁷⁴ First, the fact-finder must determine the scope and content of the prior art.⁷⁵ Second, the fact-finder must ascertain the differences between the prior art and the patent claims at issue.⁷⁶ Third, the fact-finder must resolve the level of skill in the prior art.⁷⁷ Once the fact-finder resolves these preliminary factual inquiries, the judge must determine as a matter of law whether the differences represent an obvious or nonobvious advance over the prior art.⁷⁸ In resolving that issue, a court may also consider “[s]uch secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc.”⁷⁹

Three years later, in *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*,⁸⁰ the Court returned to the nonobviousness requirement. The patent at issue, as in the *Hotchkiss* case, took existing elements from the prior art, in this case the prior art of paving, including a radiant-heat burner and the equipment for spreading and shaping asphalt, and combined them on one

⁷¹ *Id.* at 11–12.

⁷² *Id.* at 16.

⁷³ *Id.* at 17.

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ *Id.* at 17–18.

⁸⁰ 396 U.S. 57 (1969).

chassis.⁸¹ The Court held that the patent claims were invalid for obviousness.⁸² In doing so, the Court reasoned that “[t]he combination of putting the burner together with the other elements in one machine, though perhaps a matter of great convenience, did not produce a ‘new or different function,’” nor any “synergistic result.”⁸³ It was therefore obvious. And given that it merely combined existing elements from the prior art, the invention’s commercial success or the fact that it filled a long-felt need could not establish invention or nonobviousness.⁸⁴ As the Court wrote: “It is, however, fervently argued that the combination filled a long felt want and has enjoyed commercial success. But those matters ‘without invention will not make patentability.’”⁸⁵ In short, the secondary factors were secondary. If a comparison of the claims to the prior art revealed only such slight differences that obviousness was plain, then the secondary factors could not establish invention that was otherwise lacking.

In 1976, the Court reiterated these points in *Sakraida v. Ag Pro, Inc.*⁸⁶ In *Sakraida*, the patent claimed, in essence, a barn-washing mechanism consisting of a tank filled with water, an appropriately sloped floor, and drains.⁸⁷ In the patent, the tank would suddenly release its water in order to wash animal waste down the drain.⁸⁸ As in *Hotchkiss*, each of the elements of the patented invention was found in the prior art, but the patentee claimed that he was the first to combine them to create an effective barn-washing device.⁸⁹ The Court held that the patent claims were obvious.⁹⁰ Although the Court acknowledged that the patentee’s combination of the elements produced “a more striking result than in previous combinations,” the Court nonetheless

⁸¹ *Id.* at 58.

⁸² *Id.* at 62–63.

⁸³ *Id.* at 60–61 (citation omitted).

⁸⁴ *Id.*

⁸⁵ *Id.* at 61 (quoting *A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 153 (1950)).

⁸⁶ 425 U.S. 273 (1976).

⁸⁷ *Id.* at 275–77.

⁸⁸ *Id.* at 277.

⁸⁹ *Id.*

⁹⁰ *Id.* at 282–83.

insisted that the combination failed to produce a “synergistic” result.⁹¹ Rather, “this patent simply arranges old elements with each performing the same function it had been known to perform.”⁹² In the end, “[t]hough doubtless a matter of great convenience, producing a desired result in a cheaper and faster way, and enjoying commercial success, Dairy Establishment ‘did not produce a “new or different function” . . . within the test of validity of combination patents.’ These desirable benefits ‘without invention will not make patentability.’ ”⁹³

While this trilogy established clear guidelines and set a high bar for satisfying the nonobviousness requirement, their influence proved short-lived. In 1982, Congress created the Federal Circuit and gave it largely exclusive appellate jurisdiction over patent appeals.⁹⁴ Before the creation of the Federal Circuit, patent litigation followed the usual course through the federal courts. A patentee sued in any federal district court with venue and personal jurisdiction over the alleged infringer. Appeals from patent infringement litigation went to the relevant regional circuit court of appeals. With the advent of the Federal Circuit, however, essentially all appeals from patent litigation went to the Federal Circuit rather than regional courts of appeals.

While the regional circuits largely shared the Court’s perception of patents as potentially undesirable monopolies and therefore vigorously enforced the nonobviousness requirement,⁹⁵ the Federal Circuit did not. Rather, it viewed patents as simply a desirable form of property.⁹⁶ Almost immediately, it set about rewriting the nonobviousness requirement to make it easier to satisfy.

⁹¹ *Id.*

⁹² *Id.* at 282.

⁹³ *Id.* at 282–83 (alteration in original) (citation omitted) (quoting *A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 153 (1950)).

⁹⁴ See Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25, 37 (codified as amended at 28 U.S.C. § 1275 (2006)).

⁹⁵ See Lunney, *supra* note 37, at 380.

⁹⁶ See, e.g., *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1246–47 (Fed. Cir. 1989) (“Infringement having been established, it is contrary to the laws of property, of which the patent law partakes, to deny the patentee’s right to exclude others from use of his property.”); *In re Kaplan*, 789 F.2d 1574, 1578 n.3 (Fed. Cir. 1986) (distinguishing the meaning of monopoly in patent and antitrust cases); *Jamesbury Corp. v. Litton Indust.*

With respect to patents claiming a combination of prior art elements, the Federal Circuit simply rejected the Court's reasoning in *Anderson's-Black Rock* and *Sakraida*. There is no meaningful category of "combination" patents, the Federal Circuit insisted, and no "synergism" or "synergistic result" requirement in the statute.⁹⁷ As Chief Judge Markey explained:

A requirement for "synergism" or a "synergistic effect" is nowhere found in the statute The reference to a "combination patent" is equally without support in the statute. . . . Reference to "combination" patents is, moreover, meaningless. Virtually *all* patents are "combination patents," if by that label one intends to describe patents having claims to inventions formed of a combination of elements.⁹⁸

Yet even if one accepts Chief Judge Markey's argument, that still leaves the question as to when a combination of prior art elements is nonobvious. In 1984, the Federal Circuit answered that question in *ACS Hospital Systems, Inc. v. Montefiore Hospital*.⁹⁹ The patent at issue in *ACS Hospital Systems* claimed a rental television system.¹⁰⁰ Finding that the claimed invention consisted of nothing more than a combination of three well-known prior art elements operating in an entirely traditional manner, the trial court held that the invention was obvious.¹⁰¹ On appeal, the Federal Circuit rejected the trial court's analysis as "no more than

Prods., Inc., 756 F.2d 1556, 1558–59 (Fed. Cir. 1985) (disapproving of the term monopoly in patent cases as pejorative); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) ("The essence of all property is the right to exclude . . ."); *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1367 (Fed. Cir. 1984) (distinguishing illegal antitrust monopolies from patent monopolies); *Union Carbide Corp. v. Am. Can Co.*, 724 F.2d 1567, 1574 n.4 (Fed. Cir. 1984) (criticizing use of the term monopoly); *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) ("[A] patent is a form of property right, and the right to exclude recognized in a patent is but the essence of the concept of property."); *Carl Schenck, A.G. v. Nortron Corp.*, 713 F.2d 782, 786 n.3 (Fed. Cir. 1983) ("A patent, under the statute, is property.").

⁹⁷ *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1540 (Fed. Cir. 1983).

⁹⁸ *Id.*

⁹⁹ 732 F.2d 1572 (Fed. Cir. 1984).

¹⁰⁰ *Id.* at 1574.

¹⁰¹ *Id.* at 1575.

hindsight reconstruction of the claimed invention,"¹⁰² and held that "[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so."¹⁰³ In the years following *ACS Hospital Systems*, the Federal Circuit consistently required some teaching, suggestion, or motivation to be present in the prior art before elements from different prior art references could be combined.¹⁰⁴

In addition to rejecting the Court's approach to combining prior art references, the Federal Circuit was also dissatisfied with the Court's approach to the so-called "secondary considerations." Although the Court in *Graham v. John Deere Co. of Kansas City* had acknowledged that "[s]uch secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc. . . . may have relevancy" as "indicia of obviousness or nonobviousness,"¹⁰⁵ the Court consistently limited the role of these secondary considerations. As *Anderson's-Black Rock* and *Sakraida* reflect, the secondary considerations were insufficient to "tip the scales of patentability" where the invention as whole otherwise appeared obvious.¹⁰⁶

Again, however, the Federal Circuit disagreed with the Court's approach. As Chief Judge Markey explained, evidence of secondary considerations is often "the most probative and cogent evidence in the record" and that it "must always when present be considered."¹⁰⁷ In keeping with this more central role, the Federal

¹⁰² *Id.* at 1577.

¹⁰³ *Id.*

¹⁰⁴ See, e.g., Thomas L. Irving et al., *A Year in Review: The Federal Circuit's Patent Decisions of 1993*, 43 AM. U. L. REV. 1259, 1314-15 (1974) (describing the Federal Circuit's test for obviousness).

¹⁰⁵ 383 U.S. 1, 17-18 (1966).

¹⁰⁶ *Id.* at 36; see *supra* notes 80-93 and accompanying text (discussing *Anderson's-Black Rock* and *Sakraida*).

¹⁰⁷ *Stratoflex Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983); see also *Simmons Fastener Corp. v. Ill. Tool Works, Inc.*, 739 F.2d 1573, 1574-75 (Fed. Cir. 1984) (reversing finding of obviousness for failure to consider evidence of secondary considerations); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1555 (Fed. Cir.

Circuit renamed this type of evidence. No longer would it be known as “secondary considerations”; under the Federal Circuit, it became “objective evidence of nonobviousness.”¹⁰⁸

Like the Federal Circuit’s substitution of its own suggestion test for the Court’s synergy approach, the Federal Circuit’s increased reliance on secondary considerations tends to reduce directly the likelihood that a litigated patent will be found obvious. As Professor Edmund Kitch warned more than forty years ago, an increased reliance on secondary considerations, such as commercial success, to resolve questions of patent validity almost necessarily leads to a “rule that all patents that are litigated should be held valid.”¹⁰⁹ As Professor Kitch explained, “it is unlikely that patents that are not commercially successful will be brought to litigation.”¹¹⁰ As a result, to the extent that commercial success becomes an important factor in determining a patent’s validity, the very fact that the patent is worth litigating should establish its validity.

Despite the fact that the Federal Circuit overlooked, rewrote, and in some cases expressly rejected the Court’s interpretation of the nonobviousness requirement, the Court for twenty-five years refused all invitations to reexamine the Federal Circuit’s doctrinal developments.¹¹¹ As a result, the Federal Circuit’s weakening of the nonobviousness requirement became, without the benefit of either congressional or Supreme Court action, de facto the new law of the patent land.

1983) (same).

¹⁰⁸ *E.g.*, *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 725 (Fed. Cir. 1990).

¹⁰⁹ Kitch, *supra* note 40, at 333.

¹¹⁰ *Id.*

¹¹¹ Between the Federal Circuit’s creation in 1982 and the Court’s decision in *KSR International Co. v. Teleflex, Inc.* in 2007, the only Federal Circuit obviousness decision the Court reviewed was *Dennison Manufacturing Co. v. Panduit Corp.*, 475 U.S. 809 (1986). In that case, after a bench trial, the district court held that the patent claims at issue were obvious. The Federal Circuit reversed the district court without explaining which parts of the obviousness determination were factual and hence subject to review only for clear error and which parts of the determination were legal. After granting certiorari, the Court, without the benefit of briefing or oral argument, summarily reversed the Federal Circuit. In a per curiam opinion, the Court directed the Federal Circuit to explain whether the clear error rule insulated all or part of the trial court’s obviousness decision. *Id.* at 811.

B. THE COURT STEPS IN: *KSR V. TELEFLEX*

Having rewritten the nonobviousness doctrine to its satisfaction, the Federal Circuit applied it, in an entirely routine fashion, in *Teleflex, Inc. v. KSR International Co.*¹¹² The patent claims at issue in *KSR* concerned an adjustable pedal assembly for use with automobiles with electronically controlled engines. The patent claimed a particular combination of three elements, already well-known in the prior art, including a support bracket, an adjustable pedal assembly, and an electronic pedal position sensor. Rather than attach the sensor to the pedal, as in the prior art, where the pedal's movement could lead to chafing of the wires connecting the sensor to the engine, the patent claim at issue placed the sensor on the nonmoving support bracket.¹¹³

On summary judgment, the trial court held that the patent claim at issue was obvious. In the trial court's view, the patent claim represented a simple combination of prior art elements. The trial court acknowledged that it was bound by the Federal Circuit's teaching, suggestion, or motivation test but believed that the prior art contained sufficient suggestion to combine the prior art elements in the manner set forth in Teleflex's patent claim.¹¹⁴ The trial court specifically referred to a prior art patent, the Smith patent, that stated that "the pedal assemblies must not precipitate any motion in the connecting wires themselves."¹¹⁵ From this, the trial court inferred a sufficient motivation to move the sensor from the moving pedal assembly, as in the prior art, to the nonmoving support bracket, as in the patent claim at issue, in order to prevent motion in the connecting wires. Although the patentee touted his invention's commercial success, the trial court found the "evidence of commercial success insufficient to overcome Defendant's clear and convincing evidence of obviousness."¹¹⁶

¹¹² 119 F. App'x 282 (Fed. Cir. 2005), *rev'd*, 550 U.S. 398 (2007).

¹¹³ *KSR*, 550 U.S. at 407-10.

¹¹⁴ *Teleflex Inc. v. KSR Int'l Co.*, 298 F. Supp. 2d 581, 594 (E.D. Mich. 2003), *rev'd*, 119 F. App'x 282, *rev'd*, 550 U.S. 378.

¹¹⁵ *Id.*

¹¹⁶ *Id.* at 596.

On appeal, a panel of the Federal Circuit reversed.¹¹⁷ Although the panel acknowledged that each of the elements of the patent claim were readily found in the prior art, the panel insisted that the prior art failed to provide the necessary motivation to combine those elements in the particular manner claimed.¹¹⁸ In its opinion, the panel began by laying out broadly the sort of teaching, suggestion, or motivation that would suffice to combine elements from separate prior art references, assuring us:

The reason, suggestion, or motivation to combine prior art references may be found explicitly or implicitly: 1) in the prior art references themselves; 2) in the knowledge of those of ordinary skill in the art that certain references, or disclosures in those references, are of special interest or importance in the field; or 3) from the nature of the problem to be solved, “leading inventors to look to references relating to possible solutions to that problem.”¹¹⁹

Yet, as was typical for the Federal Circuit, the panel’s application of the teaching, suggestion, or motivation test proved far narrower and less flexible than this initial statement might suggest. In the panel’s view, the prior art’s suggestion to minimize movement in order to reduce wire chafing was directed at reducing wire chafing, not at reducing the size and complexity of pedal assemblies.¹²⁰ Because it was aimed at a different problem, it could not provide the necessary motivation to move the sensor from pedal to bracket.¹²¹ The panel dismissed another key prior art reference, the Asano patent, that contained each element of the claim at issue—except the sensor—for a similar reason. It too was directed

¹¹⁷ *KSR*, 119 F. App’x at 282.

¹¹⁸ *Id.* at 288–89.

¹¹⁹ *Id.* at 285 (internal alterations omitted) (quoting *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 665 (Fed. Cir. 2000)).

¹²⁰ *Id.* at 288.

¹²¹ *Id.*

at solving a different problem, so it also could not provide the necessary motivation.¹²²

There was nothing particularly unusual or surprising in the panel's narrow and rigid reading of the teaching, suggestion, or motivation test. To the contrary, it was entirely typical of the manner in which the Federal Circuit applied the test. And the panel certified the decision as suitable for resolution without a published opinion.

Yet on June 26, 2006, the Supreme Court granted certiorari,¹²³ and on April 30, 2007, it reversed.¹²⁴ In its opinion, the Court began with a gentle reminder to the Federal Circuit that the Court's earlier decisions in *Anderson's-Black Rock* and *Sakraida* remained valid and binding law on the circuit court.¹²⁵ Quoting from *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, the Court emphasized that

[n]either the enactment of § 103 nor the analysis in *Graham* disturbed this Court's earlier instructions concerning the need for caution in granting a patent based on the combination of elements found in the prior art. For over a half century, the Court has held that a "patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men."¹²⁶

The Court then went on to note the "synergism" standard set forth in *Anderson's-Black Rock*,¹²⁷ and to derive from its earlier cases the following principle: "The combination of familiar elements

¹²² *Id.*

¹²³ *KSR Int'l Co. v. Teleflex Inc.*, 548 U.S. 902, 902 (2006).

¹²⁴ *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007).

¹²⁵ *Id.* at 407.

¹²⁶ *Id.* at 415–16 (quoting *Great Atl. & Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152–53 (1950)).

¹²⁷ *Id.* at 417.

according to known methods is likely to be obvious when it does no more than yield predictable results.”¹²⁸

Nevertheless, the Court acknowledged that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”¹²⁹ The Court further recognized the truth of Chief Judge Markey’s observation in *Stratoflex*,¹³⁰ and admitted that “inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.”¹³¹

Moving to the case before it, the Court recognized that the presence or absence of a teaching, suggestion, or motivation in the prior art may prove relevant in trying to determine whether any particular combination of prior art elements is obvious.¹³² But it rejected any rigid rule that such a teaching, suggestion, or motivation must be present before obviousness can be found.¹³³ The Court further rejected the Federal Circuit’s overly narrow and unduly circumscribed sense for the sort of teaching, suggestion, or motivation sufficient to establish obviousness.¹³⁴ It is not necessary for the prior art to be directed at solving the same problem as the patented claim for it to provide the necessary motivation to combine, the Court held, for two reasons. First, patent claims are not typically limited to the problem they intend to solve.¹³⁵ Teleflex’s patent, for example, claimed a particular arrangement of pedal, support bracket, and sensor, whether undertaken to reduce the size and complexity of the pedal assembly, to reduce wire chafing, or for some other reason. Second, whatever the original or primary purpose of a given piece of prior art, persons having ordinary skill in the art will often

¹²⁸ *Id.* at 416.

¹²⁹ *Id.* at 418.

¹³⁰ See *supra* note 97 and accompanying text.

¹³¹ *KSR*, 550 U.S. at 418–19.

¹³² *Id.*

¹³³ *Id.* at 419.

¹³⁴ *Id.* at 420.

¹³⁵ *Id.*

recognize that the prior art solves other problems as well.¹³⁶ For these reasons, the Court held that “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”¹³⁷

Finally, the Court rejected the longstanding Federal Circuit rule that “a patent claim cannot be proved obvious merely by showing that the combination of elements was ‘obvious to try.’”¹³⁸ To the contrary, “obvious to try” can establish obviousness “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions.”¹³⁹

Applying these principles, the Court held the patent claim at issue obvious—“well within the grasp of a person of ordinary skill in the relevant art.”¹⁴⁰ Warning the Federal Circuit that not all patents are good patents, the Court cautioned that granting patents for such ordinary innovation—innovation that would likely occur even without the inducement of a patent—“might stifle, rather than promote, the progress of useful arts.”¹⁴¹

C. *KSR*'S IMPACT

Despite its occasional pretensions to being the “Supreme Court of Patents,”¹⁴² the Federal Circuit is well aware that it is not. Even before the Court issued its decision in *KSR*, its decision to grant certiorari in the case influenced the Federal Circuit’s approach to the obviousness issue. Only a few months after the Court granted certiorari, the Federal Circuit, whether reading the tea leaves or attempting to persuade the Court to leave well enough alone, emphasized that the teaching, suggestion, or

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *Id.* at 421 (citation omitted).

¹³⁹ *Id.*

¹⁴⁰ *Id.* at 427.

¹⁴¹ *Id.*

¹⁴² See Mark D. Janis, *Patent Law in the Age of the Invisible Supreme Court*, 2001 U. ILL. L. REV. 387, 387 (“[T]he Federal Circuit . . . has become the de facto supreme court of patents.”).

motivation test was not a rigid doctrine. Thus, in October 2006, Chief Judge Michel explained on behalf of the Federal Circuit that:

In contrast to the characterization of some commentators, the suggestion test is not a rigid categorical rule. The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself.¹⁴³

Later in the same opinion, Chief Judge Michel insisted that “[o]ur suggestion test is in actuality quite flexible and not only permits, but *requires*, consideration of common knowledge and common sense.”¹⁴⁴

After the Court issued its *KSR* opinion, numerous Federal Circuit opinions cited the case and relied on its reasoning. For example, only a few months after *KSR* was decided, the Federal Circuit held invalid for obviousness a patent on an electronic learning device intended to teach children to read phonetically.¹⁴⁵ In doing so, the court relied on *KSR*'s reasoning that the common sense alone of a person having ordinary skill in the art could provide the necessary motivation to combine prior art elements.¹⁴⁶ A few years after that, in *Bayer Schering Pharma AG v. Barr Laboratories, Inc.*, the Federal Circuit affirmed a district court's conclusion that a patent on the formulation of a daily oral contraceptive was obvious.¹⁴⁷ In doing so, the court relied on the *KSR* Court's reasoning that “obvious to try” could establish obviousness, at least where the prior art provides a reasonable

¹⁴³ *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006).

¹⁴⁴ *Id.* at 1367; *see also* *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . .”).

¹⁴⁵ *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007).

¹⁴⁶ *Id.* at 1161.

¹⁴⁷ 575 F.3d 1341, 1350 (Fed. Cir. 2009).

expectation of success among “a finite number of identified, predictable solutions.”¹⁴⁸ And two years after that, in *Tokai Corp. v. Easton Enterprises, Inc.*, the Federal Circuit affirmed a district court’s holding that three patents on automatic safety mechanisms for utility lighters were invalid for obviousness.¹⁴⁹ Again, the court relied extensively on *KSR*’s reasoning, holding that where the art lends itself to “identified, predictable solutions,” each of the elements exists in the prior art, and an explicit need in the prior art provides the necessary motivation to combine the elements, the resulting invention is obvious.¹⁵⁰

In addition to this anecdotal evidence of *KSR*’s impact, an empirical examination of appellate patent decisions establishes the difference that *KSR* has made. To examine this issue, we conducted an empirical investigation of all appellate decisions arising from patent infringement litigation in six pre-Federal Circuit time periods, beginning with the period 1944–1946,¹⁵¹ and since January 1, 1984. As has become the practice, we conducted a population, rather than a sample, study and included all intermediate appellate utility patent infringement decisions that were available in the “Federal Circuit-US Court of Appeals” LEXIS database for the post-Federal Circuit periods or in the “Federal Court Cases, Combined” LEXIS database for the pre-Federal Circuit periods. After identifying cases in the relevant population, we separated decisions into three categories: (1) “success”; (2) “failure”; or (3) “non-final” resolutions where a patent holder neither succeeded nor failed. “Success” was defined as a decision where a patent holder obtained preliminary or permanent injunctive relief or damages, on any patent claim at issue in the litigation. “Failure” was defined as a decision where the appellate court either denied preliminary injunctive relief or finally resolved all claims of patent infringement and no claim of patent

¹⁴⁸ *Id.*

¹⁴⁹ 632 F.3d 1358, 1372 (Fed. Cir. 2011).

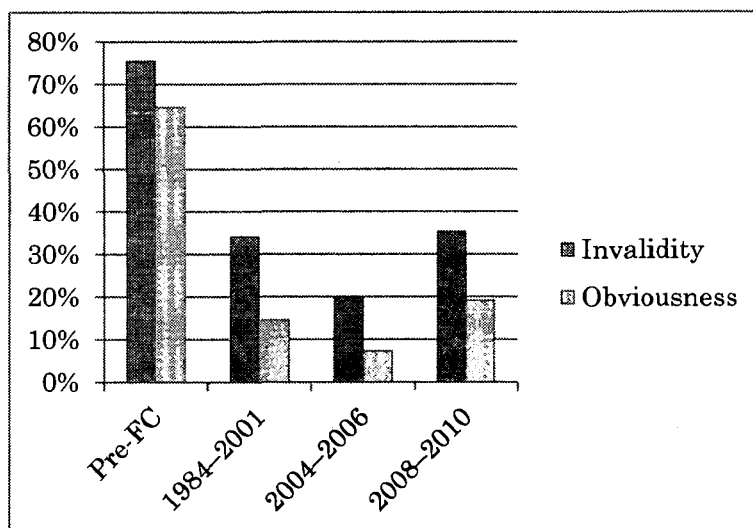
¹⁵⁰ *Id.* at 1371–72 (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)).

¹⁵¹ The six time periods were: (1) 1944–1946; (2) 1955–1957; (3) 1964–1965; (4) 1966–1967; (5) 1975–1976; and (6) 1981–1982. For the study, I selected the six periods to give a representative sample for each decade, with an additional period bracketing the Court’s decision in *Graham v. John Deere & Co. of Kansas City*.

infringement in the case succeeded. The final category consisted of “non-final” decisions, where a patent holder did not succeed in obtaining the relief sought, but the claims of infringement were not finally rejected by the court. Rather, the appellate court reversed or vacated the ruling of the district court on one aspect or another and remanded the case for further proceedings.

To account for the possibility of selection bias in the population, we then focused exclusively on the “failure” category. For this category, we broke down the reasons why the patent claims failed into the following categories: (1) the patent claims were held invalid or otherwise unenforceable; (2) the patent claims were held obvious; (3) the patent claims were held not infringed; or (4) the patentee lost for some other reason. We then tracked the percentage of cases in the failure category for which invalidity and obviousness accounted. Figure 1 presents the results for four time periods: (1) the pre-Federal Circuit era; (2) the pre-*KSR* Federal Circuit era from 1984 through 2001; (3) the immediate pre-*KSR* era from 2004 through 2006; and (4) the post-*KSR* era from 2008 through 2010.

Figure 1. Reasons for Losing: Percentage of Losses Due to Invalidity or Unenforceability of Patent and Due to Obviousness



As Figure 1 illustrates, obviousness was once far and away the most important doctrine in patent law. During the pre-Federal Circuit era studied, when a patentee lost on claims of patent infringement, nearly 65% of the time it was due to a finding that the patent claims at issue were obvious. Given that patentees lose between 60% and 70% of the time on final resolutions at the appellate level,¹⁵² if we multiply the percentage of cases in which patentees lost by the percentage where they lost due to obviousness, we find that nearly half of all cases that were finally resolved at the appellate level during the pre-Federal Circuit era were resolved through a finding or conclusion that the patent claim at issue was obvious.

In contrast, with the advent of the Federal Circuit in 1982, the nonobviousness requirement became much easier to satisfy. From 1984 through 2001, when a patentee lost in the Federal Circuit, obviousness was the reason in less than 15% of those losses. From 2004 through 2006, the period immediately preceding the grant of certiorari in *KSR*, when a patentee lost in the Federal Circuit, obviousness was the reason in only 7.5% of the losses, thus playing a decisive role in less than 5% of the appellate cases in which claims of patent infringement were resolved. Where obviousness was once the single, most common reason a patentee lost, under the Federal Circuit, noninfringement has become the dominant explanation for patentee losses.¹⁵³

These results reveal that the Federal Circuit substantially weakened the nonobviousness requirement. They conflict directly with the results that Professors Petherbridge and Wagner and Professor Cotropia reach in a pair of studies empirically examining the Federal Circuit's nonobviousness jurisprudence.¹⁵⁴ Both of these studies examine, *inter alia*, the rate at which the Federal Circuit reaches a nonobviousness result where the issue of

¹⁵² See Lunney, *supra* note 27, at 12.

¹⁵³ *Id.* at 15.

¹⁵⁴ Christopher A. Cotropia, *Nonobviousness and the Federal Circuit: An Empirical Analysis of Recent Case Law*, 82 NOTRE DAME L. REV. 911 (2007); Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051 (2007).

obviousness is litigated.¹⁵⁵ Both find that the Federal Circuit reaches a nonobvious result in less than 43% of the cases where the issue is litigated.¹⁵⁶ Professors Petherbridge and Wagner tout their finding as evidence that the Federal Circuit has not weakened the nonobviousness requirement.¹⁵⁷ Professor Cotropia makes a similar claim but acknowledges that his results may be the result of selection bias and therefore admits that “any inference into the strength of the nonobviousness requirement from this data is weak.”¹⁵⁸

¹⁵⁵ Both papers also examine reversal rates on obviousness determinations. They predict that a somewhat higher-than-normal reversal rate will accompany any change in the obviousness standard. Cotropia, *supra* note 154, at 931; Petherbridge & Wagner, *supra* note 154, at 2076. Finding no such change in reversal rates over the periods studied, they both conclude that the Federal Circuit has not weakened or otherwise significantly changed the obviousness standard. Cotropia, *supra* note 154, at 937; Petherbridge & Wagner, *supra* note 154, at 2080. This aspect of their work suffers from three defects. First, an appellate court can change a legal standard without reversals. In *Stratoflex, Inc.*, for example, Chief Judge Markey expressly rejected the Court’s reasoning in *Anderson’s-Black Rock* and *Sakraida*. See *supra* notes 97–98 and accompanying text. He significantly weakened the nonobviousness requirement, yet to avoid the possibility of Court review, he specifically affirmed the district court’s finding of obviousness. Second, even if a high reversal rate accompanies a change in legal standards, both papers focus on the wrong time periods. Most of the changes in the obviousness standard occurred at the outset of the Federal Circuit in 1983 and 1984. As Professor Lunney’s work has shown, invalidity was the reason why a patent claim failed in approximately 80% of the cases in 1981–1982, yet by 1986–1987, it was the reason in less than 40% of the cases. See Lunney, *supra* note 27, at 14–15. So if there is a high reversal rate to be found, presumably we should look in the 1983–1985 time period. Unfortunately, Professors Petherbridge and Wagner’s data does not begin until January 1, 1990, and Professor Cotropia’s does not begin until January 1, 2002. Petherbridge & Wagner, *supra* note 154, at 2071; Cotropia, *supra* note 154, at 924. Third, reversal rates suffer from the same selection effects that drive success rates. Just as parties will settle rather than litigate a case unless both sides have some equilibrium chance of success, parties will settle rather than litigate an appeal unless there is again some given chance of success. Both studies seem to assume that a higher reversal rate will arise following a change in a legal standard because it will take time for parties and their lawyers to adjust to the new legal standard. That is possible, but neither Petherbridge and Wagner nor Cotropia explain how long that adjustment period will be. It seems extremely unlikely that the reversal rate will remain high for fifteen or even four years following a change in a legal standard, as these authors seem to assume.

¹⁵⁶ Cotropia, *supra* note 154, at 934; Petherbridge & Wagner, *supra* note 154, at 2087.

¹⁵⁷ Petherbridge & Wagner, *supra* note 154, at 2088.

¹⁵⁸ Cotropia, *supra* note 154, at 914.

We believe that Professor Cotropia understates the problem. Selection bias does not render the “inference . . . weak.”¹⁵⁹ It renders any inference as to the strength of the nonobviousness requirement drawn directly from the success rate for obviousness claims at the Federal Circuit at best irrelevant and at worst—and more likely—affirmatively misleading. Where obviousness is the principal defense at issue, overall appellate success rates on that issue tell us nothing about the strength or weakness of the obviousness requirement. Rather, the average success rate merely reflects the underlying considerations that lead parties to select a case for resolution through litigation rather than settlement.

When we use appellate resolutions as our data set, we are observing only those patent disputes that parties have chosen to litigate rather than settle. Parties chose to litigate rather than settle presumably because they have decided that, given their chance of success, they have more to gain, or less to lose, by litigating rather than by settling. For example, if both parties know that one of the parties is virtually certain to lose, then often it will make sense to settle accordingly and avoid the costs of litigation. If the issues are close, or if litigation offers something that cannot be obtained through settlement, then we should expect that litigation is more likely. As a practical matter, these selection effects tend to lead to an equilibrium success rate in decided cases. In an earlier study, Professor Lunney showed that success rates for patentees has remained relatively unchanged, at approximately 30%, for more than sixty years beginning in the 1940s.¹⁶⁰ This appears to be the point at which, given the potentially asymmetric stakes for the parties,¹⁶¹ the parties’ relative preference for uncertainty, and the costs and benefits of litigating, parties chose to litigate rather than settle.

When we examine success rates on obviousness or some other central issue, we are not in fact examining whether there have been changes in the obviousness standard but whether there have been

¹⁵⁹ *Id.*

¹⁶⁰ Lunney, *supra* note 27, at 10.

¹⁶¹ *See id.* at 12–13 (noting that “patent holders and alleged infringers calculate the value of an injunction from radically different perspectives”).

changes in the strategic considerations that would lead a party to litigate rather than settle. Assume, for example, that we have three cases (or types of cases) in the litigation pipeline and that a 35% success rate represents the equilibrium at which parties will choose to litigate rather than settle. Under the present nonobviousness standard, the patent at issue in the first case has a 50–50 chance of being held not proven obvious; in the second case, the patent has a 35–65 chance on that issue; and in the third case, the patent has a 20–80 chance on that issue. If a 35% success rate represents the appropriate equilibrium where—given asymmetric information, disproportionate stakes, and relative preferences for risk and uncertainty—litigating rather than settling will occur, then, under the existing standard, the first case and others like it will settle, as will the third case and others like it. Only the second case and others with a similar probability of success will be litigated. As a result, if we examine appellate decisions as Petherbridge and Wagner and Cotropia do, when we add up all the nonobviousness results, we find that the Federal Circuit upholds patents as nonobvious in 35% of the cases.¹⁶² If, as these cases are working their way through the litigation pipeline, the Federal Circuit weakened the nonobviousness standard to increase the chance of a nonobviousness result by 15% for each of these three cases, then Petherbridge and Wagner as well as Cotropia seem to assume implicitly that the second case will still be the one litigated, but now the success rate will go up from 35% to 50%. If that were to happen, then we could add up success rates on obviousness from appellate decisions and point to the higher success rate as evidence of a weakening of the nonobviousness requirement. But that is not what will happen. Instead, if the strategic considerations that drive the parties' decision to litigate rather than settle remain unchanged, then the overall success rate will remain unchanged. What will change is that parties, facing the new nonobviousness standard, will now settle the first and second cases (and others like them) and will choose to litigate the third case (and others like it), which now has a 35–65 chance of success on the nonobviousness

¹⁶² See *supra* notes 154–55 and accompanying text.

issue. As a result, examining appellate decisions and calculating success rates on nonobviousness based upon litigated cases, we will find that the Federal Circuit still upholds patents in 35% of the litigated cases. The success rate on nonobviousness remains unchanged even though the nonobviousness standard has changed, because parties adapt to the new standard and settle or litigate accordingly.¹⁶³

In a previous paper, Professor Lunney showed that we can account for selection effects and get a clearer picture of changes in substantive doctrine when we use appellate decisions as our data set by focusing on the subset of cases where a patent holder lost and then examining the reason(s) why a patent holder lost.¹⁶⁴ By focusing on obviousness as a fraction of those cases where a patentee lost, we can effectively normalize our data. While parties still select which cases to litigate rather than settle and which issues to argue, those selection effects now help us identify the relative importance of any given doctrine within the overall structure of patent law and to track substantive doctrinal changes. If a court weakens the nonobviousness requirement, making obviousness much harder for a defendant to prove, then defendants will emphasize other defenses, such as noninfringement, and we should see obviousness account for fewer patent-holder losses accordingly. By using this approach and thus accounting for selection effects, we find a clear weakening of the nonobviousness requirement under the Federal Circuit before *KSR*.

Using this approach, we find some recovery in the importance of the nonobviousness doctrine following *KSR*, as one would expect.¹⁶⁵ From 2008 through 2010, obviousness accounted for just less than 20% of the losses patentees experienced. Compared to the immediately preceding period of 2004 through 2006, this

¹⁶³ Curiously, both papers acknowledge the presence of, and risks presented by, selection bias, but both still tout their results as evidence that the Federal Circuit has not weakened the nonobviousness requirement. See *supra* note 155.

¹⁶⁴ Lunney, *supra* note 27, at 14–16.

¹⁶⁵ We would be interested to see if the Petherbridge and Wagner and Cotropia approaches find any similar effects from *KSR*. If selection effects are driving their results, as we believe, then, at least after a transition period, we should expect to find no significant changes in success or reversal rates using their approaches.

represents a healthy rebound. Yet, despite the bump, obviousness today accounts for only a small fraction of the losses for which it accounted in the pre-Federal Circuit era and is no longer the dominant doctrine it once was.

III. OBVIOUSNESS IN THEORY

The diminished vitality of the nonobviousness doctrine weakens the ability of the patent system to encourage the full range of potential innovations in the useful arts. Although there remains an unfortunate level of confusion over the economic trade-offs entailed in patent protection, the basic trade-off is simple: Because patent law provides a largely uniform level of protection for everything within its scope, expanding protection brings forth additional innovation at the cost of overprotecting innovations that would have been brought forth at some lower level of protection (the “preexisting” innovations).¹⁶⁶ The trade-off is not between incentives and access for any given innovation, nor between static and dynamic efficiency more generally.¹⁶⁷ Rather, the trade-off is between the marginal increase in social value the additional innovations generate and the marginal decrease in social value that arises from overprotecting (or further overprotecting) the preexisting innovations. Within this framework, the question becomes one of optimal mechanism design, given limited information.

In any given art or technological field, there is the potential for a wide range of innovations. At any given time, some advances are

¹⁶⁶ *E.g.*, Lunney, *supra* note 27, at 5–6, 64–67.

¹⁶⁷ As Professor Lunney explained elsewhere:

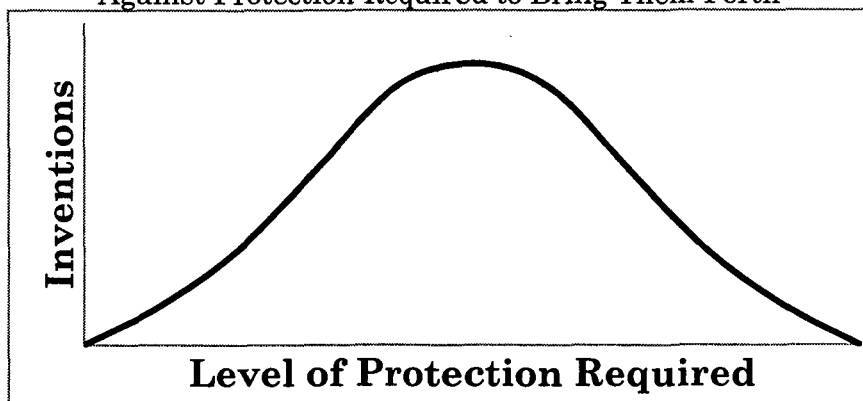
Even where a regime of exclusive rights represents the best available alternative for encouraging certain types of innovation, the social value of an innovation will presumably be somewhat less if protected by a patent than if its public good aspect could have been freely and fully exploited. Yet, if providing patent protection ensures the creation of a desirable information product and does so more efficiently than the plausible alternatives, such as patent prizes or direct government subsidies, the fact that the information product could have been more valuable still in the absence of the patent’s protection has little practical significance.

Id. at 5 (footnotes omitted).

easy and may require little or no patent protection to bring them forth. For these advances, the incentives that arise inherently in markets operating against a background of enforceable contracts and exclusive rights in real and personal property can provide the necessary incentives to bring them forth. Whether arising through lead-time advantages, reputational rents, or otherwise, ordinary market incentives are sufficient, and for these advances no patent protection is required. In contrast, other advances are more difficult and may require some degree of encouragement beyond that which contracts and traditional property rights alone will provide. While a system of exclusive rights in such advances is not the only available mechanism to provide the additional encouragement necessary, in the presence of imperfect information as to the costs, value, and best research paths to pursue to achieve the desired advance, a system of exclusive rights, such as the set patent law provides, may prove the best available alternative. Yet, even for advances that require additional encouragement, some may require only a little extra encouragement, while others may require a great deal.

Indeed, for a given art, we can imagine some distribution of the potential advances that could be brought forth as the level of patent protection available increases, from no protection to the maximum protection theoretically possible, as shown in Figure 2.

Figure 2. Possible Distribution of Inventions Available Against Protection Required to Bring Them Forth



If a regulator had perfect information regarding the potential range of inventions and the level of protection required to bring forth each and could enforce an individually tailored system of rights for each, the regulator would provide each invention with precisely that level of protection necessary to bring it forth and no more.¹⁶⁸ But in the real world, regulators do not have such perfect information and cannot realistically enforce a system of individually tailored rights.

In the real world, a regulator may have little or no information about the level of protection required to bring forth any given invention but may know only the distribution of potential innovations and the fraction of the distribution that any given level of patent protection will bring forth. Moreover, the administrative costs associated with enforcing a regime of individually tailored rights are also likely to prove prohibitive. Facing such limited information and high administrative costs, the regulator's optimal choice may be to provide some uniform level of protection—whether none, some, or a lot—to each of the potential inventions. This, historically, is what patent and copyright have done. For the creative products they cover, each has provided a largely uniform set of exclusive rights, for a largely uniform term, to every invention or work that satisfied a given set of largely uniform prerequisites.

With such a uniform system of rights, any given level of protection will bring forth all of those advances that require that level of protection or less to ensure the expectation of a non-negative producer surplus from investing in the advance. If we provide additional protection, so as to increase the expected rents from investing in any given advance, that additional protection will likely bring forth some additional advances. However, because protection is uniform, we will also provide that additional protection to those advances that could have been brought forth with less protection. This overprotection has a cost. Granting a right to exclude with respect to an otherwise nonrivalrous good, such as the information contained in a technological advance,

¹⁶⁸ Of course, if these assumptions were satisfied, then the patent system would be "both unnecessary and undesirable." Lunney, *supra* note 27, at 4.

raises the prices associated with the information, increases transaction costs associated with the use of the information, and prevents others from putting the information to all of its highest and best uses.¹⁶⁹ For these reasons, overprotection of any given advance will limit the ability of others to take advantage of the advance's nonrivalrous nature and will thereby decrease its social value. Given these competing benefits and costs from extending protection, in a system of uniform protection, we reach the optimal level of protection when, for any additional increase in protection provided, the marginal loss in social value from (further) overprotecting preexisting advances exceeds the marginal gain in social value associated with the additional advances that broader protection would bring forth.

Information costs and the resulting uniformity of protection thus impose two costs. First, we have the familiar deadweight losses and other costs associated with overprotecting those innovations that could have been brought forth with less protection. Second, given the trade-off between encouraging additional advances and maximizing the social value associated with the preexisting advances, an optimal system of uniform protection will almost invariably set the level of protection too low to ensure the expected profitability, and hence existence, of the full range of potential innovations.

A vibrant nonobviousness requirement can play a crucial role in reducing both of these uniformity costs. If our regulator lacks perfect information as to how much protection each advance requires but can group the potential advances into rough categories that require a given level of protection, the regulator can use the nonobviousness requirement to tailor the protection provided to that required for each such category. Assume, for example, that the regulator has sufficient information to divide the potential advances into two categories: easy and hard. As the difficulty increases, we need more patent protection to bring forth additional innovations, but the regulator can only provide a single

¹⁶⁹ See LAWRENCE LESSIG, *THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD* 209–11 (2001) (discussing costs of patent protection in the Internet context).

uniform set of rights for each. In this situation, the regulator faces a choice between (1) providing sufficient protection to bring forth the more difficult innovations but overprotecting the easier innovations, and (2) providing sufficient protection to bring forth the easier innovations without overprotecting them but failing to provide sufficient protection to bring forth the more difficult innovations at all.

In the absence of a tailoring mechanism, these are the only choices available. Neither is optimal, as each either underprotects, and thus fails to ensure some desired innovations, or overprotects, and thus reduces the social value of some desired innovations, or, in the real world, does both. With sufficient information, vigorous enforcement of the nonobviousness requirement can help us avoid this undesirable result. Facing an otherwise uniform term of protection and a uniform set of exclusive rights for all four categories of advance, a regulator can nonetheless provide each category with the right level of patent protection by using the nonobviousness requirement to create a risk that any given patent will not in the end prove valid. For risk-neutral patentees,¹⁷⁰ receiving a patent with a twenty-year term and the exclusive right to “make[], use[], offer[] to sell, or sell[]”¹⁷¹ the invention, but with a 50% chance that the patent will be found invalid, has the same economic value as a patent with a shorter term or a narrower set of rights and a 100% chance of being found valid.¹⁷² Thus, our regulator can give our easy innovations a full set of patent rights, but with a high chance of invalidity, while providing our hard innovations the same set of patent rights, but with a low chance of invalidity. By doing so, the regulator can tailor the level of patent protection effectively provided to each type of innovation to the level of protection necessary to bring those advances forth.

¹⁷⁰ This point holds for risk-averse patentees as well. But a given risk of invalidity will lead to a lower assessment of a patent’s value for a risk-averse patentee than for a risk-neutral patentee.

¹⁷¹ 35 U.S.C. § 271(a) (2006).

¹⁷² See Lunney, *supra* note 27, at 72–73 (comparing “expected rent” from a 50% chance of validity with “expected rent” of a patent with a narrower scope); see generally Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75 (Spring 2005).

For a range of innovations moving from exceptionally easy to exceptionally hard, so long as our regulator can group the potential advances appropriately, the regulator can create a risk that a patent will be held obvious in order to create a rough match between the level of protection needed to bring forth an innovation and the level of protection effectively provided. The regulator can thereby design a patent system that will both (1) not overprotect the relatively easy advances and (2) provide sufficient encouragement to the relatively difficult advances.

The question becomes whether courts have sufficient information to group patented inventions into even such rough categories without undue mistakes. The central role that nonobviousness once played in patent litigation suggests that courts at one time believed that they could. Moreover, as an economic matter, we have a pretty good sense of the sorts of research and development investments that will prove difficult to recoup without a patent. As a general matter, it boils down to a question of (1) the up-front investment required for the innovator; (2) the cost savings available to an imitator; (3) the lead-time advantage likely available in the absence of a patent; (4) the extent to which products will remain differentiated even after entry occurs; and (5) the availability of reputational rents due to imperfect information in the markets for the innovation.¹⁷³ While some mistakes in the sorting process are inevitable, a rough sorting of patented inventions along a spectrum from easy advances to hard advances, corresponding to some rough sense for the corresponding level of patent protection required to bring them forth seems, while not a trivial exercise, entirely practicable.

Such a rough sorting would yield two tangible benefits. First, it would reduce the overprotection costs otherwise associated with

¹⁷³ See Lunney, *supra* note 27, at 56 (noting that in the absence of a patent system, an innovator will have a lead time over imitators but that eventual copying will reduce rents available to an innovator, and also noting that product differentiation and a reputation for innovating will mean that innovations will be priced above marginal cost); see also Jonathan M. Barnett, *Do Patents Matter? Empirical Evidence on the Incentive Thesis*, in HANDBOOK ON LAW, INNOVATION AND GROWTH 178, 178–79 (Robert E. Litan ed., 2011) (referencing empirical studies testing whether the patent system actually incentivizes innovations that would be made if free-riders existed).

the easy advances in an otherwise uniform system of protection. Second, and more important, it would enable the patent system to provide the broader protection necessary to encourage the more difficult advances.

Despite these potential benefits, the Federal Circuit has been curiously reluctant to engage in such a rough sorting, relegating the nonobviousness requirement to the role of bit player in the patent system. In part, this is due to the Federal Circuit's rejection of the notion that patents are undesirable monopolies.¹⁷⁴ In the Federal Circuit's eyes, patents are simply property, presumptively desirable.¹⁷⁵ As a result, the court sees no sense in attempting to sort those inventions that are worth "the embarrassment of an exclusive patent" from those that are not,¹⁷⁶ or in a nonobviousness doctrine that purports to do so.

Yet this "simply property" perspective has not been the only reason behind the Federal Circuit's refusal to enforce a vibrant nonobviousness requirement. The court's jurisprudence also reflects a strong fear of hindsight. And it is to this fear which we now turn.

IV. HINDSIGHT, BIAS, AND OBVIOUSNESS

A. THE FEAR OF HINDSIGHT IN PATENT LAW

Patent law has had a longstanding fear of hindsight in the obviousness determination. Indeed, even before the issue became known as "obviousness" with the enactment of the Patent Act of 1952, courts had recognized the tendency for hindsight to make an improvement or advance seem simpler or easier than it in fact was. In 1897, for example, the Second Circuit upheld a patent on an improvement to the sewing machine, concluding that it constituted the work of an inventor and not that of a skilled mechanic.¹⁷⁷ In reaching its conclusion, the court acknowledged

¹⁷⁴ Lunnay, *supra* note 37, at 380.

¹⁷⁵ *Id.*

¹⁷⁶ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 9 (1966).

¹⁷⁷ *Schenck v. Singer Mfg. Co.*, 77 F. 841, 844 (2d Cir. 1897).

that “[i]n view of the prior state of the art thus exhibited, it seems now to have been a very simple thing to do what was done by the patentees.”¹⁷⁸ The court refused, however, to accept hindsight’s suggestion of apparent ease. Rather, the court found invention in the patent based upon the so-called secondary considerations. Despite the invention’s seeming simplicity, it offered clear advantages over the prior art, and despite the “vast number of skilled workmen” working in the field, no one else had discovered it.¹⁷⁹ Other courts reached similar conclusions.¹⁸⁰ From these cases, the Seventh Circuit derived the following rule: “Whether a

¹⁷⁸ *Id.*

¹⁷⁹ *Id.* As the court explained:

But the record in this case affords extrinsic evidence of a most convincing kind that what was done by the patentees was not an obvious thing, and that the change of organization was not one which the skilled mechanics of the particular art could have suggested and introduced without the exercise of inventive faculty. This evidence is supplied, not only by the many patents for improvements, which fell short of producing the simple, compact, less expensive, and more efficient bearings of the patent, but by the sterility, during 20 years, of the great army of mechanics employed by the various sewing-machine manufacturers. The complainant itself, from 1865 to 1879, used the overhung stud, and for several years of that period its machines contained cross braces readily adaptable to the office of the patented brace. It employed a vast number of skilled workmen. Yet to none of them did the suggestion occur which is embodied in the new organization of the patentees. The simple change made by the patentees has proved so valuable that the complainant has adopted it in more than 9,000,000 sewing machines. The sewing-machine company whose president is the defendant in this suit has also adopted it. No one can examine the bearings of the patent, even cursorily, and compare them with those previously in use, without recognizing the meritorious improvements which they embody. We agree with the court below that these improvements were invention, and not merely the exercise of mechanical skill and adaptation.

Id.; see also *Brunswick-Balke-Collender Co. v. Thum*, 111 F. 904, 905–06 (2d Cir. 1901) (following similar approach).

¹⁸⁰ See, e.g., *Brown & Sharpe Mfg. Co. v. Kar Eng'g Co.*, 154 F.2d 48, 50 (1st Cir. 1946) (rejecting hindsight’s suggestion that an advance was obvious); *Becket v. Coe*, 98 F.2d 332, 336 (D.C. Cir. 1937) (same), *rev'd in part*, No. 6790, 1938 WL 28299 (D.C. Cir. June 6, 1938); *Skinner Bros. Belting Co. v. Oil Well Improvements Co.*, 54 F.2d 896, 898 (10th Cir. 1931) (acknowledging “[w]e know that we should try to eliminate ‘hindsight’” in determining whether a patent constitutes invention); cf. *Am. Valve & Meter Co. v. Fairbanks, Morse & Co.*, 249 F. 234, 239 (7th Cir. 1917) (noting that “even with the aid of hindsight we fail to see in the patent anything other than a meritorious invention”).

patent involves invention is to be determined in the light of historical facts rather than what might appear to be simple in the light of hindsight.”¹⁸¹

With the enactment of the Patent Act of 1952, courts tied the prohibition on hindsight to the statute’s requirement that the obviousness or nonobviousness of the patented invention be determined “at the time the invention was made.”¹⁸² Yet the basic approach to guarding against undue or improper hindsight remained the same. Against the appearance of simplicity that hindsight might suggest, courts posited the simple fact that no one else had previously developed the invention at issue. This was not always sufficient to save a patent,¹⁸³ but as the Court recognized in *Graham*, focusing on secondary considerations such as long-felt but unsolved need, the failure of others, and commercial success “may . . . serve to ‘guard against slipping into use of hindsight,’ and to resist the temptation to read into the prior art the teachings of the invention in issue.”¹⁸⁴

Under the Federal Circuit, the fear of hindsight also became a justification for the requirement that the prior art teach, suggest,

¹⁸¹ *Lakeshire Cheese Co. v. Shefford Cheese Co.*, 72 F.2d 497, 499 (7th Cir. 1934).

¹⁸² 35 U.S.C. § 103(a) (1952). See *In re Sporck*, 301 F.2d 686, 689 (C.C.P.A. 1962) (“In determining the issue here we are required by 35 U.S.C. § 103 to do so from the vantage point of one having ordinary skill in the metal spinning art and then to determine whether or not the claimed invention would have been obvious to such a person at the time the invention was made. This requires us to view the prior art without reading into that art the teachings of appellant’s invention.”); see also *Monroe Auto Equip. Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (6th Cir. 1964) (“The first [principle] is that in considering the question of obviousness, we must view the prior art from the point in time just prior to when the patented device was made. Many things may seem obvious after they have been made, and for this reason courts should guard against slipping into use of hindsight.”).

¹⁸³ For example, in *Procter & Gamble Co. v. Berlin Mills Co.*, the Second Circuit reversed the district court’s holding that a patent claim was invalid for lack of invention. 256 F. 23, 26–27 (2d Cir. 1918), *rev’d*, 254 U.S. 156 (1920). In reversing, the court explained that “the question really is one of measuring foresight by hindsight. The problem seems easy now, but, when the object reached was desirable, useful, and apt for commercial success, the bald fact that nobody ever did it before is persuasive, though not conclusive, evidence of some invention.” *Id.* at 26. Yet, on further appeal, the Supreme Court reversed, holding that the patent claims lacked invention. *Berlin Mills Co. v. Procter & Gamble Co.*, 254 U.S. 156, 166 (1920).

¹⁸⁴ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 36 (1966) (quoting *Monroe Auto Equip. Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (6th Cir. 1964)).

or motivate a given combination of elements in order to establish the prima facie obviousness of the combination.¹⁸⁵ In *KSR* itself, the Court, while acknowledging “the distortion caused by hindsight bias” and the need to “be cautious of arguments reliant upon *ex post* reasoning,”¹⁸⁶ rejected the need for a teaching, suggestion, or motivation as an absolute prerequisite for finding the obviousness of a given combination of prior art elements.¹⁸⁷ Nevertheless, even after *KSR*, the Federal Circuit has continued to insist that the teaching, suggestion, or motivation test, flexible now rather than rigid, remains an important guard against the improper use of hindsight.¹⁸⁸

Despite the repeated and pervasive cautions against the use of hindsight, patent law does not prohibit the use of hindsight altogether in obviousness determinations.¹⁸⁹ To the contrary, patent law expressly allows the obviousness decision maker to

¹⁸⁵ See *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984) (“Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination.”); see also *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001) (“The genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some ‘teaching, suggestion or reason’ to combine cited references.”); *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 664 (Fed. Cir. 2000) (“In order to prevent a hindsight-based obviousness analysis, we have clearly established that the relevant inquiry for determining the scope and content of the prior art is whether there is a reason, suggestion, or motivation in the prior art or elsewhere that would have led one of ordinary skill in the art to combine the references.”); *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998) (“To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness.”); *Tex. Instruments, Inc. v. U.S. Int’l Trade Comm’n*, 988 F.2d 1165, 1178 (Fed. Cir. 1993) (“Absent such suggestion to combine the references, respondents can do no more than piece the invention together using the patented invention as a template. Such hindsight reasoning is impermissible.”).

¹⁸⁶ *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

¹⁸⁷ *Id.* at 421–22.

¹⁸⁸ See *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008) (holding after *KSR* that “a flexible TSM test remains the primary guarantor against a non-statutory hindsight analysis such as occurred in this case”); *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1260 (Fed. Cir. 2007) (“In any event, as the Supreme Court suggests, a flexible approach to the TSM test prevents hindsight and focuses on evidence before the time of invention, without unduly constraining the breadth of knowledge available to one of ordinary skill in the art during the obviousness analysis.” (citation omitted)).

¹⁸⁹ See *supra* notes 23–26 and accompanying text.

consider a number of facts arising after the date of invention. Many of the so-called secondary factors, including the commercial success of a patented invention, copying of the patented invention by others, or its widespread licensing, necessarily arise after the time of invention and thus represent hindsight. Yet the Federal Circuit has emphasized that this hindsight evidence may provide “the most probative and cogent evidence available” on the obviousness issue.¹⁹⁰ Going further, the Federal Circuit has expressly held that such evidence “must always when present be considered.”¹⁹¹ The failure to recognize that this evidence represents an apparently permissible form of hindsight is a curious blind spot in the court’s otherwise pervasive jurisprudential war on hindsight.

Thus, patent law does not prohibit altogether the use of facts arising after the date of invention in making obviousness determinations. Rather, the prohibition on hindsight seems focused on one particular type of hindsight—the use of the inventors’ own discovery against them. Yet this is not hindsight at all. An inventor’s own discovery does not arise after the date of invention, but simultaneously with it. Perhaps that helps explain why the prohibition on using hindsight often seems, in practice, more a rhetorical trump card than a meaningful analytical rubric. Invariably, patent applicants and patentees insist that any conclusion of obviousness represents no more than an impermissible hindsight reconstruction.¹⁹² When a district judge or a Patent and Trademark Office examiner nevertheless concludes that an invention is obvious despite the claim of hindsight, appellate panels sometimes reverse.¹⁹³ When they do not, a dissenting judge will often chide the majority for failing to

¹⁹⁰ *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983).

¹⁹¹ *Id.*; see also *Simmons Fastener Corp. v. Ill. Tool Works, Inc.*, 739 F.2d 1573, 1575 (Fed. Cir. 1984) (reversing finding of obviousness for failure to consider evidence of secondary considerations); *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (same).

¹⁹² See, e.g., *In re Winslow*, 365 F.2d 1017, 1020 (C.C.P.A. 1966) (“Appellant presents the usual argument that hindsight reconstruction has been employed by the examiner and the board.”).

¹⁹³ See *supra* note 16.

recognize the improper presence of hindsight,¹⁹⁴ and when they do, a dissenting judge will often chide the majority for seeing hindsight when, in the dissenter's view, it was not there.¹⁹⁵

Even within a single opinion, courts will use hindsight to explain why a patented invention was obvious while at the same time insisting that the use of hindsight is improper. For example, in *Graham v. John Deere Co. of Kansas City*, the invention pertained to chisel plows.¹⁹⁶ When a chisel plow is in use, the point of the plow digs a furrow several inches deep. Sometimes as the plow is digging the furrow, it will encounter an obstacle, such as a large buried rock. At that point, the plow needs to ride up and over the obstacle and then return to digging the furrow at the appropriate depth.¹⁹⁷ Graham patented a particular arrangement of the key elements—the shaft of the plow, a hinge plate, and the body of the plow—in a way that apparently improved the plow's performance, in terms of breakage and wear, significantly.¹⁹⁸ At the time of invention, no one knew all the reasons why Graham's arrangement worked better than prior arrangements; apparently, it just did.¹⁹⁹ When the patent was eventually litigated, Graham's attorney theorized that the arrangement worked better because it allowed free flexing of the plow shaft along its full length.²⁰⁰ In holding Graham's arrangement obvious, the Court wrote:

If free-flexing, as petitioners now argue, is the crucial difference above the prior art, then it appears evident that the desired result would be obtainable by not boxing the shank within the confines of the hinge. The only other effective place available in the arrangement was to attach it below the hinge plate and run it

¹⁹⁴ See *supra* note 17.

¹⁹⁵ See, e.g., *In re Fine*, 837 F.2d 1071, 1075–76 (Fed. Cir. 1988) (reversing Board of Patent Appeals over Judge Smith's dissent and holding that examiner improperly relied on hindsight).

¹⁹⁶ 383 U.S. 1, 4 (1966).

¹⁹⁷ *Id.* at 19–20.

¹⁹⁸ *Id.* at 20–21.

¹⁹⁹ *Id.* at 23.

²⁰⁰ *Id.*

through a stirrup or bracket that would not disturb its flexing qualities. Certainly a person having ordinary skill in the prior art, given the fact that the flex in the shank could be utilized more effectively if allowed to run the entire length of the shank, would immediately see that the thing to do was what Graham did, *i.e.*, invert the shank and the hinge plate.²⁰¹

In this passage, the Court used the insight from Graham's own invention—that free flexing of the plow shaft is desirable—against him. Later in the same opinion, however, the Court emphasized the need “to ‘guard against slipping into use of hindsight,’ and to resist the temptation to read into the prior art the teachings of the invention in issue.”²⁰²

Patent law's fear of hindsight is thus, at best, inconsistent. Patent law fears some types of hindsight but embraces others. Even where patent law seems clear that the use of certain types of hindsight is prohibited, judges disagree over whether hindsight was in fact impermissibly used in any given case. And sometimes, even when courts say that certain types of hindsight should not be used, they use it anyway.

To rise above mere rhetoric and use hindsight as a meaningful analytical tool, we need a better understanding of hindsight and the ways in which it informs our decisionmaking. The key question is whether hindsight helps improve our decisionmaking on obviousness and if so, how. As discussed above, for each patented invention there is some risk of obviousness that is socially optimal, in that it ensures for each socially desirable invention that the expected incentives from the patent exactly cover the invention's otherwise unrecoverable expected costs. The question thus becomes whether, and when, the use of hindsight information improves the patent system's ability to achieve that optimal risk of an obviousness result. To begin exploring that question, the next section examines the role of hindsight in a world of limited information.

²⁰¹ *Id.* at 24–25 (footnote omitted).

²⁰² *Id.* at 36 (citation omitted).

B. IMPERFECT INFORMATION AND HINDSIGHT

As a general matter, hindsight plays a central and important role in our everyday lives. Reviewing how things turned out can improve the information available, and thus our decisionmaking, when, as is often the case, a given set of choices recurs. Consider the simple example of a stop sign. The law requires drivers to come to a full and complete stop at a stop sign, but many drivers do not. A driver approaching a stop sign can run it, roll it, or obey it. If the driver matches the assumptions of neoclassical economics, the driver will choose between these three options in order to maximize utility. Invariably, however, the driver will have imperfect information regarding the utilities each choice offers. What is the marginal increase in the likelihood of an accident at this particular stop sign at this particular time of day from rolling the stop sign rather than stopping completely? What is the marginal increase in the chance of an accident from running it altogether? What is the likely cost if an accident occurs? What is the chance and cost of a traffic ticket? How much time can the driver save by not coming to a complete stop? Given the driver's schedule for the day and other circumstances, what is the marginal utility associated with that time savings?

When first approaching a given stop sign, a driver may have a good sense of some of these values but relatively imperfect information regarding the others. Over time and by repeatedly making different choices at the same stop sign, the driver will build up through hindsight a reasonably good sense of the costs and benefits associated with running, rolling, or obeying the stop sign. The actual results in terms of the decisions the driver makes and the resulting outcomes—whether accident or no accident, ticket or no ticket—will come over time to match reasonably well the actual distribution of risks associated with each decision. Of course, there will be outliers—those unlucky souls who get a ticket or into an accident every time they fail to come to a complete stop, or the carefree drivers who never do. We should expect, however, the actual risks, costs, and benefits drivers experience to form a bell curve around the true values. As a result, on average, updating the available information set regarding those risks, costs,

and benefits through the use of hindsight should help our driver develop a more accurate decisionmaking heuristic over time.

This is true not just for decisions about whether to stop at stop signs, but decisions more generally. We make decisions all of the time and never have perfect information as to the decision's true costs and benefits. But if the opportunity for a choice repeats itself, over time our choices and their consequences should begin to approach the average and, in that sense, true costs and benefits associated with the decision. As a result, if we define bias as a difference between (1) the true costs and benefits of a choice and (2) our perception of those costs and benefits, then the use of hindsight in our everyday lives typically reduces bias over time by bringing our perception of the risks, costs, or benefits associated with a choice more in line with the true values.

Hindsight offers the same benefit with respect to the question of obviousness. Consider a simplified model of the interaction between investments in innovation and patentability. A given innovation can either be hard or easy. If it is hard, our researcher will not invest in the innovation unless he or she will receive a patent for the innovation. If it is easy, our researcher will invest in the innovation whether a patent results or not. Of course, even if it is easy, the researcher would still prefer to receive a patent. In making investment decisions, our researcher has an expectation as to whether any given innovation will prove hard or easy, but that expectation may be mistaken.

Given this framework, the question becomes: Should we award patents based upon the researcher's expectation of the innovation's difficulty at the outset, or based upon how things actually turn out? In other words, should we make obviousness determinations using hindsight? The answer: Use hindsight. In this framework, to maximize social utility, we should make obviousness determinations and award patents (or not) based not on the researcher's expectations in approaching the project, but on how things actually turned out.

Using hindsight and awarding patents based upon how things actually turned out ensures that the innovation is found nonobvious and hence receives a patent when it was in fact hard,

and it further ensures that the innovation is found obvious and hence does not receive a valid patent when it was in fact easy. A researcher, knowing that a patent will be forthcoming if the innovation in fact turns out to be hard, can invest in an innovation whether the researcher expects the innovation at the outset of the research to be hard or easy. If the researcher expects it to be hard and it is, the researcher will receive a patent and knows that and will therefore pursue the innovation. If the researcher expects it to be easy and it turns out to be hard, the researcher will continue working on the innovation. Because the innovation turned out to be hard, the researcher will receive a patent and knows that. On the other hand, if the researcher expects it to be easy and it is, or expects it to be hard but it turns out to be easy, the researcher will not receive a patent and knows that. The researcher will nevertheless pursue or continue work on these easy innovations because the additional incentives a patent might provide are unnecessary to encourage investment in such easy innovations.

In contrast, a rule that awarded patents on the basis of the researcher's initial expectations would create two problems. First, if our researcher expected the innovation to be easy, and it turned out to be hard, a rule that awarded patents based solely on initial expectations and ignored how things actually turned out would deny the researcher a patent. As a result, once it became clear that the innovation was going to be hard, the researcher would abandon the work. Second, if our researcher expected the innovation to be hard, but it turned out to be easy, a rule that awarded patents based solely on initial expectations would give the researcher a patent unnecessarily, creating the associated deadweight losses.

Despite this perfectly sensible justification for using hindsight, the prohibition on at least some kinds of hindsight seems to arise from two concerns. First, using the inventor's own work on the obviousness issue may lead to a mistaken conclusion of obviousness because the inventor had exceptional, rather than ordinary, skill in the art. For a person with exceptional skill, certain inventions may prove easy where they would have been hard for a person of ordinary skill. As a result, a test that focuses

on whether the invention was hard or easy for the actual inventor might deny patents to the true genius. Yet, if that is our concern, several of the secondary factors, including long-felt but unsolved need and failure of others, should help us sort out directly whether an easy innovation was easy because the inventor happened to be a genius or because it would have been easy for a person of ordinary skill.

Second, hindsight may also lead the decision maker mistakenly to identify a hard invention as easy by providing a roadmap to piece together the relevant prior art to solve the problem at hand. The risk here is that, while we judge obviousness from the perspective of a person having ordinary skill in the art, who is presumed to know all of the relevant prior art, we must not focus our hypothetical person's attention on only that prior art that the inventor's own work proves is the most directly relevant and helpful. Thus, if we imagine our person of ordinary skill in the art sitting in a shop with the prior art references hanging around, as Judge Rich once suggested,²⁰³ we must ensure that the walls include all of the prior art references, the helpful as well as the unhelpful. When we imagine our hypothetical person looking at all the available prior art, the task at hand may well seem impossible. In contrast, if we imagine our person of ordinary skill in the art sitting in a shop with only those prior art references that the inventor's own work has shown to be most helpful, the task of connecting the dots may seem trivially easy.²⁰⁴ As the Federal Circuit has explained:

It is wrong to use the patent in suit as a guide through
the maze of prior art references, combining the right

²⁰³ *In re Winslow*, 365 F.2d 1017, 1020 (C.C.P.A. 1966) ("Appellant presents the usual argument that hindsight reconstruction has been employed by the examiner and the board. We disagree with that position. We think the proper way to apply the 103 obviousness test to a case like this is to first picture the inventor as working in his shop with the prior art references—which he is presumed to know—hanging on the walls around him.")

²⁰⁴ See *In re Antle*, 444 F.2d 1168, 1171 (C.C.P.A. 1971) (holding that limiting references to those "in the very same art" . . . does not apply in cases where the very point in issue is whether one of ordinary skill in the art would have *selected*, without the advantage of hindsight and knowledge of the applicant's disclosure, the particular references which the examiner applied").

references in the right way so as to achieve the result of the claims in suit. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness in a court of law.²⁰⁵

While this second concern raises an interesting possibility, the key question is the extent to which hindsight, or certain types of hindsight, will actually lead to such mistakes. Using a series of surveys, Professor Mandel has attempted to answer that question.

C. TESTING FOR HINDSIGHT AND HINDSIGHT BIAS: PROFESSOR MANDEL'S WORK

For his research, Professor Mandel followed survey protocols that social science researchers have developed and used to identify the influence and significance of hindsight on a variety of issues.²⁰⁶ The protocols essentially provide two groups of respondents with two information sets: the first lays out a question or problem with the information available up to the point where the question or problem is resolved, and the second includes the same "before the fact" information set but adds information regarding how the event actually turned out.²⁰⁷

In applying this protocol to the use of hindsight in obviousness determinations, Professor Mandel developed fact patterns based upon two litigated patents.²⁰⁸ The first focused on finding a way to teach baseball players how to pitch without the need for one-on-one instruction.²⁰⁹ The solution actually developed and patented

²⁰⁵ *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1012 (Fed. Cir. 1983) (per curiam).

²⁰⁶ Mandel, *Patently Non-Obvious*, *supra* note 19, at 1400; see also Baruch Fischhoff, *Hindsight ≠ Foresight: The Effect of Outcome Knowledge on Judgment Under Uncertainty*, 1 J. EXPERIMENTAL PSYCHOL.: HUM. PERCEPTION & PERFORMANCE 288, 289 (1975) (outlining basic protocol for testing hindsight bias); Susan J. LaBine & Gary LaBine, *Determinations of Negligence and the Hindsight Bias*, 20 L. & HUM. BEHAV. 501, 502-04 (1996) (surveying wide variety of hindsight bias studies); Jay J.J. Christensen-Szalanski & Cynthia Fobian Willham, *The Hindsight Bias: A Meta-analysis*, 48 ORG. BEHAV. & HUM. DECISION PROCESSES 147 (1991) (meta-analysis of more than 120 hindsight bias studies).

²⁰⁷ See Fischhoff, *supra* note 206, at 289 (describing protocol).

²⁰⁸ Mandel, *Patently Non-Obvious*, *supra* note 19, at 1406-07.

²⁰⁹ *Id.* at 1407.

was to manufacture a baseball with the finger positions for various pitches marked on the surface of the ball.²¹⁰ The second fact pattern focused on finding a way to incorporate a salty taste into fishing lures.²¹¹ The solution actually developed and patented was to add salt into the plastic of the lure itself.²¹²

For each fact pattern, Professor Mandel created a brief (one page or so) description of (1) the relevant prior art and (2) the problem to be solved.²¹³ Based simply on this description, and without telling his respondents the nature of the solution or even if one had been found, he then asked two different groups of respondents, one for the baseball and one for the salty-tasting lure, whether they believed that a solution to the problem at issue would be obvious to a person of ordinary skill in the art.²¹⁴ For this “no hindsight” or “foresight” scenario, 24% of his respondents thought a solution to the baseball fact pattern was obvious, and 23% of his respondents thought a solution to the salty-tasting lure fact pattern was obvious.²¹⁵

With these foresight scenarios as a benchmark, Professor Mandel then presented the same descriptions to two additional response groups. For these second groups, however, Professor Mandel added the fact that the problem had been solved and provided a brief description of the solution devised. With the benefit of this hindsight, the respondents were asked if they believed the solution to the problem was obvious. In this hindsight scenario, 76% of the respondents said the solution to the baseball fact pattern was obvious, and 59% of the respondents said the solution to the salty-tasting lure fact pattern was obvious.²¹⁶ Finding the differences between the two scenarios to be large and

²¹⁰ See *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1343 (Fed. Cir. 2001) (describing patent).

²¹¹ Mandel, *Patently Non-Obvious*, *supra* note 19, at 1407.

²¹² See *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 954–55 (Fed. Cir. 1997) (describing patent).

²¹³ Mandel, *Patently Non-Obvious*, *supra* note 19, at 1456–59.

²¹⁴ *Id.* at 1460.

²¹⁵ *Id.* at 1409.

²¹⁶ *Id.*

statistically significant, Professor Mandel proclaimed his results proof of a hindsight bias.²¹⁷

We are not so sure. Both his survey design and his interpretation of the results present difficulties. In terms of survey design, there are at least two serious issues. First, Professor Mandel changes the question that he asks the respondents. For the foresight scenario, he asks if *a* solution to the problem was obvious. In the hindsight scenario, he asks if *this* solution was obvious.²¹⁸ Although this slight change in wording seems small—just a few letters, after all—in surveying, seemingly small changes can lead to large differences in outcome. With this change in wording, Professor Mandel moves from an abstract inquiry whether *any* imaginable solution to this problem is obvious to a specific inquiry whether a *given* solution is obvious. He moves from essentially two questions—“Is there a solution, and, if so, is it obvious?”—to a single question—“Here’s the solution. Now is it obvious?”

It is impossible to know whether this change in wording made a difference in Professor Mandel’s results. But it raises a real question as to whether Professor Mandel has found something real or simply an artifact of his survey’s design.

Our second concern with Professor Mandel’s survey design is the limited information that he provides his respondents. Given limited initial information on an issue, people will invariably update their information set when they see how things actually turned out. Indeed, Professor Mandel’s set-up seems predisposed to create the largest possible difference between the hindsight and foresight scenarios. Respondents are given a brief description of

²¹⁷ *Id.* at 1411. In Professor Mandel’s words:

The results demonstrate that the hindsight bias significantly influences non-obvious judgments. Participants who were not informed of the invention were substantially more likely to judge a solution non-obvious than participants who were informed what the invention was. The magnitude of the hindsight bias in these patent scenarios was striking and is greater than that reported for other legal judgments.

Id.

²¹⁸ *Id.* at 1408 & n.60.

the prior art²¹⁹ but no real understanding of the art, the principles that underlie it, or how it might tie together. They are asked to answer the obviousness inquiry as if they were a person of ordinary skill in the art, yet they have no such skill.

While we certainly understand the need to simplify for the purposes of a survey, no reasonable patent attorney is going to allow a case to go forward on summary judgment, let alone to trial, with the sort of summary information Professor Mandel provided his respondents.²²⁰ The plaintiff's attorney will certainly present evidence concerning the difficulties encountered on the road to invention. The judge and the jury will hear extensive testimony regarding the long nights, the false trails, and the other elements now common to the heroic inventor story. The defense attorney will counter with evidence, showing how the prior art ties together and how its underlying principles lead almost inevitably to the patentee's solution.

Rather than this conflicting, but rich, tableau, respondents in Professor Mandel's surveys are presented with only an informational skeleton. Given the limited information they are provided, it seems to us almost inevitable that respondents will seize upon the fact and nature of the invention as a proxy for the otherwise missing or indecipherable information. As the most easily understood, and perhaps the only understandable, information available on the difficulty of solving the problem at issue, respondents may give the fact of invention undue weight. Indeed, it may become dispositive.

The real question here is not whether respondents used the fact that a problem was solved to help resolve the obviousness inquiry. Mere knowledge of the fact and nature of the solution is not the sort of illegitimate hindsight with which patent law is concerned. It does not indicate that respondents used that solution as a roadmap to connect the prior art dots. Nor does it establish that the respondent used the solution to focus on some pieces of prior

²¹⁹ *Id.* at 1456–59.

²²⁰ While Professor Mandel acknowledged this problem with his format, he did not believe that it would affect the validity of his results. *See id.* at 1413–14 (discussing limitations of the study).

art while ignoring others. At most, the difference that Professor Mandel finds establishes that the respondent used the additional information provided—the solution—to help understand the information already available. It does not establish that they used this information, even if we label it hindsight, improperly.

More troubling than these questions of survey design, however, is Professor Mandel's interpretation of his results as evidence of "bias."²²¹ Bias refers not to a difference in outcomes but to a difference from the true value.²²² One might try to argue that the foresight scenario's obviousness outcome represents the true value on the grounds that the statute prohibits the use of hindsight. There are two problems with such an argument, however. First, while the statute states that nonobviousness is to be determined "at the time the invention was made," it does not state that relevant after-arising information cannot be considered in making that determination.²²³ Thus, the statute does not prohibit the use of hindsight in determining whether an invention was obvious at the time it was made. Second, even if the statute did prohibit the use of hindsight, the information in Professor Mandel's "hindsight" scenario is not hindsight. The fact and nature of the invention does not arise after the invention was made, but at the time it was made. Therefore, it is not hindsight.

The question, then, is not whether the obviousness outcomes are different in the two scenarios. It is which outcome comes closer to the socially optimal obviousness outcome. In other words, to determine if hindsight leads to bias, we would need to know, for the baseball patent, whether the 76% obviousness result of the hindsight scenario or the 24% obviousness result of the foresight scenario comes closer to the socially optimal resolution of the obviousness issue. Similarly, for the fishing lure, we would need to know whether the 59% obviousness result of the hindsight scenario or the 23% obviousness result of the foresight scenario is closer to the optimal result. Given that the purpose of the

²²¹ *Id.* at 1411.

²²² See Daniel L. Rudinfeld, *Reference Guide on Multiple Regression*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 222 (2d ed. 2000) (defining "bias").

²²³ 35 U.S.C. § 103(a) (2006).

nonobviousness requirement is to create a risk of invalidity that improves the match between the effective level of protection provided and the level of protection needed to bring forth a given advance, results should be measured against that purpose.

While not perfectly clear, a plausible case can be made that Professor Mandel's hindsight results are closer than the foresight results to the obviousness results in the actual litigated cases. For the patent on the baseball, the jury found the invention not proven obvious, yet the district court granted judgment as a matter of law that the invention was obvious; however, the Federal Circuit reversed and reinstated the jury verdict, over Judge Michel's dissent.²²⁴ Thus, two judges held the invention obvious, and two judges and a jury held its obviousness not proven.²²⁵ In the case of the fishing lure, the district court granted summary judgment, concluding that the invention was obvious, but a panel of the Federal Circuit reversed, again over Judge Michel's dissent.²²⁶ So again, two judges held the invention obvious, and two held its obviousness not proven. The actual results in these cases thus suggest that the obviousness issue in both was pretty close. Indeed, the very fact that the cases were litigated rather than settled suggests that obviousness was a close issue. Given the disproportionate stakes in patent litigation, patentees and alleged infringers choose to litigate, rather than settle, not on the 50–50 case, but, typically, on a 30–70 case.²²⁷ Taken together, these facts suggest that the obviousness results in Professor Mandel's hindsight scenarios probably come closer to the 50%–70% obviousness value that the litigation of the cases suggest is appropriate than the obviousness results in the foresight scenarios.

²²⁴ *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1343, 1358 (Fed. Cir. 2001).

²²⁵ That the jury found the invention's obviousness not proven also suggests that Professor Mandel's survey results do not duplicate real-world conditions. After all, the inventor's solution was certainly described to the jury. Despite the benefits of that hindsight, the jury nonetheless concluded that the invention was not proven obvious.

²²⁶ *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 954 (Fed. Cir. 1997).

²²⁷ See Lunney, *supra* note 27, at 12–14 (analyzing patterns of settlement and appellate success).

Of course, using the actual results in these cases as a proxy for the “right” result is not entirely satisfactory. The actual results in the cases reflect existing doctrine, which in turn reflects a given view of hindsight bias. Given that we are trying to determine if that view of hindsight bias is accurate, we cannot assume that the actual results are also the socially optimal results. To do so would almost necessarily concede that the existing doctrine’s view of hindsight bias must be accurate. Yet that is the very question we are trying to answer. Another way to see this point is to note that both cases were decided before the Supreme Court’s decision in *KSR*. Given that both may well have come out differently had they been decided afterwards, if we use actual results as a proxy for “right” results, then we would have to allow our socially optimal result to change depending on whether these cases were decided before or after *KSR*. But that cannot be right. The costs and benefits of upholding or striking down these patents dictate the socially optimal result, not the relative timing of these decisions vis-à-vis *KSR*.

Thus, Professor Mandel’s work demonstrates a statistically significant and large difference in obviousness outcomes when we tell respondents that the problem at hand has been solved and explain how. Yet we cannot tell if this difference is simply an artifact of the survey format, or whether it represents something likely to be present in real-world litigation. Even if the difference matches real-world experience, we also cannot tell whether this additional information leads to bias, in the sense of a deviation from the ideal, or merely a difference, in the sense of a deviation between the hindsight and foresight scenarios.

D. TESTING FOR A HINDSIGHT DIFFERENCE WITH AN EXPANDED INFORMATION SET

To explore these remaining questions, we took Professor Mandel’s basic approach and devised our own parallel set of materials. Our problem focused on dental hygiene. In the survey materials, we described the prior art, including conventional toothbrushes, floss, and ultrasonic or vibrating toothbrushes. We then described some of the advantages and disadvantages of each.

A conventional toothbrush is inexpensive but fails to clean some areas between and behind the teeth. Floss is great for cleaning between teeth, but many people fail to use it. Ultrasonic toothbrushes clean behind teeth well but are expensive. We then described the problem our would-be inventor faced: design an inexpensive toothbrush that cleans as well between teeth as floss and as well behind teeth as an ultrasonic toothbrush.

Following Professor Mandel's lead, we began by exploring the difference in obviousness outcomes for foresight and hindsight scenarios. First, we asked a group of student respondents, based upon a description of these prior art devices and the problem to be solved, whether they believed that a solution would be obvious to a person of ordinary skill in the art of dental hygiene. Forty-eight percent of respondents thought that a solution would be obvious. Second, we compared this foresight scenario to the obviousness percentage for a hindsight scenario. For the hindsight scenario, we provided the respondents with the same descriptions of the prior art and the problem to be solved, but we added a statement that the problem had been solved and a brief description of the resulting toothbrush. With the benefit of this hindsight information, 70% of respondents thought that a solution would be obvious. Like Professor Mandel, we found a large and statistically significant ($p=0.04$) difference between the obviousness outcomes in the foresight and hindsight scenarios.²²⁸

To begin exploring the possible shortcomings of Professor Mandel's work, we then devised a third scenario, which we called the "partial" hindsight scenario. In this third scenario, we provided the respondents with the same descriptions of the prior art and the problem to be solved. We also told them that the problem had been solved. However, rather than present one solution, we presented the respondents with four possible solutions and told them that one of the four had been developed and patented, but that the other three were "*never* invented, *never* developed, and *never* patented." We did not tell the respondents which one of the four possible solutions was the actual one

²²⁸ We calculated p values using Fisher's exact test.

developed and patented. Thus, respondents had the benefit of some hindsight—knowing the problem had been solved—but not perfect hindsight. We then described the four possible solutions, presenting the actual solution second, and after all four were presented, asked the respondents if each would have been obvious.

We had three issues we wanted to address through this scenario. First, we wanted to explore whether the hindsight difference Professor Mandel found remained as large when the hindsight was placed in a broader informational context. In this regard, the four possibilities, three of which did not work, might represent the sort of evidence judges and juries would likely hear regarding false trails and missteps on the path to the patented invention. Second, we wanted to explore the nature of the hindsight at work. In this scenario, respondents have some hindsight information. They are told that the problem has been solved but are uncertain as to which of the possible solutions actually worked. From an engineering or scientific perspective, knowing that there is a solution is often half the battle. So we wanted to determine whether knowing that there was a solution would generate the same hindsight difference. Third, we wanted to check for a demand effect, to see if the order in which the possible solutions were presented to the respondents affected the obviousness results.

Although hindsight is clearly present in this third scenario, our results reflect no statistically significant hindsight difference between this scenario and the original foresight scenario. In response to whether the actual solution would have been obvious to a person of ordinary skill in the art, only 38% of respondents thought that it was. This obviousness result is statistically indistinguishable from the result in the foresight case ($p=0.419$).²²⁹ Unfortunately, from the results, we cannot tell why there was no hindsight effect. We cannot tell if the lack of a hindsight effect was due to (1) the differing nature of the hindsight information available, that is, knowledge only that a solution was found but not its nature; or (2) the reduced importance of the hindsight

²²⁹ More precisely, we cannot reject the null hypothesis that the obviousness percentages are the same.

information, given the additional information provided by the description of the three failed solutions. Further work will be necessary to distinguish between these possibilities. Yet the results plainly establish that the presence of this partial hindsight does not inevitably lead to a difference in obviousness results, let alone any bias.

The third scenario also revealed a steady decline in the obviousness results across the four possible solutions. Ninety percent of respondents believed that the first proposed solution was obvious. Thirty-eight percent of respondents believed that the second proposed solution—the actual solution—was obvious. Sixteen percent of respondents believed that the third proposed solution was obvious. And 6% of respondents believed that the fourth proposed solution was obvious. The differences between the obviousness results for the first, second, and fourth proposed solution are large and statistically significant. Although not definitive,²³⁰ the tendency of respondents to leap to an obviousness conclusion for the first proposed solution, once they know there is a solution, strongly suggests that Professor Mandel's supposed hindsight difference may reflect, at least in part, a demand effect or respondents' desire to get the answer "right."

For our fourth scenario, we wanted to explore whether any of the hindsight difference arose because the survey respondents were not persons of skill in the art. We considered different approaches that we might use to try and get respondents to act and think more like persons of skill in the art. In the end, we settled on simply asking the respondents to write briefly how they thought the problem might be solved. We asked for their written suggestions after describing the prior art and the problem to be solved, but before walking through the four possible solutions. After giving respondents an opportunity to write down their suggested solutions,²³¹ we then presented the four possible

²³⁰ The differences could be due to some inherent difference in the obviousness of the four proposed solutions. Although the results of the fourth scenario, discussed *infra*, tend to refute that, further testing may be necessary to resolve that possibility.

²³¹ Of the fifty respondents, thirty-seven wrote some sort of proposed solution. The remaining thirteen either wrote that they could not think of a solution or left the space

solutions, with the actual solution again second on the list, and then asked with respect to each of the four possible solutions whether it would have been obvious to a person having ordinary skill in the art.

Through this approach, we hoped to have our respondents approach the problem in at least the same way as would a person of ordinary skill in the art. While the respondents would still lack formal or informal training in the art, they would at least grapple with the problem directly and engage it actively, rather than passively accept the information that we provided. We also hoped that this would reduce if not eliminate any tendency of respondents to use the fact of a solution as a proxy for the difficulty of that solution.

Our results from this scenario were surprising. The hindsight information available in the third and fourth scenarios is the same. Both offer some hindsight—we mention that the problem has been solved but do not identify the actual solution, and we present the actual solution as one of four possible solutions. As a result, given that we found no hindsight difference between the foresight scenario and partial hindsight scenario, there should be no hindsight difference in the fourth scenario. Yet 58% of respondents thought the actual solution was obvious. This obviousness result is statistically indistinguishable from the 70% of respondents who thought the invention obvious in the perfect hindsight case ($p=0.298$). It is also statistically different, at least weakly, from the 38% obviousness result in the other partial hindsight scenario ($p=0.07$).

In addition to the difference in these obviousness results for the third and fourth scenarios, we also saw a different pattern in the obviousness responses. In the partial hindsight scenario, the obviousness result started at 90% for the first of the four possible

blank. Even among those who could not think of a solution or who left this space blank, all thirteen thought at least one of the proposed solutions was obvious; four thought two of the solutions were obvious; and one thought three of the solutions were obvious. Seven of these thirteen (or 54%) thought the actual solution was obvious—a percentage not statistically different from the 58% obviousness result for the respondents as a whole with respect to the actual solution.

inventions and then decreased steadily over the remaining three. There is no similar pattern in the engagement scenario. For the first proposed solution, the obviousness result dropped from 90% to 56%. For the third proposed solution, the obviousness result remained statistically unchanged, moving from 16% in the third scenario to 18% in the fourth. The obviousness result for the fourth solution increased, moving from 6% in the third scenario to 48% in the fourth. Moreover, while the respondents in the third and fourth scenarios rearranged their votes as to which of the four solutions were obvious, the total number of obviousness results across the four solutions was statistically unchanged.²³²

The results from this fourth scenario raise some troubling issues. First, there should be no hindsight difference, let alone bias, in the fourth scenario. After all, despite the introduction of some hindsight information in the third scenario, there was no difference in the obviousness result between the third scenario and the original foresight scenario. Moreover, the third and fourth scenarios contained identical hindsight information, presented in an identical format. Yet the results of the fourth scenario are statistically identical to the results from the pure hindsight scenario. This suggests that the original difference we found between the foresight and hindsight scenarios does not represent hindsight bias. Rather, it appears more likely to represent merely an artifact of survey design.

Second, given that the same hindsight was present in the third and fourth scenarios, the statistically different obviousness results between the third and fourth scenarios must necessarily reflect something other than hindsight. The only difference between the third and fourth scenarios was that we asked the respondents in the fourth scenario to write a brief suggested solution to the problem. Given that it is the only difference between the two scenarios, that request for engagement must somehow account for the differing obviousness results.²³³

²³² In the third scenario, the fifty respondents thought a solution was obvious a total of seventy-five times across the four inventions. In the fourth scenario, the fifty respondents thought a solution was obvious a total of eighty times across the four inventions.

²³³ As a matter of random chance, the two groups of respondents may have simply

While we are open to other interpretations, we believe that the difference in results between the third and fourth scenarios arose because the fourth scenario's engagement corrects, either in whole or in part, an otherwise inherent bias in obviousness determinations. Specifically, we asked the decision maker in these cases to resolve obviousness issues as if they were persons having ordinary skill in the art. Yet they have no such skill. Lacking such skill, our decision makers are likely to overestimate the difficulty of solving any given technological problem. Absent the technical background to understand the prior art references, see the principles underlying them, and recognize their possible connections, our obviousness decision maker, whether judge or jury, may, if not at trial then certainly given the limited information provided in Professor Mandel's survey format, see the prior art references as inherently indecipherable. Allowing our obviousness decision makers to use hindsight helps them understand these references, see their principles, and recognize their connections as if the decision makers had skill in the art.

The question remains, however, whether hindsight goes too far and allows the decision maker to see these things too easily. Our survey results are consistent with the proposition that the availability of certain hindsight information, specifically the knowledge that the problem was solved and how, helps the decision maker neither too much nor too little, but just the right amount. In our study, when we tried to correct for this lack of skill by asking our respondents to engage the problem more like persons having ordinary skill in the art, we get an obviousness result that is at the same time (1) higher than the obviousness results in the partial-hindsight-without-engagement scenario and (2) statistically identical to the results in the pure hindsight scenario. Taken together, these results suggest that the hindsight at issue in Professor Mandel's study, rather than introducing a bias into the system, may merely correct for a bias already present. By using hindsight knowledge of the fact and nature of

perceived the obviousness issue differently. While our test for statistical significance suggests a less than 10% chance that random chance alone accounts for the difference, it does not foreclose that possibility entirely.

the solution found, a person having no skill in the art can reach an obviousness outcome that more closely parallels the outcome that would have been reached by a person skilled in the art. Rather than lead to bias and incorrect obviousness determinations, our results suggest that the use of hindsight of this sort may improve decisionmaking on the obviousness issue.

V. WHO'S AFRAID OF A LITTLE HINDSIGHT?

Our results thus suggest that we should not allow our fear of hindsight to preclude a tough, vibrantly enforced nonobviousness standard. A robust nonobviousness requirement plays an essential part in ensuring the efficiency of the patent system. It reduces the extent to which the patent system overprotects relatively easy innovations, and by doing so, it ensures that the patent system can provide the more extensive protection necessary to bring forth relatively difficult innovations.

Since its advent in 1982, the Federal Circuit has been reluctant to enforce the nonobviousness requirement as vigorously as the regional circuits and the Supreme Court had previously. Although not the only factor, a fear of hindsight bias has played an important role in this reluctance. The fear is that even a nonobvious advance will appear obvious once it has been made. While long part of patent law, this fear has become paralyzing in recent years, and it led, for example, the Federal Circuit to require a teaching, suggestion, or motivation before elements from different pieces of prior art could be combined to show obviousness.

In *KSR International Co. v. Teleflex Inc.*, the Supreme Court held that a teaching, suggestion, or motivation was not required and otherwise attempted to reinvigorate the nonobviousness requirement. Moreover, the Court expressly cautioned the Federal Circuit that it “drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias.”²³⁴ Nevertheless, despite a small post-*KSR* bump in enforcement, the

²³⁴ *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

nonobviousness requirement remains a pale shadow of its former self.

For patent law to “promote the Progress of . . . useful Arts”²³⁵ effectively, this fear of hindsight and the resulting reluctance to enforce a vibrant nonobviousness requirement needs to end. Of course, it is possible that a judge or jury will too readily infer obviousness from the mere fact that a solution has been found or an invention has been made. Yet, against this possibility, the law has long recognized a simple and effective response: If it were so easy, why didn’t someone else think of it? For nearly a hundred years, courts held that this response adequately countered the risk of hindsight bias that might otherwise arise from the mere fact of invention.

In a pair of articles, Professor Mandel attempts to provide a firmer basis for patent law’s fear of hindsight. While his work demonstrates a sharp difference in obviousness outcomes between foresight and hindsight scenarios, we are not convinced (1) that his results reflect likely real-world differences, rather than mere artifacts of survey design; and (2) that his results, even if reflective of real-world outcomes, represent a bias rather than merely a difference. In other words, even if the foresight and hindsight outcomes are different, it is not clear to us which comes closer to the socially optimal obviousness outcome.

By expanding on Professor Mandel’s work to include surveys with “partial hindsight” and “partial hindsight with engagement” scenarios, we set out to explore some of the weaknesses we perceived in Professor Mandel’s work. While there remains considerable work to be done in this area, our results are consistent with the proposition that there is not a hindsight bias problem in patent nonobviousness determinations. From our perspective, our fourth scenario, where respondents were given four possible solutions and were asked to write a brief description of their own ideas for a solution, comes closest to an unbiased and realistic representation of nonobviousness litigation. For that

²³⁵ U.S. CONST. art. I, § 8, cl. 8.

scenario, the obviousness outcomes were statistically indistinguishable from those for the perfect hindsight scenario.

While we do not contend that our results definitively establish that hindsight can never bias obviousness determinations, we believe that our results tend to show that hindsight knowledge of the fact of invention is unlikely to bias obviousness determinations in the context of real-world litigation. To paraphrase Franklin D. Roosevelt, when it comes to our fear of hindsight bias, the only thing we may have to fear is our fear itself. We should not allow our fear to prevent us from restoring the nonobviousness requirement to its proper place in an efficient and well-functioning patent system.

