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Nonobviousness: Before and After

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Nonobviousness: Before and After

Dmitry Karshted*

ABSTRACT: The requirement of nonobviousness, codified in 35 U.S.C. § 103, has been called “the ultimate condition of patentability” because of its crucial function of keeping technically trivial inventions out of the patent system. The obviousness determination must be made based on the state of the invention’s field at a particular point in time—in the Patent Act’s current version, the date that the patent application was effectively filed with the U.S. Patent and Trademark Office (“PTO”).

*However, in spite of the critical role of time in patent law and the danger that hindsight bias could distort § 103 analysis when patentability is evaluated long after the relevant date (as it usually is), the seminal Supreme Court obviousness opinion in *Graham v. John Deere* said little about temporal considerations. Instead, *Graham*’s lasting contribution was to suggest that the § 103 inquiry is to be divided into two stages based on the source of the proffered evidence. The Court said that as an initial matter, the PTO or a court should look to pre-patent publications and other materials in the public*

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domain and determine the differences between those disclosures and the patent claim at issue. Further, should the parties introduce additional evidence that the Court called “secondary considerations,” such as commercial success of the patented product or failure of others to come up with the claimed invention, decision-makers would need to continue the analysis to determine the relevance and weight of this evidence before making a final judgment on validity. Although courts and commentators disagree vigorously about the relative roles of these two aspects of the nonobviousness calculus, the primary-secondary framework has a central place in the law of § 103.

This Article shows that *Graham*’s apparent creation of two tiers of obviousness evidence has caused confusion and error, and should be rejected in favor of a different approach that is focused on time. First, the rigid segmenting of the patentability inquiry into two steps, which is seen in some lower-court decisions interpreting *Graham*, has caused certain evidence to be arbitrarily discounted or bolstered depending on whether it falls into the primary or secondary silo. Second, and more pernicious, these evidentiary tiers have obscured the significance of time for patentability. This Article argues that, instead, the filing date of the patent application as the default dividing line between the pre- and post-invention state of the relevant field provides a more logical fulcrum around which to organize the § 103 analysis. Accordingly, obviousness evidence should be classified based on whether it came into existence independently of the patent and generally prior to filing (*ex ante*) or, instead, whether it appeared in response to the invention or during its further, post-filing, development (*ex post*). This Article demonstrates that the proposed scheme would pave the way to a more rational approach to § 103 by helping decision-makers determine the relevance and weight of various obviousness evidence with greater accuracy.

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I. INTRODUCTION

The requirement of nonobviousness, codified in the Patent Act in 35 U.S.C. § 103, has been called “the ultimate condition of patentability”¹ because it serves the key function of weeding out patents on technically trivial inventions² and is contested in a large majority of patent cases.³ Decision-

1. See NONOBVIOUSNESS—THE ULTIMATE CONDITION OF PATENTABILITY (John F. Witherspoon ed., 1980); see also Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1593 (2011) (collecting references); John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771, 789 (2003) (identifying nonobviousness as “[t]he fundamental gatekeeper to patenting”).

2. ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 512–13 (7th ed. 2017).

3. Daralyn J. Durie & Mark A. Lemley, *A Realistic Approach to the Obviousness of Inventions*, 50 WM. & MARY L. REV. 989, 990 (2008) (citing John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 209 tbl.2 (1998)); see also *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1074 (Fed. Cir. 2016) (en banc) (Dyk, J., dissenting) (“Obviousness is

makers have struggled to devise a framework for determining if a patent claim would have been obvious,⁴ and the challenge of § 103 can be highlighted in comparison to its U.S. Code neighbor, § 102.⁵ The requirement of novelty in § 102 is addressed to a relatively tractable, rule-like question of whether a single piece of “prior art”—such as a previous patent or a journal publication—identically discloses all the elements of the invention to which the would-be patentee is attempting to claim a right.⁶ In contrast, nonobviousness is a relatively amorphous standard that bars patents on inventions that have not improved enough upon the prior art.⁷

Indeed, the statute is not very informative on what it takes for a patent claim to be adjudged nonobvious. Section 103 states that obviousness is decided based on whether “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious,”⁸ thus committing the cardinal sin of using the term to be defined in its own definition. Moreover, this language does not answer the difficult question of how significant the differences between the prior art and the claim must be in order to pass § 103.⁹ Given the meager guidance in the Patent Act and the fact that the origins of obviousness are non-statutory, the

the most common invalidity issue in both district court and post-grant proceedings before the PTO.”).

4. See, e.g., Gregory Mandel, *The Non-Obvious Problem: How the Indeterminate Nonobviousness Standard Produces Excessive Patent Grants*, 42 U.C. DAVIS L. REV. 57, 61 (2008) [hereinafter Mandel, *Excessive Patent Grants*].

5. See 35 U.S.C. § 102 (2018).

6. See Gregory Dolin, *Exclusivity Without Patents: The New Frontier of FDA Regulation for Genetic Materials*, 98 IOWA L. REV. 1399, 1433 n.249 (2013) (“In order for [a claim] to fail the § 102 test, the prior art has to disclose the *exact same* invention.” (citing *Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 780 (Fed. Cir. 1985))). An alternative to the strict novelty principle is “substantial novelty,” sometimes also described as “substantial identity”—a concept that overlaps in some aspects with the modern nonobviousness requirement. See MERGES & DUFFY, *supra* note 2, at 401 (discussing the relationship between substantial novelty and nonobviousness). See generally N. Scott Pierce, *Common Sense: Treating Statutory Non-Obviousness as a Novelty Issue*, 25 SANTA CLARA COMPUT. & HIGH TECH. L.J. 539 (2012) (arguing that nonobviousness is best analyzed as substantial novelty).

7. Sean B. Seymore, *Reinvention*, 92 NOTRE DAME L. REV. 1031, 1064 (2017) (“Nonobviousness is a standard.”); see also MERGES & DUFFY, *supra* note 2, at 643 (discussing some challenges in applying the nonobviousness standard).

8. 35 U.S.C. § 103.

9. Mandel, *Excessive Patent Grants*, *supra* note 4, at 88–89 (identifying this feature of the statute as one of three factors leading to indeterminacy). See generally Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 ST. JOHN’S L. REV. 39 (2008) (making this observation about the statute and the case law); John F. Duffy, *A Timing Approach to Patentability*, 12 LEWIS & CLARK L. REV. 343 (2008) [hereinafter Duffy, *Timing Approach*] (arguing that a “timing approach” can achieve greater clarity for determining what would have been obvious); Joseph Scott Miller, *Nonobviousness: Looking Back and Looking Ahead*, in 2 INTELLECTUAL PROPERTY AND INFORMATION WEALTH: ISSUES AND PRACTICES IN THE DIGITAL AGE 1 (Peter K. Yu ed., 2007) [hereinafter Miller, *Looking Back*] (reviewing development of the nonobviousness standard in view of the limited statutory guidance).

framework for applying this requirement of patentability has naturally been built up and refined mostly through case law development.¹⁰ Courts, however, have not done much better, instead complicating the inquiry without a clear payoff.

Specifically, the Supreme Court's seminal 1966 opinion in *Graham v. John Deere* has led to a dubious segmentation of the obviousness inquiry into two stages, during which two different kinds of evidence are respectively analyzed.¹¹ The first stage incorporates the factors captured by the statutory language, and thus calls on a tribunal to examine disclosures in the prior art references, the differences between them and the patent claim at issue, and the level of ordinary skill in the relevant field.¹² The second stage—which covers evidence that the Supreme Court actually termed “secondary considerations,”¹³ but other courts have sometimes described as “objective indicia”¹⁴—involves looking at real-world facts such as commercial success of the patented product and failure of others to come up with the claimed invention.¹⁵ Given all this information, the tribunal is ultimately supposed to determine if the invention would have been obvious to a hypothetical “person having ordinary skill in the art” (“PHOSITA”) as of the date that the patent application was filed.¹⁶ But courts have offered little guidance on how to integrate these two types of evidence into the ultimate § 103 determination.

The *Apple v. Samsung* litigation over patents covering smartphone features illustrates the doctrinal difficulties created by *Graham*.¹⁷ One of the patents asserted by Apple covered the familiar “slide to unlock” tool.¹⁸ Samsung's key prior art against the patent was a mobile phone with a touch-sensitive screen that could be unlocked by the sweep of a finger.¹⁹ But the screen lacked an “unlock image” (e.g., a touch-sensitive arrow) claimed by

10. Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051, 2052 (2007) (“[T]he issue's status as a question of law, as well as the spare statutory language, means that the law of obviousness is entirely a creation of the courts.”).

11. See *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

12. *Id.*

13. *Id.* at 17–18.

14. *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016).

15. *Graham*, 383 U.S. at 17–18.

16. See *WBIP*, 829 F.3d at 1334. PHOSITA is a term of art in patent law that refers to a hypothetical construct, sometimes likened to the reasonable person of negligence law, from whose perspective obviousness is evaluated. See Jonathan J. Darrow, *The Neglected Dimension of Patent Law's PHOSITA Standard*, 23 HARV. J.L. & TECH. 227, 227–28 (2009); Rebecca S. Eisenberg, *Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L.J. 885, 885–86 (2004) [hereinafter Eisenberg, *Obvious to Whom*]; Greg Reilly, *Rethinking the PHOSITA in Patent Litigation*, 48 LOY. U. CHI. L.J. 501, 501 (2016).

17. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–62 (Fed. Cir. 2016) (en banc).

18. *Id.* at 1049–50.

19. *Id.* at 1050.

Apple, which foreclosed an argument for lack of novelty under § 102.²⁰ The second reference described a wall-mounted air conditioning unit that could be powered on by, among other methods, toggling a graphical “slider” on a touchscreen between the “off” and “on” positions.²¹ The two pieces of prior art together disclosed all the elements of the slide-to-unlock claim that Samsung was accused of infringing.²² But would it have been obvious for a PHOSITA to combine them to achieve this invention at the relevant time?²³

Apple argued that the use of the unlock tool in a mobile phone embodied a creative insight worthy of a patent under § 103.²⁴ Apple’s experts explained that a PHOSITA would not have thought to modify the prior art phone with a slider because the toggle switch was not popular with users and that, in any event, technology from wall-mounted devices cannot be readily adapted to smartphones.²⁵ Apple also introduced several pieces of secondary considerations evidence: namely, that the invention solved the longstanding problem of pocket dialing, was copied by Samsung, and helped drive the iPhone’s commercial success.²⁶ Samsung, in contrast, contended that the slide-to-unlock claim was so close to the prior art that it would have been obvious as a matter of law.²⁷

A jury found that the claim was not invalid and the Court of Appeals for the Federal Circuit, the court with exclusive jurisdiction over patent appeals, ultimately upheld that verdict in an en banc decision.²⁸ *Apple* concluded that

[t]hough the prior art references each relate to touchscreens, the totality of the evidence supports the conclusion that it would not have been obvious for a skilled artisan, seeking an unlock mechanism that would be both intuitive to use and solve the pocket dialing problem for cell phones, to look to a wall-mounted controller for an air conditioner.²⁹

20. *Id.*

21. *Id.* at 1051.

22. *Id.* at 1049–51.

23. Here, the apparent date for measuring validity was the so-called “priority date” of the application that matured into the slide-to-unlock patent, which was December 23, 2005. *See* U.S. Patent No. 8,046,721, at [63].

24. *Apple*, 839 F.3d at 1051.

25. *Id.*

26. *Id.* at 1052–57.

27. *Id.* at 1050–51. Invalidating an asserted claim is a way for a defendant in a patent case to avoid liability for infringement. *See* 35 U.S.C. § 282(b)(2) (2018).

28. *Apple*, 839 F.3d at 1039–40, 1058. In doing so, the full court reversed a panel decision that had essentially reached contrary conclusions on every factual issue underlying the obviousness determination, as well as on the overall role of secondary considerations in the § 103 inquiry. *Apple Inc. v. Samsung Elecs. Co.*, 816 F.3d 788 (Fed. Cir.), *vacated in part on reh’g en banc*, 839 F.3d 1034 (Fed. Cir. 2016).

29. *Apple*, 839 F.3d at 1058.

The court then proceeded to address secondary considerations. It noted that “the objective indicia found by the jury . . . are particularly strong in this case and powerfully weigh in favor of validity”³⁰ and added that “[t]hese real world indicators of whether the combination would have been obvious to the skilled artisan in this case ‘tip the scales of patentability.’”³¹ Thus, like the other evidence addressed in *Apple*, objective indicia favored nonobviousness. But what if the two kinds of evidence pointed in opposite directions? How do we know when secondary considerations are strong enough relative to the other evidence to tip the scales toward patentability?³² The Federal Circuit said little on this score,³³ and generally provided scant guidance on the role of objective indicia other than to say that they must be considered if a party proffers them.³⁴

Apple exemplifies some of the problems created by *Graham*: Courts have not been clear on the framework for determining obviousness and the function of secondary considerations within it. For example, some opinions relegate objective indicia to rebuttal evidence,³⁵ while others treat them as an integral part of the § 103 inquiry.³⁶ These inconsistencies raise the unwelcome specter of arbitrary decision-making.³⁷ Even more pernicious, and central to this Article’s thesis, is the problem that the very distinction between the two types of evidence is not particularly coherent given the scheme for evaluating obviousness that courts have developed after *Graham*. This Article’s goal is to show that a different approach to classifying § 103 evidence would help resolve the tensions in the case law and better effectuate the goals of this requirement.

Indeed, a mechanism for screening out patents on technically trivial inventions is essential to a well-functioning patent system—and nonobviousness plays that critical role.³⁸ First, inventions that embody insignificant variations on what is known are likely to be created without the

30. *Id.*

31. *Id.* (quoting *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966)).

32. Those were the very issues at play in the panel opinion that the full court ultimately vacated and reversed. *See Apple*, 816 F.3d at 804 (“Here, the prima facie case of obviousness was strong. Apple’s evidence of secondary considerations was weak and did not support a conclusion that the . . . patent was nonobvious.”).

33. The court offered only the cryptic statement that “[t]o the extent that [an earlier opinion] should be interpreted as precluding a jury finding of long-felt need favoring non-obviousness when the difference between the prior art and the claimed invention is small, we reject such a categorical rule.” *Apple*, 839 F.3d at 1056 (citing *Geo. M. Martin Co. v. All. Mach. Sys. Int’l LLC*, 618 F.3d 1294, 1304 (Fed. Cir. 2010)).

34. *Id.* at 1048.

35. *See, e.g., Myers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010).

36. *See, e.g., Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1357 (Fed. Cir. 2013).

37. *See infra* Part III; *see also Merck Sharpe & Dohme Corp. v. Hospira, Inc.* 874 F.3d 724, 731–34 (Fed. Cir. 2017) (Newman, J., dissenting) (detailing the inconsistencies in the Federal Circuit’s case law on this point).

38. MERGES & DUFFY, *supra* note 2, at 643.

incentive of a patent.³⁹ In these circumstances, “denying a patent on the innovation costs society nothing (because the innovation would be developed anyway) and saves society from needlessly suffering the well-known negative consequences of patents.”⁴⁰ Second, rewarding routine innovation with patents may channel resources toward the low-hanging fruit and away from higher-value projects, slowing technological progress.⁴¹ Third, a lax or non-existent nonobviousness requirement can contribute to the growth of so-called “patent thickets,” resulting in high search costs for various participants in the economy who may be affected by patents.⁴²

While these economic considerations amply justify § 103, it can be difficult to figure out directly if an invention would have been made, or at least made nearly as quickly,⁴³ without the inducement of a patent. Furthermore, the PTO and courts probably do not have the institutional capacities to measure if a particular patent grant would lead to unjustifiable “deadweight losses” (i.e., higher prices commanded by patented products) and other economic inefficiencies.⁴⁴ Instead, the modern approach to obviousness relies largely on the difficulty of the cognitive and technical tasks of coming up with the claimed invention as a proxy for screening out patents of questionable social value.⁴⁵ Under this framework, patentability is determined based on whether the subject matter would have been risky for a PHOSITA to pursue and challenging to discover at the time of patent

39. Abramowicz & Duffy, *supra* note 1, at 1594.

40. *Id.*

41. MERGES & DUFFY, *supra* note 2, at 516 (“[G]ranting patents to obvious developments may compromise the incentives that the patent system provides to develop nonobvious inventions.”).

42. See John F. Duffy, *Inventing Invention: A Case Study of Legal Innovation*, 86 TEX. L. REV. 1, 12 (2007) [hereinafter Duffy, *Inventing Invention*]; MERGES & DUFFY, *supra* note 2, at 516–17.

43. Abramowicz & Duffy, *supra* note 1, at 1626–27; Chiang, *supra* note 9, at 41–42.

44. See Stuart Minor Benjamin & Arti K. Rai, *Who’s Afraid of the APA? What the Patent System Can Learn from Administrative Law*, 95 GEO. L.J. 269, 276–77 (2007) (“Instead of asking whether a given patent is necessary to promote innovation, the patent statute directs the PTO to determine whether the patent application meets validity standards that have scientific and technical underpinnings.”); see also *id.* at 278 (“Scientifically- and technically-based requirements such as nonobviousness can . . . serve as reasonably good proxies for the ultimate economic inquiry.”). *But cf.* Abramowicz & Duffy, *supra* note 1, at 1655–77 (making the contrary argument that these adjudicators can and should perform the requisite economic analysis). To be clear, an approach to obviousness that is more focused on economic rather than cognitive challenges of pursuing the claimed invention can still benefit from this Article’s proposal, except that the focus of the evidence would be on an ex ante economic risk rather than a technical or cognitive one.

45. See Jeanne C. Fromer, *A Psychology of Intellectual Property*, 104 NW. U. L. REV. 1441, 1487–92 (2010) (discussing the cognitive aspect of obviousness determinations); Amy L. Landers, *Ordinary Creativity in Patent Law: The Artist Within the Scientist*, 75 MO. L. REV. 1, 69–75 (2010) (examining mental processes that reflect ordinary creativity for the purposes of obviousness analysis); Laura G. Pedraza-Fariña, *Patent Law and the Sociology of Innovation*, 2013 WIS. L. REV. 813, 830–32 [hereinafter Pedraza-Fariña, *Sociology of Innovation*] (discussing the risk dimension of the nonobviousness requirement).

application filing.⁴⁶ Although, as Michael Abramowicz and John Duffy have shown, this approach reflects some built-in economic considerations, the focus of the current doctrine is mainly on the technical challenge of getting to the claimed invention.⁴⁷

Superimposed upon the primary-secondary distinction, the test for implementing the cognitive framework asks whether a PHOSITA would have been motivated to “modify” or “combine” the prior art to arrive at the invention,⁴⁸ and would have had a reasonable expectation of success of doing so, at the time of filing.⁴⁹ This test was developed by the Federal Circuit and arguably endorsed by the Supreme Court in *KSR International v. Teleflex*,⁵⁰ a key post-*Graham* § 103 decision. Nevertheless, subsequent cases have not fully reconciled *KSR* and *Graham*. For example, it has not been clearly recognized that *KSR* implicitly undermined *Graham* by emphasizing the value of evidence not in the prior art and exhorting lower courts to pay heed to timing in the § 103 analysis.⁵¹ Moreover, as the *Apple* case illustrates, evidence like commercial success and failure of others fits uneasily within the motivation-expectation inquiry.⁵²

This Article builds on the work of scholars who have made foundational observations that secondary considerations are generally something of a puzzle. For example, several commentators have critiqued the relevance of some of this evidence⁵³ and the Federal Circuit’s inconsistent treatment of it.⁵⁴ This Article adds to these contributions by making a more sweeping point

46. See *infra* Section II.C.

47. See Abramowicz & Duffy, *supra* note 1, at 1608–12; see also Laura G. Pedraza-Fariña & Ryan Whalen, *A Network Theory of Patentability*, 87 U. CHI. L. REV. 63, 84 (2020) (noting the complexities in the cognitive approach to obviousness).

48. I use quotation marks because the inventor usually does not actually modify the prior art—rather, the question is whether the “omniscient” PHOSITA would be able to do so readily. See, e.g., *In re Winslow*, 365 F.2d 1017, 1020 (C.C.P.A. 1966).

49. See *infra* Section II.C. Sometimes, these elements are phrased somewhat differently, depending on the nature of the specific problem addressed by the invention. See, e.g., *Hoffmann-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1329, 1331 (Fed. Cir. 2014) (explaining that “[t]he issue in this case is whether it would have been obvious at the time of invention to select” the claimed invention’s parameters and later going on to discuss “a reasonable expectation of success”).

50. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 408, 410–11, 414 (2007).

51. See *infra* Section III.C.2.

52. See *supra* notes 24–34 and accompanying text.

53. Edmund W. Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293, 315–20 [hereinafter Kitch, *New Standards for Patents*]; Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CALIF. L. REV. 803, 859 (1988) [hereinafter Merges, *Commercial Success*] (contending that “commercial success is a poor indicator of significant technical advance” in many circumstances).

54. Jonathan J. Darrow, *Secondary Considerations: A Structured Framework for Patent Analysis*, 74 ALB. L. REV. 47, 50–53 (2011) [hereinafter Darrow, *Secondary Considerations*]; Rebecca S. Eisenberg, *Pharma’s Nonobvious Problem*, 12 LEWIS & CLARK L. REV. 375, 383, 418 (2008) [hereinafter Eisenberg, *Nonobvious Problem*] (noting that the Federal Circuit on the one hand “has fortified the relevance of” objective indicia, but on the other that “[t]he coding of [certain] evidence as

about secondary considerations and their role within the cognitive framework. It argues that *Graham's* very scheme is problematic and outdated and should be abandoned. Confusion and error have set in because the primary-secondary distinction obscures the significance of time that *KSR* sought to reinforce. This Article then argues that the *Graham* heuristic should be more explicitly displaced by a framework that better accounts for the crucial role of the time of filing.⁵⁵

In short, this Article contends that obviousness evidence has been characterized based on the wrong feature. It shows that the logically salient dividing line is not between primary and secondary factors, but rather between evidence coming into existence independently of the invention and usually prior to the filing date of the patent application (*ex ante*) and evidence that appears in response to the invention or during its further, post-filing, development (*ex post*).⁵⁶ Although courts and commentators have addressed the significance of timing for obviousness—in the context of so-called “hindsight bias,”⁵⁷ and beyond⁵⁸—the distinction between *ex ante* and *ex post* evidence has not yet been articulated in a comprehensive way. This Article fills this gap and maintains that the proposed approach would facilitate the tasks of ascertaining the relevance and weight of various pieces of obviousness evidence and thus lead to a more coherent and accurate patentability analysis.

The filing date provides a natural scheme for organizing the evidence in § 103 cases because *ex ante* and *ex post* factors are relevant to the motivation and reasonable expectation elements in analytically distinct ways. *Ex ante* evidence bears *directly* on the state of the art at the time of filing and, thus, on a PHOSITA's challenge in bridging the differences between the prior art and

‘secondary’ may have led the Federal Circuit to discount its relevance in” an important decision). See generally Duffy, *Timing Approach*, *supra* note 9 (proposing an approach to weighing secondary considerations based on timing); Durie & Lemley, *supra* note 3 (arguing that courts should focus on secondary considerations evidence that is realistically available to a PHOSITA).

55. See *infra* Part IV; see also *infra* Table 2 (tabulating the proposed changes).

56. While this Article uses the phrase “filing date” for simplicity, a technically more accurate term is “priority” date, see 35 U.S.C. §§ 119, 120 (2018), which refers to the “effective filing date” of a patent application, see *id.* § 100(i). For the differences in the law before and after the Leahy–Smith America Invents Act (AIA), Pub. L. No. 112-29, 125 Stat. 284 (2011), with respect to the relevant dates against which novelty and nonobviousness are measured, see *infra* notes 357–58 and accompanying text.

57. See, e.g., *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (discussing hindsight bias); Gregory N. Mandel, *Patently Non-Obvious: Empirical Demonstration that the Hindsight Bias Renders Patent Decisions Irrational*, 67 OHIO ST. L.J. 1391, 1400–03 (2006) [hereinafter Mandel, *Hindsight Bias*] (providing empirical evidence of hindsight bias in the adjudication of patent cases). For more discussion of hindsight bias, see *infra* notes 165–71 and accompanying text.

58. See, e.g., *Forest Lab'ys, LLC v. Sigmapharm Lab'ys, LLC*, 918 F.3d 928, 937 (Fed. Cir. 2019) (noting the importance of analyzing certain § 103 evidence based on the time of filing). See generally Duffy, *Timing Approach*, *supra* note 9 (addressing the significance of the length of time that a piece of evidence was available for nonobviousness determinations).

the invention.⁵⁹ In contrast, ex post evidence requires a more attenuated chain of inferences and accordingly bears *indirectly* on these issues.⁶⁰ Although this feature does not make it consistently less probative than ex ante evidence, the indirect nature of ex post evidence does create the additional burden of connecting it to the time of filing. This insight extends the concept of “nexus,” which courts currently rely on mainly to test if the proffered objective indicia relate to the technical merit of the claimed invention,⁶¹ to timing considerations.

The rest of this Article proceeds as follows. Part II sets forth the doctrinal foundations of obviousness, discusses and critiques the *Graham* opinion, and chronicles *Graham’s* aftermath—which includes the emergence of the cognitive approach and an increasing recognition of the significance of time in the § 103 inquiry. Part III lays out the Article’s first contribution, detailing the shortcomings of the primary-secondary framework and arguing that courts should no longer rely on it. Part IV describes the Article’s second contribution, demonstrating how and why § 103 decision-making would be improved by focusing on the distinction between ex ante and ex post evidence. The Article then concludes in Part V.

II. NONOBVIOUSNESS: HISTORY AND DEVELOPMENT

A. LIFE BEFORE GRAHAM: “INVENTION” AND CODIFICATION

The core statutory patentability requirements dating back to the earliest versions of the Patent Act are novelty and utility.⁶² Novelty, now codified in § 102, mandates that all the elements of the patent claim under review not be identically disclosed in a single prior art reference, and utility, in § 101, requires patented inventions to be useful—both relatively low bars.⁶³ Nonetheless, the history of U.S. patent law reflects a pervasive sense that these prerequisites are not sufficient for a well-functioning patent system.⁶⁴ If one believes that patents on technically trivial advances should be prohibited, then novelty and utility are inadequate⁶⁵ because a trivial invention can undoubtedly

59. *But cf.* Merges, *Commercial Success*, *supra* note 53, at 863 (contending that some types of pre-filing evidence constitute indirect evidence of nonobviousness from the technical perspective).

60. *See infra* Section IV.A.

61. *See, e.g.*, *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219–23 (Fed. Cir. 2016); *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006).

62. *See* Duffy, *Inventing Invention*, *supra* note 42, at 34.

63. *See* MERGES & DUFFY, *supra* note 2, at 201; *supra* note 6 and accompanying text.

64. *See* Frank D. Prager, *Standards of Patentable Invention from 1474 to 1952*, 20 U. CHI. L. REV. 69, 69 (1952) (“[O]ur judges and patent examiners agree that ‘invention,’ in addition to plain novelty and utility, is one of the important prerequisites of a valid patent.”).

65. *See* Duffy, *Inventing Invention*, *supra* note 42, at 2 (“Though nonobviousness is the most recently developed of the three requirements for obtaining a patent, it is now generally considered to be the defining feature of invention.”); Pierce, *supra* note 6, at 557–75 (discussing the early history of the “invention” requirement). *See generally* Edward C. Walterscheid, *The Hotchkiss Unobviousness Standard: Early Judicial Activism in the Patent Law*, 13 J. INTEL. PROP. L. 103 (2005)

be new and economically useful.⁶⁶ Accordingly, from the early days of the U.S. patent system, some courts sought to impose a patentability standard beyond novelty and utility.⁶⁷ Purporting to summarize this law, Willard Phillips stated in his 1837 treatise that “[a]n invention may be slight and trivial as being so obvious and apparent that it cannot be considered a discovery”⁶⁸ and maintained that this “defect” renders a patent invalid.⁶⁹

Although historians have questioned the existence of a general nonobviousness standard in early nineteenth-century U.S. patent law,⁷⁰ the Supreme Court held in no uncertain terms in *Hotchkiss v. Greenwood*, decided in 1851, that an invention may be unpatentable even if novel and useful.⁷¹ The patent at issue was directed to a doorknob made of clay or porcelain, which was adapted with a cavity for inserting a special shank that enabled a connection to a door.⁷² Metal and wooden doorknobs having this construction were known, and the clay and porcelain materials have been around for centuries.⁷³ However, the inventors were the first to make clay and porcelain doorknobs with this structure, and asserted that the new knobs were “cheaper and better” than those in the prior art.⁷⁴ But the Court was unmoved and invalidated the patent. It held that “[t]he difference [from the prior art] is

[hereinafter Walterscheid, *Judicial Activism*] (detailing the development of the nonobviousness standard from “invention”).

66. See generally *Reckendorfer v. Faber*, 92 U.S. 347 (1875) (giving a constitutional foundation to a patentability requirement beyond novelty and utility).

67. One way they did that, besides creating the invention requirement, is by imposing a standard of substantial novelty rather than strict novelty. See Duffy, *Inventing Invention*, *supra* note 42, at 18–19; Pierce, *supra* note 6, at 579–82.

68. WILLARD PHILLIPS, *THE LAW OF PATENTS FOR INVENTIONS* 142 (Boston, Am. Stationers’ Co. 1837).

69. *Id.*; see also *id.* at 126 (“To permit a formal, trivial change in an article to be patentable . . . would defeat the beneficial operation of the statute and in effect repeal it.”). A modern casebook calls the Phillips formulation “the first general articulation of the obviousness doctrine anywhere in the world.” MERGES & DUFFY, *supra* note 2, at 525.

70. See Kenneth J. Burchfiel, *Revising the “Original” Patent Clause: Pseudohistory in Constitutional Construction*, 2 HARV. J.L. & TECH. 155, 198–99 (1989); Pierce, *supra* note 6, at 619; Edward C. Walterscheid, *Graham v. John Deere Co. in a Different Light*, 51 IDEA: INTELL. PROP. L. REV. 649, 690 (2011); Walterscheid, *Judicial Activism*, *supra* note 65, at 113; see also *Earle v. Sawyer*, 8 F. Cas. 254, 255–56 (C.C.D. Mass. 1825) (No. 4,247) (Story, Circuit Justice) (rejecting any “invention” requirement beyond novelty and utility); MERGES & DUFFY, *supra* note 2, at 524–26 (discussing early case law rejecting the invention requirement).

71. *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 267 (1851). For an illuminating background of *Hotchkiss*, see Joseph P. Fishman, *Originality’s Other Path*, 109 CALIF. L. REV. (forthcoming 2021) (manuscript at 32–35), <https://ssrn.com/abstract=3620118> [<https://perma.cc/MJV8-4MSC>].

72. *Hotchkiss*, 52 U.S. at 264.

73. *Id.* at 264–65.

74. *Id.* at 266.

formal, and destitute of ingenuity or invention,”⁷⁵ and that “the improvement is the work of the skilful [sic] mechanic, not that of the inventor.”⁷⁶

Hotchkiss paved the way for patent denials for lack of “invention.”⁷⁷ But perhaps because the opinion did not set out a framework for deciding when a patent embodies a contribution greater than that of a “mechanic,” its precise impact was difficult to discern.⁷⁸ In the wake of *Hotchkiss*, courts struggled to develop a standard for what constitutes invention beyond the fact-bound proposition that mere substitution of one material for another without any “peculiar effect” is unpatentable.⁷⁹

One notable subsequent opinion, *Smith v. Goodyear Dental Vulcanite*,⁸⁰ arguably went beyond *Hotchkiss*, pointing the way to a more generally applicable standard of invention and flagging the kinds of evidence that might be important for that inquiry. In upholding the validity of a patent on a method of setting artificial teeth, the Supreme Court focused on the struggles that the field of dentistry had experienced in coming up with the claimed solution:

To find a material, with a mode of using it, capable of being combined with the teeth in such a manner as to be free from the admitted faults of all other known combinations, had been an object long and earnestly sought. It had been a subject for frequent discussion among dentists and in scientific journals. The properties of vulcanite were well known; but how to make use of them for artificial sets of teeth remained undiscovered, and apparently undiscovorable [sic], until [the inventor] revealed the mode.⁸¹

75. *Id.*

76. *Id.* at 267. For an extended critique of *Hotchkiss*, see George M. Sirilla, 35 *U.S.C. § 103: From Hotchkiss to Hand to Rich, the Obvious Patent Law Hall-of-Famers*, 32 J. MARSHALL L. REV. 437, 460–62 (1999). For a recent rehabilitation of *Hotchkiss*, see Craig Allen Nard, *Patent Law’s Purposeful Ambiguity*, 87 TENN. L. REV. 187, 195–96 (2019).

77. See, e.g., *Dunbar v. Myers*, 94 U.S. 187, 197 (1876); *Leonard v. Lovell*, 29 F. 310, 314 (C.C.W.D. Mich. 1886); *Teese v. Phelps*, 23 F. Cas. 832, 833 (C.C.N.D. Cal. 1855) (No. 13,819).

78. See *Kitch*, *New Standards for Patents*, *supra* note 53, at 309; see also *Burchfiel*, *supra* note 70, at 204–05 (maintaining that even Justice Samuel Nelson, the author of *Hotchkiss*, gave that opinion a narrow reading in his subsequent invention decisions); *Pierce*, *supra* note 6, at 579 (evaluating the cases following *Hotchkiss* to understand that opinion’s impact); *Walterscheid*, *Judicial Activism*, *supra* note 65, at 104 (noting a nearly two-decade period before the test set forth in *Hotchkiss* was used to invalidate a patent).

79. *Hotchkiss*, 52 U.S. (11 How.) at 266–67; see Charles Hain Werner, *Invention in Patent Law 15–24* (1895) (LL.B. thesis, Cornell University), https://scholarship.law.cornell.edu/historical_theses/58 [<https://perma.cc/82L5-7XUC>] (attempting to distill workable principles from post-*Hotchkiss* case law).

80. *Smith v. Goodyear Dental Vulcanite Co.*, 93 U.S. 486 (1876).

81. *Id.* at 495; see 1 WILLIAM C. ROBINSON, *THE LAW OF PATENTS FOR USEFUL INVENTIONS* § 122, at 174–76 (Boston, Little, Brown, & Co. 1890) (discussing the value of such evidence in invention cases).

In line with these observations, *Goodyear* suggested that a showing that the claimed subject matter was somehow not within a PHOSITA's ready grasp during the period when the patentee came up with it was generally probative of patentability.⁸² This analytical move both provided a path for distinguishing the facts of *Hotchkiss* from those involving the patent at issue⁸³ and served as an important elaboration of that precedent,⁸⁴ offering an approach to judging patentability beyond the context of substitution of a prior art material. But while the *Goodyear* framework had the potential to grow into a workable test of invention that took into account the PHOSITA's perspective at the relevant time, its deployment was far from uniform.⁸⁵ By the mid-twentieth century, the Court appeared to embrace a different, "deeply subjective"⁸⁶ approach to the invention requirement.⁸⁷ This so-called "flash of creative genius" standard⁸⁸ led to widespread dissatisfaction in the patent bar, which pled with Congress to curtail this latest line of cases.⁸⁹

B. GRAHAM

The reformers' efforts ultimately led to a refashioning of invention as the codified requirement of nonobviousness in the Patent Act of 1952.⁹⁰ In 1966, the Supreme Court interpreted this provision for the first time in *Graham v. John Deere*.⁹¹ The Court concluded that, in adopting § 103, Congress had meant largely to keep the invention case law,⁹² avoided creating any "relaxed standard" of patentability,⁹³ and only rejected the "flash of creative genius" standard.⁹⁴ Nevertheless, *Graham's* discussion of the precedent was so limited that the opinion seemingly reset the law back to the square one of *Hotchkiss*,

82. *Goodyear*, 93 U.S. at 495-97.

83. *Id.* at 496.

84. *Id.* at 492.

85. See, e.g., Nard, *supra* note 76, at 195-98 (noting the generally inconsistent application of the obviousness tests); cf. Pedraza-Fariña & Whalen, *supra* note 47, at 78-79 (noting the difficulties that subjective inquiries into obviousness may create).

86. Nard, *supra* note 76, at 196.

87. See *Great Atl. & Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 150-54 (1950); *Cuno Eng'g Corp. v. Automatic Devices Corp.*, 314 U.S. 84, 90-92 (1941).

88. *Cuno Eng'g*, 314 U.S. at 91; see also John F. Duffy & Robert P. Merges, *The Story of Graham v. John Deere Company: Patent Law's Evolving Standard of Creativity*, in *INTELLECTUAL PROPERTY STORIES* 109, 118-19 (Jane C. Ginsburg & Rochelle Cooper Dreyfuss eds., 2006) (describing the "flash of creative genius" test).

89. See *MERGES & DUFFY*, *supra* note 2, at 531 (discussing the movement "to end the confusion surrounding the invention requirement").

90. See Patent Act of 1952, Pub. L. No. 82-593, § 103, 66 Stat. 792, 798 (codified as amended at 35 U.S.C. § 103 (2018)).

91. See *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

92. See *id.* at 14-15.

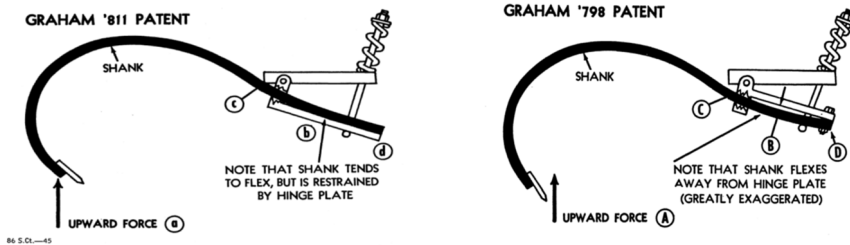
93. See *id.* at 19.

94. See *id.* at 15.

without incorporating insights from later decisions like *Goodyear*.⁹⁵ Moreover, the one significant substantive move that *Graham* did make, which was to introduce the phrase “secondary considerations” into obviousness law, was rather unprecedented and ended up sowing the confusion that this Article seeks to sort out.

1. Background

The opinion captioned as *Graham v. John Deere* is actually a part of a “trilogy” of Supreme Court cases, decided on the same day, that constitute the foundation of the modern nonobviousness requirement.⁹⁶ The technology in *Graham* itself involved so-called “chisel” plows, which were designed to withstand resistance from stones and other obstructions in the soil, that were invented and patented by one William Graham.⁹⁷ A prior art plow (pictured below on the left), also invented by Graham, addressed the problem of plow shank damage caused by rocky soil by attaching the shank to the plow frame with a hinge-like clamp equipped with a spring mechanism, with the whole assembly acting as a kind of a shock absorber.⁹⁸ In the prior art configuration, the shank was positioned between the hinge plate and the plow frame.⁹⁹ That solution, however, suffered from certain drawbacks, including wear and tear on the frame and, perhaps, damage to the shank because of restriction on its flexing due to the plate’s position.¹⁰⁰



In the patent under review, Graham purportedly addressed these problems by placing the shank below the hinge plate, rather than above, to

95. See Steven P. Smith & Kurt R. Van Thomme, *Bridge Over Troubled Water: The Supreme Court’s New Patent Obviousness Standard in KSR Should Be Readily Apparent and Benefit the Public*, 17 ALB. L.J. SCI. & TECH 127, 174–76 (2007).

96. Mandel, *Excessive Patent Grants*, *supra* note 4, at 65–70. The trilogy actually includes four cases—*Graham*, *Calmar, Inc. v. Cook Chemical Co.*, and *Colgate-Palmolive Co. v. Cook Chemical Co.*, which are reported together with *Graham*, and *United States v. Adams*, reported separately. *Graham*, 383 U.S. 1; *United States v. Adams*, 383 U.S. 39, 40 (1966). However, the two *Cook Chemical* cases concern the same patent that was asserted against two separate defendants, so the trilogy ultimately involves three patents.

97. *Graham*, 383 U.S. at 21.

98. *Id.* at 22–24.

99. *See id.*

100. *Id.* at 23 & n.11, 25 & n.13.

make a “free-flex” structure instead (pictured above on the right), and by adding a “stirrup” to limit wear on the frame and further reduce the strain on the shank.¹⁰¹ As it turned out, however, another prior art clamp, Glencoe, also included such a stirrup, though its shank was above the hinge plate just as in Graham’s old clamp.¹⁰² Thus, the shank’s placement was the only feature of the claimed invention distinguishing it from the prior art. The Court of Appeals for the Eighth Circuit concluded that this claim would have been obvious over Graham’s own prior patent and the Glencoe clamp,¹⁰³ and the Supreme Court granted certiorari in *Graham* and in the companion *Cook Chemical* and *Adams* cases in order to set down a definitive interpretation of § 103.¹⁰⁴

The Court held that “the 1952 Act was intended to codify judicial precedents embracing the principle long ago announced by this Court in *Hotchkiss*,”¹⁰⁵ which in turn called for a comparison “between the subject matter of the patent . . . and the background skill of the calling.”¹⁰⁶ But *Graham* did not elaborate on this test.¹⁰⁷ In a much-quoted passage that came to be known as the exposition of the so-called “*Graham* factors,” the Court simply parroted the fact findings required by § 103, explaining that “the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.”¹⁰⁸ It then announced that “[a]gainst this background, the obviousness or nonobviousness of the subject matter is determined.”¹⁰⁹ This framework left much to be desired because it failed to explain how these factors, which are really just fact findings, bear on the conclusion of patentability.¹¹⁰

2. Primary-Secondary Framework

Graham, to be sure, went beyond the language of § 103. Adding a fourth factor, the Court casually noted that “[s]uch secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might

101. *Id.* at 37; *see also id.* at 20–22 (discussing the role of the stirrup in the patent at issue relative to the prior art).

102. *Id.* at 25–26.

103. *John Deere Co. v. Graham*, 333 F.2d 529, 534 (8th Cir. 1964).

104. *Graham*, 383 U.S. at 4–5; *see also* *United States v. Adams*, 383 U.S. 39, 40 (1966) (companion case).

105. *Graham*, 383 U.S. at 3–4.

106. *Id.* at 12.

107. The Court explained that the second sentence of § 103, “[p]atentability shall not be negated by the manner in which the invention was made,” was meant to foreclose the above-mentioned subjective “flash of creative genius” test—which the *Graham* Court characterized as merely “a rhetorical embellishment.” *Id.* at 13, 15 & n.7; *see supra* notes 87–95 and accompanying text.

108. *Graham*, 383 U.S. at 17.

109. *Id.*

110. *See* Chiang, *supra* note 9, at 49–50; Miller, *Looking Back*, *supra* note 9, at 9.

be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.”¹¹¹ It explained that, “[a]s indicia of obviousness or nonobviousness, these inquiries may have relevancy,”¹¹² presumably to bolster patent validity. Over time, other types of evidence came to be recognized as coming within the ambit of *Graham*’s “etc.” They include expert skepticism, industry praise, copying of the patented invention, (sometimes) unexpected results or properties of the claimed invention,¹¹³ and—the only secondary consideration that counts against validity—near-simultaneous invention of the claimed subject matter by others.¹¹⁴

This language, finally, signaled something seemingly new:¹¹⁵ No court prior to *Graham* divided the facts introduced on the issue of obviousness into “secondary considerations”¹¹⁶ and others—presumably, primary ones.¹¹⁷ The Court explained that such indicia are useful for the § 103 inquiry because they are more easily understandable to lay decision-makers than the “the highly technical facts” encompassed in the first three factors.¹¹⁸ In addition, it noted that because their historical-fact character may objectively demonstrate the merits of the claimed invention,¹¹⁹ secondary considerations can help restrain the human tendency to find obviousness through an exercise of

111. *Graham*, 383 U.S. at 17–18.

112. *Id.* at 18 (citing Richard L. Robbins, Note, *Subtests of “Nonobviousness”: A Nontechnical Approach to Patent Validity*, 112 U. PA. L. REV. 1169 (1964)). Some commentators suggested that the “may have relevancy” language signals that the Court thought of this evidence as categorically less important than the prior art. See, e.g., Glynn S. Lunney, Jr. & Christian T. Johnson, *Not So Obvious After All: Patent Law’s Nonobviousness Requirement, KSR, and the Fear of Hindsight Bias*, 47 GA. L. REV. 41, 64 (2012). But the Court was merely stating a legal truism—all potential evidence may or may not have relevancy. See FED. R. EVID. 401; see also Giles S. Rich, *Laying the Ghost of the “Invention” Requirement*, 1 APLA Q.J. 26, 38 (1972) (“Well of course [secondary considerations] do have relevancy and the Supreme Court itself applied them in the *Adams Case*.”).

113. See *infra* notes 289–300 and accompanying text (cataloguing courts’ struggles with classifying unexpected results).

114. See Natalie A. Thomas, Note, *Secondary Considerations in Nonobviousness Analysis: The Use of Objective Indicia Following KSR v. Teleflex*, 86 N.Y.U. L. REV. 2070, 2077 (2011).

115. See Duffy, *Timing Approach*, *supra* note 9, at 364; cf. Darrow, *Secondary Considerations*, *supra* note 54, at 84 & n.216 (cataloguing the literature that discussed the role of non-prior art and non-technical evidence in opinions involving § 103 and the invention requirement, none of which used the “secondary” label).

116. Darrow, *Secondary Considerations*, *supra* note 54, at 48; Thomas, *supra* note 114, at 2075.

117. For an example of an opinion juxtaposing the terms “primary considerations” and “secondary considerations,” see *Commonwealth Sci. & Indus. Rsch. Org. v. Buffalo Tech. (USA), Inc.*, 542 F.3d 1363, 1376–77 (Fed. Cir. 2008).

118. *Graham v. John Deere Co.*, 383 U.S. 1, 35–36 (1966).

119. The absence of secondary considerations, however, is generally not considered to be probative of obviousness. See *infra* note 460 and accompanying text.

hindsight.¹²⁰ This nod to a recurring problem in § 103 jurisprudence was *Graham*'s only attempt to grapple with timing.¹²¹

But where did the primary-secondary framework come from and why was non-prior art evidence bracketed out as a separate factor? The Court cited a student note by Richard Robbins, as well as some lower-court decisions, to support this classification.¹²² The Robbins note perceptively identified the use of evidence such as commercial success of the patented product and failure of others to come up with the claimed solution in § 103 cases, explaining that “[t]he focus of these inquiries is upon economic and motivational rather than technical issues.”¹²³ Nonetheless, in the view of Robbins and of the opinions he discussed, evidence outside the prior art was simply a way to ease the highly technical challenge of determining obviousness,¹²⁴ as opposed to a distinct “secondary consideration.” Notably, neither the Robbins note nor any of the § 103 decisions referenced in it used this phrase. It is possible, perhaps, that by “secondary” the Court simply meant “extrastatutory,” but the opinion never made this point clear.¹²⁵

Moreover, although non-technical and other non-prior art evidence frequently came up in pre-1952 cases applying the invention requirement, including in the *Goodyear* decision analyzed above,¹²⁶ *Graham* cited no opinion endorsing any formal grading of evidence as primary or secondary, and no such precedent appears to exist. It is, of course, the Court's prerogative to create new precedent, but *Graham* did not suggest that it was making a major break with the invention case law—which, as the Court held, § 103 had largely codified.¹²⁷ Nevertheless, *Graham* said what it said, and the “secondary considerations” language launched something of an accidental revolution.

120. *Graham*, 383 U.S. at 35–36.

121. See *In re Sporck*, 301 F.2d 686, 689 (C.C.P.A. 1962) (warning tribunals to take care “to view the prior art without reading into that art the teachings of appellant's invention”); Mandel, *Hindsight Bias*, *supra* note 57, at 1420–21; Samson Vermont, *A New Way to Determine Obviousness: Applying the Pioneer Doctrine to 35 U.S.C. § 103(a)*, 29 AIPLA Q.J. 375, 390 (2001). *But cf.* Eisenberg, *Obvious to Whom*, *supra* note 16, at 887–90 (arguing that the Federal Circuit sometimes overcompensated in its goal to prevent hindsight bias); Lunney & Johnson, *supra* note 112, at 43–47 (similar).

122. See 1 JANICE M. MUELLER, MUELLER ON PATENT LAW: PATENTABILITY AND VALIDITY § 9.02[C][2][b], at 9-19 (2012) (“[T]he Supreme Court gleaned from § 103 (and, rather remarkably, a law student-written article) the . . . four factors that have come to be essential to every nonobviousness analysis . . .”).

123. Robbins, *supra* note 112, at 1172.

124. *Id.*

125. I thank Jonathan Darrow for suggesting that I make this observation. *Cf.* Rich, *supra* note 112, at 38–39 (bemoaning the term “secondary”).

126. See *supra* notes 80–84 and accompanying text.

127. *Graham v. John Deere Co.*, 383 U.S. 1, 19 (1966); see *supra* notes 90–94 and accompanying text.

Thus, lower courts and the PTO have had to intuit the significance of the distinction between the two types of evidence into the present day.¹²⁸

“Intuit” is a word that was chosen intentionally. While the Court lamented “a notorious difference between the standards applied by the Patent Office and by the courts,”¹²⁹ it gave these tribunals little to go on in their quest for uniformity. Moreover, the Court’s validity analysis added little, if any, useful guidance¹³⁰—and worse yet, *Graham* did not even rely very much on its own framework in when it actually decided whether the patents at issue were valid under § 103. In determining that Graham’s patent would have been obvious, the Court did compare his invention to the prior art, thus addressing the “differences” factor, but it did not even mention the level of ordinary skill in the art, nor any secondary considerations.¹³¹ The Court, moreover, did not deal with the problem of hindsight and never explained why the differences were too small for the claim to be patentable as of the relevant time. It only observed tersely that

[c]ertainly 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.¹³²

Problematically, the Court failed to point to any evidence in the record that demonstrated why a PHOSITA would have realized that flexing was a technical challenge that needed to be addressed,¹³³ and its assertion that a

128. This Article focuses on courts and the PTO, but other tribunals empowered to make judgments on patent validity, including the Court of Federal Claims and the International Trade Commission, must also deal with this standard.

129. *Graham*, 383 U.S. at 18.

130. See Chiang, *supra* note 9, at 49–50 (“The opinion gave all the appearance of expecting a solution to appear out of thin air once the formula was followed. The lack of an articulable rule meant that determinations of obviousness took the appearance—and arguably the reality—of resting on judicial whim, where the validity of a patent was heavily dependent on the court that was deciding the case, a result that the drafters of section 103 had clearly sought to avoid.” (footnotes omitted)). This Article focuses on the *Graham* patent, but the Court’s analysis of the Cook Chemical patent is similarly spare. *Graham*, 383 U.S. at 34–37; see Duffy & Merges, *supra* note 88, at 134 (discussing the *Cook Chemical* part of the *Graham* opinion).

131. ROGER E. SCHECHTER & JOHN R. THOMAS, PRINCIPLES OF PATENT LAW 163–64 (3d ed. 2019). Duffy and Merges explain that Graham did not put forward any evidence of secondary considerations (because he did not market the patented product), but the Court did not even mention this point. Duffy & Merges, *supra* note 88, at 140–41.

132. *Graham*, 383 U.S. at 25.

133. Cf. Laura G. Pedraza-Fariña, *The Social Origins of Innovation Failures*, 70 SMU L. REV. 377, 433 (2017) [hereinafter Pedraza-Fariña, *Innovation Failures*] (addressing the importance of problem recognition for nonobviousness).

PHOSITA “would immediately see” the claimed invention was conclusory.¹³⁴ Commenting on *Graham*’s approach, Glynn Lunney and Christian Johnson noted that it embodies the very hindsight reconstruction of the claimed invention from the prior art that the Court had spoken out against earlier in the opinion.¹³⁵ In addition, they observed that *Graham*’s cursory treatment of secondary considerations is difficult to reconcile with its own statements that they can be a critical guard against hindsight bias.¹³⁶ These insights confirm that the Court did not do much to grapple with the issue of time in the § 103 inquiry, nor to clarify the role of secondary considerations in the application of the *Graham* factors.

3. The Court’s Failure to Apply the *Graham* Framework in *Adams*

The Supreme Court’s analysis of the patent asserted against the government by Bert Adams, the one patent in the trilogy that was upheld,¹³⁷ only added to the muddle because the Court appeared to walk away from its own framework in *Graham*. Thus, in considering the claims to a battery employing a water-soluble electrolyte operating in conjunction with a magnesium electrode, the Court made very little use of the approach it had articulated in the immediately preceding pages of the U.S. Reporter.¹³⁸ Concluding that the patent would have been nonobvious, *Adams* instead focused primarily on the fact that an operational “wet” (i.e., water-based) battery was an unexpectedly good result—the product of a research path that, experience suggested, was unlikely to be fruitful.¹³⁹

Adams intimated that evidence which, in today’s patent jargon, would be said to “teach away” from the claim (i.e., to indicate that the path toward the invention should not be taken) may be key to solving the § 103 puzzle.¹⁴⁰ It explained “that known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness.”¹⁴¹ Furthermore, patentability was supported by the fact “that at the time Adams perfected his invention noted experts expressed disbelief in it,” in part because the relevant prior art batteries “cannot be used

134. SCHECHTER & THOMAS, *supra* note 131, at 163–64 (noting the scantiness of *Graham*’s analysis and contending that the Court’s “application of the law to the particular patents at issue seems problematic”).

135. Lunney & Johnson, *supra* note 112, at 90–91.

136. *Id.* at 87.

137. *United States v. Adams*, 383 U.S. 39, 52 (1966).

138. *See generally Graham v. John Deere Co.*, 383 U.S. 1 (1966) (setting forth the primary-secondary framework).

139. *Adams*, 383 U.S. at 51–52.

140. *See infra* notes 308–11 and accompanying text.

141. *Adams*, 383 U.S. at 52. In addition, *Adams* somewhat mixes up the concepts of novelty and nonobviousness. *Id.* at 49–52. *See generally Pierce*, *supra* note 6 (discussing similarities between novelty and nonobviousness).

as sources of power.”¹⁴² Although the Court did not cite to it, *Adams’s* analysis resembled the approach in *Goodyear* in focusing on the difficulties that the field had experienced in coming up with the claimed solution and on crediting the inventor for overcoming the challenges in the prior art to the surprise of many experts.¹⁴³ In sum, *Adams* prevailed in significant part because his technical achievement was thought infeasible prior to (and even after!) his invention.¹⁴⁴

The *Adams* Court addressed the prior art and the differences between it and the claims at length—for example, it discussed batteries with zinc electrodes and explained how zinc is chemically unlike magnesium.¹⁴⁵ But an examination of other factors identified in *Graham*, particularly secondary considerations, is nowhere to be found in the *Adams* opinion. For example, the Robbins note included industry skepticism¹⁴⁶ and “professional approval”¹⁴⁷ as evidence bolstering patentability that could be characterized as secondary,¹⁴⁸ and such evidence played a large role in *Adams*.¹⁴⁹ Nevertheless, the Court did not mention Robbins (nor the relevant discussion in *Graham*) and did not make clear which category the skepticism and approval evidence fell into. Conversely, the notions of unexpected results or of teaching away did not appear either in *Graham* or in the Robbins note, but seemed to be all but decisive in *Adams*. When analyzing this evidence, too, the *Adams* Court did not apply or even mention the primary-secondary divide, making the disconnect with *Graham* palpable.

We will soon see that teaching away and its inverses, such as suggestions for modifying the prior art and other evidence tending to establish a motivation to pursue the claimed invention, have now become central concepts in the law of § 103.¹⁵⁰ As courts have recognized in subsequent cases,

142. *Adams*, 383 U.S. at 51–52.

143. See *supra* notes 80–84 and accompanying text.

144. *Adams*, 383 U.S. at 52 (discussing various signals in the art that “would . . . deter any investigation into such a combination as is used by Adams”). To be sure, skepticism *after* the invention has been shown to work is *ex post*, and is in that sense more similar to praise. Perhaps, to distinguish pre-filing industry skepticism that the path toward the invention would be unproductive from a refusal to believe that the invention actually works, we should be using terms “skepticism” and “disbelief,” respectively. Cf. Darrow, *Secondary Considerations*, *supra* note 54, at 72 (addressing *ex post* skepticism).

145. *Adams*, 383 U.S. at 46, 48–49.

146. See Robbins, *supra* note 112, at 1182 (“[I]f before the issuance of a patent an expert had maintained that what the patentee in fact did could not be done, an inference of nonobviousness would be entirely justified.”).

147. *Id.* at 1181–82. Robbins likewise noted that “failure of other investigators to solve the problem solved by a patentee is evidence of a longfelt demand” that can count toward validity. *Id.* at 1180; see also *id.* at 1174 (discussing this evidence further).

148. These types of evidence are now generally treated as part of the secondary considerations. See *infra* notes 308–11 and accompanying text.

149. See *Adams*, 383 U.S. at 51–52.

150. See *infra* Section II.C.

this kind of evidence properly focuses the obviousness inquiry on the cognitive and technical barriers facing a PHOSITA at the relevant time. This feature makes *Adams* the most contemporary third of the trilogy, but it also creates a challenge to fit this opinion's insights within the *Graham* framework. In all, lower courts have not fully appreciated that *Adams* sidestepped *Graham*'s primary-secondary framework and adopted a more nuanced analytical approach: The Court in *Adams* "traveled back in time" to examine the field's difficulties with the problems ultimately solved by the patent.

C. LIFE AFTER GRAHAM: THE FEDERAL CIRCUIT AND KSR

Although the *Graham* trilogy resolved several important issues,¹⁵¹ it left many questions open and gave the PTO and lower courts no choice but to muddle through.¹⁵² The Supreme Court issued three obviousness opinions in the decade following *Graham*, but they added little clarity or guidance.¹⁵³ The disuniformity¹⁵⁴ in the application of patent law across the United States, often manifested by courts' inconsistent approaches to § 103, eventually led Congress to intervene once again. The Federal Courts Improvement Act of 1982 stripped the regional circuits of jurisdiction over appeals of cases arising under the Patent Act and created the Court of Appeals for the Federal Circuit, which now hears almost every patent appeal in the country.¹⁵⁵

151. For example, the Court ruled that § 103 did not lower the substantive standard of patentability relative to the pre-codification case law. *See supra* note 93 and accompanying text.

152. *See* Charles W. Adams, *The Court of Appeals for the Federal Circuit: More Than a National Patent Court*, 49 MO. L. REV. 43, 55-57 (1984) (detailing the inconsistent approaches to § 103 among the lower courts); Rich, *supra* note 112, at 28 (similar); *see also* Jason Rantanen & Lee Petherbridge, *Disuniformity*, 66 FLA. L. REV. 2007, 2009 (2014) ("The picture that emerged was one of an awkward legal infrastructure. The patent office and its reviewing court, the Court of Customs and Patent Appeals, developed and applied standards of patentability to decide whether patents should validly issue, and the regional circuit courts developed and applied their own different standards to determine whether a given patent had validly issued."). *See generally* Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1 (1989) (discussing the institutional role of the Federal Circuit).

153. *MERGES & DUFFY*, *supra* note 2, at 567-68 (discussing *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969); *Dann v. Johnston*, 425 U.S. 219 (1976); and *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273 (1976)); *cf.* Kevin Rhodes, Comment, *The Federal Circuit's Patent Nonobviousness Standards: Theoretical Perspectives on Recent Doctrinal Changes*, 85 NW. U. L. REV. 1051, 1061-62 (1991) (suggesting that these opinions cemented the primary-secondary distinction).

154. Senator Roman L. Hruska, Address at the First Judicial Conference of the United States Court of Customs and Patent Appeals (Apr. 30, 1974), in 65 F.R.D. 171, 209 (1974); *see also* COMM'N ON REVISION OF THE FED. CT. APP. SYS., STRUCTURE AND INTERNAL PROCEDURES: RECOMMENDATIONS FOR CHANGE (1975), *reprinted in* 67 F.R.D. 195, 199 (1975) (calling for the establishment of a national patent court of appeals); Dorothy Whelan, Note, *A Critique of the Use of Secondary Considerations in Applying the Section 103 Nonobviousness Test for Patentability*, 28 B.C. L. REV. 357, 374 (1987) (explaining "that Congress intended the Federal Circuit to establish uniform standards in the patent law area").

155. Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25.

1. Entrenchment of the Cognitive Approach

The Federal Circuit's takeover of patent law is widely seen as having driven the jurisprudence of § 103 in a decidedly pro-patent direction soon after its creation.¹⁵⁶ As particularly relevant to this Article, the new appellate court elevated the status of secondary considerations so as to sometimes weigh them heavily in the patentee's favor¹⁵⁷ and, more notoriously, crafted the so-called teaching-suggestion-motivation ("TSM") test.¹⁵⁸ As Lee Petherbridge and Polk Wagner explained, TSM demanded that "somewhere within the full scope of the relevant prior art, the claimed subject matter must be sufficiently taught or suggested that it would have been easily perceived by a person of ordinary skill in the art."¹⁵⁹ In the test's more rigorous instantiations, the entity challenging the patent had to identify specifically, and preferably with documentary evidence such as a passage in a reference, why a PHOSITA would seek to modify a key piece of prior art or combine it with another one to arrive at the claimed invention.¹⁶⁰

The TSM test was criticized widely and on numerous grounds. Among other things, many commentators took the Federal Circuit to task for its dubious construction of a PHOSITA as an entity incapable of creative insight, which forced the PTO, trial judges, and juries to ignore common sense or even tacit knowledge as potential sources of information (and motivation) in the inventive process.¹⁶¹ The Federal Circuit was thus faulted for sanctioning the proliferation of patents on technically trivial inventions,¹⁶² which is the

156. See, e.g., Glynn S. Lunney, Jr., *Patent Law, the Federal Circuit, and the Supreme Court: A Quiet Revolution*, 11 SUP. CT. ECON. REV. 1, 17–26 (2003).

157. *Id.* at 19–21; see, e.g., *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1534 (Fed. Cir. 1983).

158. See *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984); Lunney, *supra* note 156, at 21–22; SCHECHTER & THOMAS, *supra* note 131, at 166. Antecedents of the test date back to the time of the Court of Customs and Patent Appeals, one of the Federal Circuit's predecessor courts. See Smith & Van Thomme, *supra* note 95, at 174–76.

159. Petherbridge & Wagner, *supra* note 10, at 2062; see, e.g., *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007) ("Subsumed within the *Graham* factors is a subsidiary requirement articulated by this court that . . . a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so."); Christopher A. Cotropia, *Nonobviousness as an Exercise in Gap Measuring*, in 2 INTELLECTUAL PROPERTY AND INFORMATION WEALTH: ISSUES AND PRACTICES IN THE DIGITAL AGE, *supra* note 9, at 21.

160. See, e.g., *In re Demiczak*, 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."), *abrogated on other grounds by In re Gartside*, 203 F.3d 1305 (Fed. Cir. 2000).

161. See, e.g., Eisenberg, *Obvious to Whom*, *supra* note 16, at 894–95; Lunney, *supra* note 156, at 21–22.

162. See FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 9–15 (2003), <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf> [<https://perma.cc/K64A-HQ7W>].

very problem that the nonobviousness requirement was created to address.¹⁶³ Moreover, a number of commentators maintained that the court did not clearly articulate how the TSM test fit within the *Graham* framework.¹⁶⁴

TSM did, however, speak to one of the concerns mentioned in *Graham* and raised throughout the history of obviousness¹⁶⁵—hindsight bias—which involves “the temptation to read into the prior art the teachings of the invention in issue.”¹⁶⁶ This psychological phenomenon is well-documented,¹⁶⁷ and Gregory Mandel found evidence consistent with its influence on § 103 analysis.¹⁶⁸ Once the invention is actually disclosed to a decision-maker or an expert, the process of getting to it appears much more straightforward than when it is not yet known.¹⁶⁹ In view of the widely acknowledged difficulties of judging obviousness based on the state of the art in the past,¹⁷⁰ as the statute requires, the TSM test was the new court’s responsive attempt to ensure “that the determination of obviousness is to be ascertained at the [relevant] time.”¹⁷¹

Nevertheless, the Federal Circuit’s implementation of TSM was controversial, and the Supreme Court finally addressed it in 2007 in the seminal case of *KSR International v. Teleflex*.¹⁷² The Court “beg[a]n by rejecting the rigid approach of the [Federal Circuit]”¹⁷³ and criticized the lower court for preventing decision-makers from relying on a PHOSITA’s “common sense.”¹⁷⁴ Still, *KSR* ultimately recognized the Federal Circuit’s attempt to grapple with the problem of hindsight. The Court observed that the TSM test “captured a helpful insight” into obviousness¹⁷⁵ and explained that the question of what “would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention

163. See *supra* notes 1–2 and accompanying text.

164. Lunney & Johnson, *supra* note 112, at 63–65; Rhodes, *supra* note 153, at 1066–68.

165. See, e.g., *Loom Co. v. Higgins*, 105 U.S. 580, 591 (1881).

166. *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966).

167. See Jeffrey J. Rachlinski, *A Positive Psychological Theory of Judging in Hindsight*, 65 U. CHI. L. REV. 571, 571 (1998).

168. See Mandel, *Hindsight Bias*, *supra* note 57, at 1399–400.

169. *Id.*

170. *But see generally* Lunney & Johnson, *supra* note 112 (arguing for a different approach to obviousness that openly incorporates hindsight considerations).

171. Petherbridge & Wagner, *supra* note 10, at 2062; see also Lee Petherbridge, *On the Development of Patent Law*, 43 LOY. L.A. L. REV. 893, 914–19 (2010) (explaining that the TSM test was an important contribution to the law of obviousness).

172. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007). Some of the considerations for the § 103 inquiry adopted in *KSR* were presaged in the work of Robert Merges. See Merges, *Commercial Success*, *supra* note 53, at 874–75 (analyzing evidence of “demand-side factors” tending to show obviousness, which are equivalent to the evidence that the Supreme Court later framed as design need and market pressure).

173. *KSR*, 550 U.S. at 415.

174. *Id.* at 420–22.

175. *Id.* at 418–19.

does”¹⁷⁶ can be highly pertinent to the § 103 inquiry. Moreover, *KSR* noted that “[t]here is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis.”¹⁷⁷ In sum, while holding that the Federal Circuit adopted an overly narrow conception of what can properly count as evidence of the state of the art at the time of filing,¹⁷⁸ *KSR* acknowledged and qualifiedly endorsed the lower court’s effort to fill a doctrinal gap left open by *Graham*.

In doing so, the Supreme Court broke significant new ground. While discussing what the Federal Circuit did right and wrong, *KSR* scrutinized the challenges of inventing and attempted to provide a comprehensive approach for deciding whether the claimed subject matter would have been obvious at the relevant time.¹⁷⁹ Although *KSR* is a difficult case to distill to a simple rule,¹⁸⁰ the opinion’s guidance—as filtered by the Federal Circuit¹⁸¹—supports the cognitive framework for determining obviousness that was discussed in the Introduction.¹⁸² This approach asks tribunals to decide if a PHOSITA would have had a reason to modify or combine prior art references to achieve the claimed invention and to reasonably expect success in getting to this goal at

176. *Id.* at 418.

177. *Id.* at 419.

178. See Justin Lee, Note, *How KSR Broadens (Without Lowering) the Evidentiary Standard of Nonobviousness*, 23 BERKELEY TECH. L.J. 15, 15 (2008) (“The general thrust of the [*KSR*] opinion can, and should, be interpreted to broaden the type of evidence that can be used to support a finding of obviousness, without discarding the decades of Federal Circuit precedent requiring rigorous evidence guarding against hindsight bias.”); cf. *Smiths Indus. Med. Sys., Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356 (Fed. Cir. 1999) (adopting a wide-ranging evidentiary inquiry for nonobviousness). The substantive consequence of the broadened evidentiary standard, however, appears to be a somewhat higher nonobviousness hurdle for inventors to overcome. See John M. Golden, *Remedies and Procedure: Patent Law’s Continuing Frontiers*, 17 CHI.-KENT J. INTELL. PROP. 290, 291–92 (2018) (“The United States Supreme Court [in *KSR*] appears to have caused an uptick in the stringency of patent law’s demand that an invention be nonobvious in order to be patentable, but this uptick seems more in the nature of a marginal change than in the nature of a major watershed.” (footnote omitted)).

179. See Christopher A. Cotropia, *Predictability and Nonobviousness in Patent Law After KSR*, 20 MICH. TELECOMM. & TECH. L. REV. 391, 424 (2014) [hereinafter Cotropia, *Predictability*] (explaining that the purpose of § 103, as recognized in *KSR*, is to reward “risks of journeying down a development path that an ordinary skilled artisan would not have taken”); see also Robert P. Merges, *Uncertainty and the Standard of Patentability*, 7 HIGH TECH. L.J. 1, 40–41 (1992) [hereinafter Merges, *Uncertainty*] (discussing pre-*KSR* “cases involv[ing] prior art which suggests that a certain area should be investigated, and yet the resulting invention is either not suggested in the prior art, or has unexpected properties” and concluding that “an invention is held obvious if the resulting invention does not differ significantly from what was suggested in the prior art or if the inventor was reasonably certain that she would succeed”).

180. See Peter Lee, *Patent Law and the Two Cultures*, 120 YALE L.J. 2, 66 (2010) (noting the openness of the *KSR* standards).

181. To be clear, the Federal Circuit has had to go to some lengths in its effort to reconcile *KSR*’s framework with some of its own precedent. See Mark D. Janis, *Tuning the Obviousness Inquiry After KSR*, 7 WASH. J.L. TECH. & ARTS 335, 343–48 (2012).

182. See *supra* notes 43–52 and accompanying text.

the time of filing.¹⁸³ Notably, this framework mirrors the analysis of whether the invention would have been challenging to a PHOSITA that can be found in *Adams*, on which *KSR* relied to some extent,¹⁸⁴ and even in *Goodyear*,¹⁸⁵ which the Court did not mention.

A frequently cited passage from *KSR*, which sets forth the so-called “obvious to try” doctrine, captures these intuitions:

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.¹⁸⁶

This approach is highly cognizant of inventive challenges facing a PHOSITA in the period leading up to filing. Much like a roadmap in a prior art reference that suggests the making of the claimed invention, “a design need or market pressure” may create a motivation or reason to work off the prior art to pursue a desirable research goal.¹⁸⁷ Further, the presence of “a finite number of identified, predictable solutions” would generate a reasonable expectation of achieving that goal.¹⁸⁸ If the research leads to “anticipated success”—i.e., if the invention can be made as a PHOSITA would

183. See, e.g., *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012). While the two subtests date back to the pre-*KSR* era, see *Lee*, *supra* note 178, at 22, 28–31, the Federal Circuit has read *KSR* to broaden out the inquiry into the type of evidence for establishing these elements. See, e.g., *Forest Lab’ys, LLC v. Sigmapharm Lab’ys, LLC*, 918 F.3d 928, 934 (Fed. Cir. 2019); see also Jason Rantanen, *The Federal Circuit’s New Obviousness Jurisprudence: An Empirical Study*, 16 STAN. TECH. L. REV. 709, 710 (2013) (“[W]hile the underlying requirement that patent challengers identify some ‘reason to combine’ or ‘reason to modify’ prior art references has endured, it is hardly a reincarnation of TSM, either in terms of vigor or structure. Instead, the Federal Circuit’s new obviousness framework allows substantial flexibility in the obviousness analysis.”).

184. See *infra* Section III.C.2 (discussing the parallels between *KSR* and *Adams*).

185. See *supra* notes 80–84 and accompanying text.

186. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). This principle applies even when a PHOSITA would have no idea of the final form that the invention would take, but the path to getting to a final product that would work for a desired purpose was clearly laid out. See, e.g., *In re Kubin*, 561 F.3d 1351, 1358–60 (Fed. Cir. 2009); see also Dan L. Burk, *Biotechnology in the Federal Circuit: A Clockwork Lemon*, 46 ARIZ. L. REV. 441, 442–45 (2004) (criticizing some of the Federal Circuit’s life-science obviousness case law prior to *KSR* and *Kubin*); Timothy R. Holbrook, *Patent Anticipation and Obviousness as Possession*, 65 EMORY L.J. 987, 1031–38 (2016) [hereinafter Holbrook, *Possession*] (explaining that the “obvious to try” doctrine prohibits patents on inventions that are constructively possessed by the public); Lunney & Johnson, *supra* note 112, at 98 (suggesting that the obviousness inquiry does not have to hinge on any specific solution to a problem presented in the prior art).

187. *Lee*, *supra* note 178, at 41 (quoting *KSR*, 550 U.S. at 402).

188. *Id.* (quoting *KSR*, 550 U.S. at 402).

have predicted—then it is unworthy of a patent because the work required little technological risk to undertake and presented no special cognitive difficulty.¹⁸⁹

As subsets of nonobviousness,¹⁹⁰ these elements are contestable,¹⁹¹ but they do serve as useful screens that largely put decision-makers on the right track in their assessment of which inventions are deserving of patents. Because it may be tough to measure the magnitude of the technical advance sufficient for patentability,¹⁹² and likely even more difficult to decide if a particular patent grant is economically justifiable, cognitive challenges and technological risks are reasonable proxies for socially valuable patents.¹⁹³ Indeed, if § 103 was meant to steer inventors toward non-trivial technical advances,¹⁹⁴ then the showings that a PHOSITA would have had reasons to pursue the invention and that it worked more or less as one would have predicted are sensible ways of establishing obviousness.¹⁹⁵ Conversely, the greater the ex ante technological risk,¹⁹⁶ the more likely that the invention embodies a patentably significant advance over the prior art as measured at the time of filing.¹⁹⁷

189. See Douglas L. Rogers, *Federal Circuit's Obviousness Test for New Pharmaceutical Compounds: Gobbledygook?*, 14 CHI-KENT J. INTELL. PROP. 49, 63, 73 (2014) [hereinafter Rogers, *Gobbledygook*]; see also *Saf-Gard Prods., Inc. v. Serv. Parts, Inc.*, 532 F.2d 1266, 1272 (9th Cir. 1976) (Kennedy, J.) (“Even a minor change may produce a patentable invention, where the result could not have been readily predicted beforehand by one skilled in the art.”).

190. I borrowed and adapted this term from Merges and Duffy, MERGES & DUFFY, *supra* note 2, at 567, who in turn must have borrowed and adapted it from Robbins, *supra* note 112.

191. See Abramowicz & Duffy, *supra* note 1, at 1661–67 (positing an alternative, economic approach to § 103); Pedraza-Fariña & Whalen, *supra* note 47, at 135–36 (explaining that the current nonobviousness tests reflect a panoply of considerations); cf. F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 89–95 (2003) (showing how certain features of the nonobviousness requirement protect reliance of interests of non-patentees, but noting that certain evidence—particularly, commercial success—does not clearly appear to serve this goal). See generally Lunney & Johnson, *supra* note 112 (discussing the ways in which the motivation and reasonable expectation of success elements may be objectionable).

192. Fromer, *supra* note 45, at 1487–92.

193. See *supra* notes 44–45 and accompanying text; see also Benjamin & Rai, *supra* note 44, at 277 (“[I]nventions that are risky to make are considered nonobvious.”).

194. See *supra* notes 1–2 and accompanying text.

195. Cf. Cotropia, *Predictability*, *supra* note 179, at 427–30 (showing how a contrary approach is open to the charge of impermissible hindsight).

196. See, e.g., *Dickey-John Corp. v. Int'l Tapetronics Corp.*, 710 F.2d 329, 345 (7th Cir. 1983) (explaining why researchers who decide to buck conventional wisdom often produce socially valuable inventions); cf. Merges, *Uncertainty*, *supra* note 179, at 50–55 (focusing on market risk as a proxy for patentability).

197. Landers, *supra* note 45, at 72 (“[C]ircumstances that require one to create a system, reformulate a problem or engage in a broad search invoke both risk and creative choice, and therefore these conditions weigh in favor of finding the invention nonobvious.”).

2. *KSR's* Resolution and Uneasy Aftermath

KSR's analysis of the validity of the patent claim at issue usefully illustrates the cognitive approach in action. The claim was drawn, essentially, to adapting a specialized, height-adjustable gasoline pedal in cars with a digital sensor for metering fuel by placing the sensor on the pedal's pivot point.¹⁹⁸ But during the period leading up to filing,¹⁹⁹ industry participants were routinely modifying pedals with computer-aided fuel injectors, and the automotive engineering field was even converging on the pivot point as the preferred location for the sensors that control them.²⁰⁰ Moreover, analog height-adjustable pedals were well-known, and no special barriers stood in the way of adapting such pedals with the sensors.²⁰¹

The Court looked at this evidence, acknowledged the general shift to digital technology in cars, and concluded that the claimed invention was not much of an intellectual leap. After noting that “[t]here . . . existed a marketplace that created a strong incentive to convert mechanical pedals to electronic pedals, and the prior art taught a number of methods for achieving this advance,” *KSR* held that the claim would have been obvious.²⁰² This analysis confirms that the defendant readily established both motivation (based on the advantageous features of digital sensors for fuel injection) and reasonable expectation of success (based on routine ways of equipping various known analog gas pedals with such sensors), supporting the judgment of invalidity. In sum, in resolving the case, the Court was faithful to its own framework. Moreover, in further contrast with *Graham*, *KSR* was acutely aware of the state of the art at the relevant time and cannot be faulted for relying on hindsight.

KSR, however, did not have occasion to reconcile *Graham's* primary-secondary heuristic with the cognitive framework because the patentee did not proffer any relevant objective indicia. The Court only noted in passing that, “[l]ike the District Court, . . . we conclude [that the patentee] has shown no secondary factors to dislodge the determination that [the claim] is obvious.”²⁰³ The district court's opinion, in turn, suggested that the patentee failed to prove up any nexus between its product's commercial success, the only secondary consideration it attempted to introduce, and the claim under

198. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 408, 410–11, 414 (2007).

199. Technically, the key date for establishing patentability under the version of the Patent Act in force when *KSR* was decided was the date of the invention (if it could be proven) rather than the filing date. See *infra* notes 356–58 and accompanying text (discussing the change from first-to-invent to first-to-file in the AIA). Although the anchoring date has since changed from the invention date to the effective filing date, the substantive reasoning of *KSR* is fully applicable to the AIA's first-to-file regime.

200. *KSR*, 550 U.S. at 408–10.

201. *Id.* at 420, 425–26.

202. *Id.* at 424.

203. *Id.* at 426.

review.²⁰⁴ In particular, the patentee failed to establish which of the pedals that were allegedly profitably sold actually incorporated the claimed feature, an egregious failure of proof.²⁰⁵ As a result, the question of how secondary considerations, if properly established, would have interacted with the motivation and expectation elements (and impacted the ultimate validity conclusion) was simply not raised by the facts of *KSR*. The baggage from *Graham* thus remained unsorted.

So what are the possible ways to square the primary-secondary distinction with *KSR*'s cognitive framework? On the one hand, it may be that the fact finder is supposed to ascertain if a PHOSITA would have had technical reasons to pursue the claimed invention and reasonably expected success based on the prior art disclosures alone, and then decide if those determinations are outweighed by objective indicia so as to save the claim.²⁰⁶ On the other hand, as even *Graham* appeared to recognize in passing by calling this evidence “motivational,”²⁰⁷ secondary considerations such as failure of others and industry skepticism can sometimes bear in a straightforward way on the motivation to pursue the claimed invention. Accordingly, maybe this evidence should be built into the structure of the initial inquiry of whether the claimed invention would have been readily attainable by a PHOSITA.

The former framing seems rather stilted, especially given *KSR*'s endorsement of “an expansive and flexible approach” to § 103 and its praise for the value of largely non-technical (or at least non-prior art) evidence such as design need or pressure²⁰⁸—i.e., “demand-side” objective factors²⁰⁹—in

204. *Teleflex Inc. v. KSR Int'l Co.*, 298 F. Supp. 2d 581, 595–96 (E.D. Mich. 2003); see *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995) (“For objective evidence [of secondary considerations] to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983))); *supra* note 61 and accompanying text (discussing the concept of nexus).

205. *KSR*, 298 F. Supp. 2d at 595–96.

206. Sometimes, however, an obviousness challenge can fail without the need to get to secondary considerations at all under either approach. Because the burden to prove that the claim is unpatentable is on the entity arguing against patentability, a failure to show a sufficient similarity between the prior art and the claimed invention to establish even a modicum of motivation might thus end the case without the need for the applicant or patentee to introduce any additional evidence. See, e.g., *UCB, Inc. v. Watson Lab's Inc.*, 927 F.3d 1272, 1289 (Fed. Cir. 2019); *Otsuka Pharm. Co. v. Sandoz, Inc.*, 678 F.3d 1280, 1299 (Fed. Cir. 2012) (“Because we agree with the district court that the prior art would not have provided one of ordinary skill with a reason or motivation to make [the claimed invention], we need not examine [the plaintiff's] evidence of secondary considerations of nonobviousness.”); cf. *In re Rinehart*, 531 F.2d 1048, 1051 (C.C.P.A. 1976) (discussing the burden-shifting process in the context of patent examination).

207. See *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966).

208. *KSR*, 550 U.S. at 415.

209. See *Merges, Commercial Success*, *supra* note 53, at 874–76.

the obviousness inquiry. But if lower courts are to adopt the latter, integrated approach, then why even bother with *Graham*'s distinction?²¹⁰

* * *

Post-*KSR*, the Federal Circuit has struggled with these questions, and the problem of secondary considerations continues to embody a doctrinal lacuna that the court has not yet been able to fill.²¹¹ In 2016, it issued an en banc decision, *Apple v. Samsung*, which was first discussed in the Introduction.²¹² In *Apple*, the court reaffirmed the basic proposition that “[o]bjective indicia of nonobviousness must be considered in every case where present.”²¹³ Although its general recognition of the probative value of non-prior art evidence is in accord with the Supreme Court’s pronouncements, *Apple* also appeared to endorse a sequential primary-secondary inquiry when it stated “that evidence of secondary considerations must be examined to determine its impact on the first three *Graham* factors.”²¹⁴ Besides the idea that such apparent “demotion” of the fourth factor is in potential tension with *KSR*’s catholic approach to obviousness evidence,²¹⁵ the formulation is odd as a general matter: When applying a multi-factor test, decision-makers usually consider the impact of the various factors on the ultimate legal conclusion, not on one another.²¹⁶

Judge Jimmie Reyna, dissenting in *Apple*, maintained that the Federal Circuit “disagrees over the role objective indicia play in the court’s analysis of the ultimate determination of obviousness.”²¹⁷ Specifically, he flagged the court’s internal division on two issues: “(1) whether an obviousness analysis involving secondary considerations (or objective indicia of non-obviousness) is a one- or two-step process and (2) how much weight to accord secondary considerations in the obviousness analysis.”²¹⁸

210. Sometimes courts don’t. See *infra* notes 249–52 and accompanying text.

211. See, e.g., J. Jeffrey Hawley, *The Resurgence of “Secondary Considerations”*, 16 FLA. COASTAL L. REV. 1, 7–20 (2014) (explaining that the Federal Circuit is increasingly relying on secondary considerations without a clear approach to how they matter); Ryan T. Holte & Ted Sichelman, *Cycles of Obviousness*, 105 IOWA L. REV. 107, 158 tbl.4 (2019). As the next Section shows, the court’s treatment of this evidence remains inconsistent.

212. See *supra* notes 17–34 and accompanying text.

213. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc).

214. *Id.* (citing *Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1340 (Fed. Cir. 2016)).

215. To be clear, *KSR*’s reference to secondary considerations as failing to “dislodge” the conclusion of obviousness based on the other factors may support this view. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007). I believe, however, that this statement must be understood in the context of the patentee’s failure to prove commercial success—and the rest of the *KSR* opinion strongly endorses the value of non-prior art evidence. See *infra* Section III.C.2.

216. See, e.g., *Cnty. for Creative Non-Violence v. Reid*, 490 U.S. 730, 751–53 (1989) (citing RESTATEMENT (SECOND) OF AGENCY § 220 (AM. L. INST. 1958)).

217. *Apple*, 839 F.3d at 1089 (Reyna, J., dissenting).

218. *Id.*

Part III unpacks these tensions and deals with Judge Reyna's critiques of the Federal Circuit's inconsistent § 103 jurisprudence by proposing that the court cut the Gordian knot. In short, it argues for a reading of *Graham* that does not mandate dividing obviousness evidence into primary and secondary tiers at all. Part III also shows that the Federal Circuit has taken some halting steps toward this solution and even signaled a willingness to make a better account of the timing of obviousness evidence in line with the proposal in Part IV—which provides a time-based path for further reconciliation of *Graham* and *KSR*.

III. THE CASE FOR ELIMINATING THE PRIMARY-SECONDARY FRAMEWORK

A. INTRACTABLE DISAGREEMENTS OVER THE ROLE OF OBJECTIVE INDICIA

1. The Basic Problem

It is no secret that the treatment of secondary considerations at the Federal Circuit is highly panel-dependent, and that the court's members can be assigned to two distinct factions based on their views of this evidence.²¹⁹ As Judge Reyna suggested in *Apple*,²²⁰ the disagreements generally concern the degree of integration of secondary considerations in the § 103 inquiry. In one camp are the judges who believe that all obviousness evidence must be holistically considered from the start lest the outcome—typically, patent invalidation—be prejudged based on the prior art alone.²²¹ In the other are the judges who favor a two-step framework that initially relies on the first three *Graham* factors to conclude if a PHOSITA would have pursued the claimed invention, and only then considers the objective indicia.²²²

The *Graham* heuristic has even led to disagreements over the proper semantic labeling for the fourth factor. Thus, although this Article uses these terms interchangeably, some judges consistently prefer the phrase “objective indicia” to “secondary considerations” to describe pro-patentee non-prior art evidence.²²³ This alternative terminology is typically favored by those who believe that such evidence should not be viewed as secondary in importance to the prior art and wish to reinforce the notion that the real-world facts underlying this factor are a critical counterweight to hindsight reconstruction

219. See, e.g., Hawley, *supra* note 211, at 23–25; see also Tony Pezzano & Michael Dougherty, *Fed. Circ. Judges Disagree on Section 103 Patent Validity*, LAW360 (Nov. 29, 2018, 12:52 PM), <https://www.law360.com/articles/1104972/fed-circ-judges-disagree-on-section-103-patent-validity> [<https://perma.cc/N5QX-PE8E>] (exploring the Federal Circuit's internal disagreements over § 103 evidence).

220. *Apple*, 839 F.3d at 1089 (Reyna, J., dissenting).

221. Hawley, *supra* note 211, at 5–6, 24–25.

222. *Id.* at 23–24.

223. Mark A. Lemley, *Expecting the Unexpected*, 92 NOTRE DAME L. REV. 1369, 1371–72 & n.11 (2017).

that may infect the primary inquiry.²²⁴ The term that a particular judge favors is a fairly reliable predictor of his or her willingness to adopt the holistic approach and assign high value to secondary considerations (sorry, “objective indicial”).²²⁵ These semantic squabbles are a symptom of a deep conflict within the Federal Circuit,²²⁶ which is problematic because the court was established in part to help bring uniformity to patent law.²²⁷

The conflict was on prominent display in *Intercontinental Great Brands v. Kellogg North America*,²²⁸ decided less than a year after *Apple*. The patentee argued that the trial court had improperly discounted objective indicia—indeed, “wr[ote] off the patent before turning to” this evidence²²⁹—based on the process that the court used to reach the conclusion of obviousness. The district court first determined that a PHOSITA would have been motivated to make the claimed invention because it “was addressed to a known problem”²³⁰ in the relevant field, “nearly all of the [claim] elements were found in one”²³¹ piece of prior art, and “the technology is relatively simple.”²³² It then examined secondary considerations, but concluded that they “do not overcome [the defendant’s] extremely strong prima facie showing that the invention was obvious in light of”²³³ the prior art.

The Federal Circuit, in a 2–1 decision, affirmed. The majority explained that “[t]he staged consideration undertaken by the district court . . . makes

224. See, e.g., *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012); *Truswal Sys. Corp. v. Hydro-Air Eng’g, Inc.*, 813 F.2d 1207, 1212 (Fed. Cir. 1987) (“That evidence is ‘secondary’ in time does not mean that it is secondary in importance.”).

225. For further analysis of the utility of this evidence, see Duffy, *Timing Approach*, *supra* note 9, at 369–70; and Matthew G. Sipe, *Patent Law’s Philosophical Fault Line*, 2019 WIS. L. REV. 1033, 1053–55.

226. This is not the only area of patent law, however, in which one finds the lack of uniformity and, consequently, panel dependency at the Federal Circuit. See, e.g., Paul R. Gugliuzza, *Rising Confusion About “Arising Under” Jurisdiction in Patent Cases*, 69 EMORY L.J. 459, 465 (2019) (jurisdiction); Paul R. Gugliuzza & Mark A. Lemley, *Can a Court Change the Law by Saying Nothing?*, 71 VAND. L. REV. 765, 769–74 (2018) (§ 101 and designation of opinions as precedential); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1163–78 (2004) (claim construction).

227. See *supra* notes 152–55 and accompanying text (discussing the establishment of the Federal Circuit). *But cf.* Craig Allen Nard & John F. Duffy, *Rethinking Patent Law’s Uniformity Principle*, 101 NW. U. L. REV. 1619, 1626 (2007) (questioning the need for and value of uniformity in patent law).

228. *Intercont’l Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1345–46 (Fed. Cir. 2017).

229. *Id.* at 1345 (quoting Non-Confidential Brief for Plaintiff-Appellant Intercontinental Great Brands LLC at 40, *Intercont’l*, 869 F.3d 1336 (Nos. 2015-2082, -2084)).

230. *Intercont’l Great Brands LLC v. Kellogg N. Am. Co.*, 118 F. Supp. 3d 1022, 1035 (N.D. Ill. 2015) (quoting *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1240 (Fed. Cir. 2010)).

231. *Id.* at 1042.

232. *Id.*

233. *Id.* at 1041.

sense within the motivation-to-combine framework”²³⁴ and is not erroneous so long as the tribunal considers objective indicia before reaching its ultimate judgment on § 103. It then noted that “[e]ven with a motivation proved, the record may reveal reasons [based on objective indicia] that, after all, the court should not conclude that the combination would have been obvious.”²³⁵ The Federal Circuit thus allowed trial judges and juries to start the § 103 inquiry by evaluating a “prima facie” case for motivation stemming solely from the three prior art-focused *Graham* factors.²³⁶

Judge Reyna dissented. Arguing for a strong version of the holistic approach, he maintained that “nothing in *Graham* or *KSR* requires courts to analyze the first three *Graham* factors first . . . and only then examine” secondary considerations.²³⁷ Judge Reyna contended that “[o]bjective indicia of non-obviousness must be considered from the outset,”²³⁸ rather than after a finding of motivation based solely on the primary factors. In his view, the latter approach contradicted the precedent holding that “[o]bjective indicia of non-obviousness . . . are not mere, after-the-fact considerations relegated to secondary status,” but rather “essential safeguards against hindsight bias.”²³⁹ Then, as he did in *Apple*,²⁴⁰ Judge Reyna highlighted the conflicts within the Federal Circuit on these issues and bemoaned “mixed messages coming from our court.”²⁴¹

Indeed, the conflicts within the court are so deep that some language in the *Intercontinental* majority opinion may (oddly enough) provide support for the view that all the evidence in § 103 cases should be considered holistically. Although it asserted that there is “no authority that requires consideration of objective indicia as part of the motivation-to-combine factual analysis,”²⁴² the majority then cited no less an authority than *KSR* for the proposition that “[t]he court should consider a range of real-world facts to determine ‘whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.’”²⁴³ Because real-world facts such as industry skepticism or failure of others may help establish that a PHOSITA would be

234. *Intercont'l*, 869 F.3d at 1346.

235. *Id.* at 1347.

236. *See id.* at 1347–48. Reasonable expectation of success was not an issue in dispute on appeal. *See id.* at 1343 n.4.

237. *Id.* at 1354 (Reyna, J., dissenting in part).

238. *Id.* at 1357.

239. *Id.* at 1356 (citing *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1078–79 (Fed. Cir. 2012)); *cf. In re Depomed, Inc.*, 680 F. App'x 947, 953 (Fed. Cir. 2017) (nonprecedential) (Reyna, J., concurring) (expressing similar concerns in the context of post-issuance proceedings at the PTO).

240. *See supra* notes 217–18 and accompanying text.

241. *Intercont'l*, 869 F.3d at 1356 (Reyna, J., dissenting in part).

242. *Id.* at 1346 (majority opinion).

243. *Id.* at 1344 (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)).

disinclined to pursue the claimed invention,²⁴⁴ it follows that their impact on motivation should be properly considered concurrently with prior art disclosures, and not merely in rebuttal.²⁴⁵ Nevertheless, the approach actually endorsed by the majority appears to be in conflict with this reasoning.

2. Further Inconsistencies and Tentative Steps Toward Reform

A related tension is that even the judges who countenance a two-part inquiry for motivation sometimes take a more holistic approach to reasonable expectation of success, the second subtest of nonobviousness. For example, Judge Richard Taranto, the author of *Intercontinental*, took a very different tack to the primary-secondary framework in *Institut Pasteur v. Focarino*.²⁴⁶ That decision holds that some secondary considerations can serve as “probative and cogent evidence that one of ordinary skill in the art would not have reasonably expected [to arrive at the claimed invention].”²⁴⁷ Under this approach, which arguably conflicts with that of *Intercontinental*, objective indicia are integrated into the question of whether a PHOSITA would have had a reasonable expectation of success, rather than used to rebut a prima facie finding that this element is established based on the prior art.²⁴⁸

244. In this particular case, the proffered secondary considerations were of the ex post variety (commercial success, industry praise, and copying), but the majority’s reasoning does not distinguish ex ante and ex post evidence. *Id.* at 1347.

245. *Id.* at 1346. To be sure, the staged approach might be unavoidable during patent examination as an information-forcing device, since patent examiners start out just with the prior art and the claims desired by the applicant. See *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1077–80 & n.7 (Fed. Cir. 2012) (endorsing the holistic approach to obviousness in district court § 103 analysis and distinguishing it from the PTO’s prima facie-rebuttal framework); see also *In re Oetiker*, 977 F.2d 1443, 1448–49 (Fed. Cir. 1992) (Plager, J., concurring) (discussing the examiner’s burden to prove unpatentability). *But cf. In re Rinehart*, 531 F.2d 1048, 1052 (C.C.P.A. 1976) (cautioning the PTO to avoid “analytical fixation” on primary evidence). There is another difference between patent examination and litigation based on timing that perhaps makes the problem of objective indicia less salient during the former. Some evidence, like commercial success, may not even exist during prosecution, but could come into being by the time the patent (assuming it issues) is litigated or reviewed at the Patent Trial and Appeal Board (“PTAB”). See Durie & Lemley, *supra* note 3, at 995–98; Greg Reilly, *Decoupling Patent Law*, 97 B.U.L. REV. 551, 577 (2017) [hereinafter Reilly, *Decoupling Patent Law*] (“In practice, secondary considerations are rarely relied on during patent acquisition both because of the difficulty for examiners in identifying and developing evidence of real world activities (as opposed to printed materials) and because secondary considerations tend to be ex post factors that only arise after the patent is granted and the invention publicized and marketed.”); see also *infra* notes 432–36 and accompanying text (addressing various issues with commercial success evidence).

246. *Institut Pasteur v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013) (discussing the potential probative value of ex post secondary considerations, especially licensing and praise, for establishing a reasonable expectation of success—without limiting the analysis to *only* those types of secondary considerations).

247. *Id.*

248. It may be that Judge Taranto is simply open to a variety of analytical methodologies for deciding obviousness. Although this is not necessarily a bad thing, the lack of a uniform approach

Institut Pasteur is not an outlier: In a high-profile decision, *University of California v. Broad Institute*, the Federal Circuit concluded that there was no reasonable expectation of success in coming up with the genome-editing method at issue because of the skepticism of experts and prior failures to accomplish this goal.²⁴⁹ While in tension with cases like *Intercontinental*, and perhaps even with the en banc *Apple* opinion,²⁵⁰ in treating objective indicia as more than just rebuttal evidence, the approaches in *Broad Institute*²⁵¹ and *Institut Pasteur* are sensible. Like teaching away in the prior art, the evidence that saved the patents at issue in those cases directly supported an inference of a PHOSITA's disbelief that the respective inventions could be achieved in view of the knowledge available at the time of filing.²⁵² In all, in addition to highlighting an intra-circuit conflict in § 103 evidence analysis, the *Broad Institute* and *Institut Pasteur* opinions demonstrate that nonobviousness can be evaluated quite adequately without the primary and secondary silos.

Still, these cases illustrate the inconsistent treatment of § 103 evidence and point to bigger problems. Thus, the tension over whether the obviousness inquiry should be performed in one step or two is intertwined with the substantive weighing of objective indicia against the prima facie evidence—the second issue Judge Reyna flagged in his *Apple* dissent²⁵³ and one that is further explored below.²⁵⁴ On the one hand, some panels assign little value to secondary considerations, treating them as an afterthought in both time and

to objective indicia at the Federal Circuit has nevertheless caused confusion and unpredictability. See, e.g., Pezzano & Dougherty, *supra* note 219; Jason D. Eisenberg & Todd C. Thurheimer, *Second Chances for Secondary Considerations—Hiding the “Novelty Ball”*, STERNE KESSLER GOLDSTEIN & FOX (Oct. 2017), <https://www.sterneessler.com/news-insights/publications/second-chances-secondary-considerations-hiding-novelty-ball> [<https://perma.cc/8Z43-YSZ9>] (“[T]he Federal Circuit has repeatedly stewarded practitioners and jurists towards considering secondary considerations throughout the obviousness analysis, rather than as an afterthought. Despite this guidance, confusion remains, and at times, the PTAB and the federal courts continue to treat secondary considerations as the black sheep of the *Graham*-factor family.”). Related, as I discuss in the next Section, the primary/secondary distinction often leads to error.

249. *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291–95 (Fed. Cir. 2018). While the precise question before the Federal Circuit was whether there existed an “interference-in-fact” between the two sets of claims at issue, the court noted that “[w]hen an interference-in-fact turns on whether one set of claims renders obvious the subject matter of another set of claims, the standard of review mirrors that in an obviousness review.” *Id.* at 1291.

250. See *supra* notes 213–14 and accompanying text; see also *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) (Taranto, J.) (explaining that *KSR* “[r]eject[ed] a blinkered focus on individual documents”).

251. *Broad Institute* did use the term “secondary consideration,” but only when referring to the (pro-patent) evidence of near-simultaneous invention. See *Broad Inst.*, 903 F.3d at 1295. Still, the court suggested that this evidence, too, can bear directly on both motivation and on reasonable expectation of success. See *id.* at 1296.

252. This approach is also in line with *Adams*, which did not use anything resembling a prima facie/rebuttal framework. See *United States v. Adams*, 383 U.S. 39, 42–52 (1966).

253. See *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1089 (Fed. Cir. 2016) (en banc) (Reyna, J., dissenting).

254. See *infra* Section III.B.

substance relative to prior art-based evidence.²⁵⁵ On the other, there is Federal Circuit precedent holding that some objective indicia can be crucial for the nonobviousness determination.²⁵⁶ These conflicts may come up during district court infringement cases, patent examination,²⁵⁷ and post-issuance reviews of patents at the PTAB, the PTO's judicial arm,²⁵⁸ leading to inconsistent decision-making throughout the patent system.

B. THE PROBLEMS OF LUMPING AND LINE-DRAWING

This Section examines two other related (and interrelated) problems with the primary-secondary classification scheme. The first is lumping, which causes courts to mis-weigh certain kinds of evidence based solely on which silo the evidence falls into, rather than on an individualized determination of the particular facts in the record. The second is line-drawing, which has to do with the difficulties the Federal Circuit has run into in trying to place some types of obviousness evidence into a specific (i.e., primary versus secondary) category.²⁵⁹ These issues further contribute to unpredictability and error in § 103 decision-making, demonstrate that reliance on the two evidentiary silos confuses more than clarifies, and confirm that a new approach to evaluating obviousness evidence is needed.

1. Lumping

Secondary considerations are sometimes treated as a kind of a unitary lump, without any distinct, targeted analysis of the specific piece or form of non-prior art evidence that is proffered. For example, the entirety of objective indicia might be errantly viewed as unconvincing because, say, commercial success evidence was weak, and thus become devalued by association.²⁶⁰ On the flip side, facts falling into the primary bucket are sometimes overvalued thanks to the opposite dynamic—a halo effect based on their primary status.

255. See, e.g., *Novo Nordisk A/S v. Caraco Pharm. Lab'ys, Ltd.*, 719 F.3d 1346, 1353–54 (Fed. Cir. 2013); *B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582 (Fed. Cir. 1996); see also *infra* notes 276–77 and accompanying text (discussing the *Agrizap* and *Sundance* cases).

256. See, e.g., *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1357 (Fed. Cir. 2013); *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354–57 (Fed. Cir. 2013).

257. To be sure, some form of a staged § 103 inquiry might be unavoidable during patent examination. See *supra* note 245 and accompanying text.

258. See *supra* note 245 and accompanying text (defining “PTAB”).

259. For an illuminating discussion of lumping and line-drawing in another context, see LEE ANNE FENNELL, *SLICES AND LUMPS: DIVISION AND AGGREGATION IN LAW AND LIFE* 212–14 (2019).

260. This type of error is related to the problem discussed in the previous Section, which is that facts classified as secondary sometimes get a short shrift merely because they happen to fall into this category, without an independent evaluation of the probative value of the specific piece of proffered evidence. See *supra* notes 234–36 and accompanying text. However, as the next Section shows, this type of error can also work in favor of the patentee when certain evidence is categorically overvalued.

It bears emphasizing that these errors can affect case outcomes. Using illustrative examples, I consider these problems in turn.

i. Errors in Favor of Patent Challengers

One way to exemplify the first type of error is with failure of others. Pre-*Graham*, lower courts often held that this evidence can be highly probative of nonobviousness.²⁶¹ Judge Learned Hand, a strong proponent of inferring validity from failure of others, explained that “the rationale is that what has for long escaped the quest of competent experimenters in the field, spurred on by hope of gain . . . demanded talent out of the common.”²⁶² Even commentators expressing general suspicion of objective indicia, particularly Robert Merges, agreed that consideration of failure of others can, in the right circumstances, lend “analytical rigor . . . to the nonobviousness inquiry” and strongly support validity.²⁶³ Under the cognitive framework, this evidence can be directly probative of both lack of motivation and reasonable expectation of success: the former, because a PHOSITA would be discouraged to go down a path that has proven unfruitful; the latter, because a PHOSITA would not expect success where other competent researchers have failed.

Graham acknowledged such evidence and even cited a Judge Hand opinion to highlight its significance.²⁶⁴ But the Court also stated that failure of others fell into the secondary tier,²⁶⁵ a scarlet letter that can cause judges who dislike secondary considerations to treat this evidence as automatically unpersuasive. The conflict is real. Thus, some opinions have held “that failure by others, including the accused infringer, to develop the claimed invention constitutes ‘virtually irrefutable’ evidence of nonobviousness.”²⁶⁶ Others,

261. Merges, *Commercial Success*, *supra* note 53, at 862–66 (collecting cases).

262. *Clark v. Wright Aeronautical Corp.*, 162 F.2d 960, 966 (2d Cir. 1947). For an example from another circuit, see *Entron, Inc. v. Jerrold Elecs. Corp.*, 295 F.2d 670, 675 (4th Cir. 1961).

263. Merges, *Commercial Success*, *supra* note 53, at 864.

264. *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966) (citing *Reiner v. I. Leon Co.*, 285 F.2d 501, 504 (2d Cir. 1960)). This analysis in *Graham* is focused on commercial success, but it is applicable to other secondary considerations because the Court does not distinguish or single out commercial success as different from other objective indicia.

265. *Id.* at 17.

266. *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1285 (Fed. Cir. 2000) (quoting *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1099 (Fed. Cir. 1985), *vacated on other grounds*, 475 U.S. 809 (1986) (per curiam)); see *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1082 (Fed. Cir. 2012) (calling this “classic evidence of nonobviousness”); *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1354 (Fed. Cir. 2003) (“[T]here can be little better evidence negating an expectation of success [for purposes of nonobviousness] than actual reports of failure.”). To be sure, the inference of validity can be defeated, for example, with a showing that the failures were due to the competitors’ lack of knowledge or appreciation of the available prior art, given the “omniscience” of the PHOSITA construct. See Robbins, *supra* note 112, at 1173–74 & nn.26–27; see also *infra* notes 425–26 and accompanying text (discussing the nexus issue). *But cf.* Durie & Lemley, *supra* note 3, at 997 (arguing for an approach that would take competitors’ actual knowledge into account).

however, have not been as inclined to acknowledge the value of this evidence.²⁶⁷

In *Agrizap v. Woodstream*, for example, the Federal Circuit held a patent on a rat trap operating via electrocution invalid under § 103.²⁶⁸ While prior art traps relied on mechanical-pressure switches to trigger the electrical discharge, the claimed invention took advantage of the grisly insight that the rat itself can function as “a resistive switch” to complete the circuit and generate a current—a solution conceptually related to the cattle prod.²⁶⁹ The court determined that this apparatus was too similar to the prior art and basically ended the inquiry there.²⁷⁰ Thus, it noted that “[t]he only difference between the [the prior art] and the asserted claims . . . is the type of switch used to complete the circuit that triggers the generator,”²⁷¹ and concluded that other evidence could not “overcome such a strong prima facie case” against the patent.²⁷²

The court treated objective indicia cursorily. It observed only that “commercial success of the [patented device], copying by [the defendant], and a long felt need in the market for electronic rat traps” were “insufficient,” and omitted any mention of failure of others.²⁷³ But although the commercial success-based argument for validity was indeed weak,²⁷⁴ evidence of long-felt need and failure of others was well-developed and surely had some creditable probative value. The record, for example, suggested that the defendant was “encountering great difficulty in filling the unmet need in the marketplace,” but “gave up on its own design approximately one-year [sic] into development”²⁷⁵ because it was unable to come up with a workable resistive-switch design. The court, however, did not separately analyze the various secondary considerations and did not even address the defendant’s failures at all. Indeed, it seemed to undervalue all objective indicia (and to ignore some

267. See Durie & Lemley, *supra* note 3, at 997.

268. *Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1339 (Fed. Cir. 2008).

269. *Id.* at 1340, 1343–44.

270. *Id.* at 1344. While the *Agrizap* court did not analyze motivation and reasonable expectation of success explicitly, it did rely on *KSR*’s proposition “that ‘[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.’” *Id.* at 1343 (alteration in original) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007)). Christopher Cotropia, however, argued that *Agrizap* is in tension with *KSR* in that the Federal Circuit zeroed in on the similarity between the invention and the prior art and essentially sidestepped the motivation inquiry. See generally Cotropia, *Predictability*, *supra* note 179 (critiquing the use of what Cotropia terms “Type II predictability”).

271. *Agrizap*, 520 F.3d at 1344.

272. *Id.*

273. *Id.*

274. See Principal and Response Brief of Plaintiff-Cross Appellant *Agrizap, Inc.* at 52, *Agrizap*, 520 F.3d 1337 (Nos. 2007-1415, -1421), 2007 WL 3218900, at *52 (mentioning commercial success, but failing to fully develop the argument for why it is relevant to validity).

275. *Id.* at *53–54; see also *id.* at *26 (discussing the defendant’s “own failure for years to make the very discovery it now contends was obvious”).

altogether) based on the “secondary” classification.²⁷⁶ Thus, the silos can lead to arbitrariness in the § 103 inquiry and, in turn, potentially impact ultimate validity judgments as a result.²⁷⁷

ii. Errors in Favor of Patentees or Applicants

The Federal Circuit sometimes makes a mirror-image error. Thus, the court has occasionally concluded that evidence collectively known as “unexpected results” weighs heavily in favor of the inventor based in part on the view that it constitutes a primary consideration in the obviousness inquiry.²⁷⁸ In so doing, the court has often failed to fully consider what the proffered piece of evidence tends to show with respect to the elements of motivation and reasonable expectations of success.

Here, it is helpful to understand why unexpected results are often contested. While not limited to chemical patents,²⁷⁹ many of the cases featuring this evidence involve properties of pharmaceuticals or materials (such as therapeutic utility and shelf stability).²⁸⁰ Such patents tend to be highly economically significant and often present close validity questions,²⁸¹ which can turn on this kind of evidence. Harris Pitlick found unexpected results to be “the most prevalent form of evidence of nonobviousness . . . during patent examination,”²⁸² and they often come up in litigation too.²⁸³

276. Cf. Darrow, *Secondary Considerations*, *supra* note 54, at 62–71 (providing a separate analysis of the relevance for each secondary factor).

277. See, e.g., *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1368 (Fed. Cir. 2008) (dismissing secondary considerations for failure to “overcome this strong prima facie case of obviousness”); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 719 (Fed. Cir. 1991) (disposing of all secondary considerations together in a cursory fashion); *Cubist Pharms., Inc. v. Hospira, Inc.*, 805 F.3d 1112, 1125–26 (Fed. Cir. 2015) (offering a similarly limited analysis of secondary considerations); cf. Darrow, *Secondary Considerations*, *supra* note 54, at 52 (criticizing decisions like *Sundance*).

278. This evidence is sometimes, though not always, classified as primary, a point to which I return below. See *infra* notes 301–02 and accompanying text (discussing the confusion in the categorization of unexpected results evidence).

279. 3 R. CARL MOY, *MOY’S WALKER ON PATENTS* § 9:76 (4th ed. 2020 update) (“[T]he question of inherent properties is not limited to chemistry. Instead, it extends to structure claims generally.”).

280. See, e.g., *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 997 (Fed. Cir. 2009) (offering a chemical example of unexpected results); *In re Chu*, 66 F.3d 292, 298–99 (Fed. Cir. 1995) (discussing a non-chemical example of unexpected results).

281. See Dmitry Karshedt, *The More Things Change: Improvement Patents, Drug Modifications, and the FDA*, 104 IOWA L. REV. 1129, 1159–68 (2019) [hereinafter Karshedt, *The More Things Change*].

282. Harris A. Pitlick, *Some Thoughts About Unexpected Results Jurisprudence*, 86 J. PAT. & TRADEMARK OFF. SOC’Y 169, 169 (2004). Notably, other secondary considerations, such as commercial success, appear less frequently during patent prosecution, though they come up a great deal in litigation. See Durie & Lemley, *supra* note 3, at 1004–07 (discussing patentees’ reliance on secondary considerations during litigation).

283. See generally Frederick G. Vogt, Comment, *Unexpected Results: The Current Status of Obviousness Determinations for Pharmaceutical and Biotechnology Patents*, 29 TEMP. J. SCI. TECH. &

In short, the basic rule holds that a finding that a chemical compound's properties are better than predicted tends to establish nonobviousness.²⁸⁴ Superficially, this inference seems straightforward based on the idea that, in chemistry, structure and properties are inextricably linked: Structure dictates a material's properties.²⁸⁵ Because hypotheses about effects of a structural change of a prior art chemical or material on its function are often wrong, this area of science can be challenging.²⁸⁶ Thus, if a compound exhibits unexpectedly beneficial properties for the purpose that the invention seeks to achieve, an inventor can argue that he or she should get the patent for bucking conventional wisdom,²⁸⁷ which would have instead predicted inferior or pedestrian outcomes and thus discouraged the pursuit of the invention.²⁸⁸

Some judges assign as great a weight to unexpected results as one would to other types of validity evidence often characterized as primary, such as teaching away in the prior art.²⁸⁹ But this move might be unjustified in some circumstances—specifically, when this evidence is unlikely to speak to the state of the art at the time of filing.²⁹⁰ Indeed, what if the unexpected property or function was discovered long after the patent application on the chemical was filed? Can such evidence validly bear on a PHOSITA's motivation, and should the patentee still get credit for it? Marion Western argued that this cannot be the rule in a student note provocatively titled *Is 35 U.S.C. 103 Applicable to Chemical Compounds?*:

ENV'T L. 305 (2010) (discussing and criticizing the treatment of unexpected results in the Federal Circuit's case law).

284. *In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995); cf. Darrow, *Secondary Considerations*, *supra* note 54, at 69 (exploring the possibility of having this evidence count in favor of the patentee regardless of timing considerations).

285. *See In re Papesch*, 315 F.2d 381, 391 (C.C.P.A. 1963).

286. *See* Michael Willis Vary, Note, *Chemical Obviousness and 35 U.S.C. § 103*, 31 CASE W. RESV. L. REV. 949, 951–52 (1981).

287. *See* Dickey-John Corp. v. Int'l Tapetronics Corp., 710 F.2d 329, 345 (7th Cir. 1983) (“In a very real sense, it was not . . . merely prior art which taught away from using the [claimed solution], but rather, common sense. Often common sense is the most potent barrier to innovation and it takes uncommon ingenuity to disregard it.”).

288. Lemley, *supra* note 223, at 1388 (“Truly unexpected results may cause us to question whether the PHOSITA really had a reasonable expectation of success . . .”).

289. *See id.* at 1382–85 (collecting cases). To be sure, the Federal Circuit sometimes weighs unexpected results heavily in favor of nonobviousness even when it codes them as secondary. *See, e.g.,* Sanofi-Synthelabo v. Apotex, Inc., 550 F.3d 1075, 1088–90 (Fed. Cir. 2008); Knoll Pharm. Co. v. Teva Pharms. USA, Inc., 367 F.3d 1381, 1385 (Fed. Cir. 2004) (per curiam). *But cf.* Eisenberg, *Nonobvious Problem*, *supra* note 54, at 418 (“The coding of surprising properties evidence as ‘secondary’ may have led the Federal Circuit to discount its relevance in [a significant opinion].”). Finally, and strangely enough, some Federal Circuit panels have characterized teaching away—which is usually significant in obviousness analysis—as a secondary consideration. *See infra* note 308 and accompanying text.

290. *See* Lemley, *supra* note 223, at 1388 (“It seems hard to conclude, as some courts have, that unexpected results that weren't even known at the time of the patent application indicate a lack of motivation to try the patented invention.”).

It seems rather inconsistent to say that a compound is obvious until an unobvious property is discovered and then say that an invention was made *ab initio* since the compound inherently had that property all the time. Since chemical compounds have myriad uses all one has to do is continue screening and testing any given compound until some unobvious property turns up and then predicate patentability of the compound on the basis of this inherent unobvious property. Should enough time and testing be devoted to any given chemical compound some unobvious property could surely be detected, and hence render said compound patentable.²⁹¹

Western was correct to question the relevance and probative value of post-filing unexpected results. In the modern frame of *KSR*, this evidence may be dubious because it does not necessarily speak to a PHOSITA's challenge at the relevant time.²⁹² For example, "belated" (i.e., post-filing) unexpected results may reflect the inventors' diligence in developing a fuller understanding of the claimed material after filing,²⁹³ rather than demonstrate that a PHOSITA would have had to work against the grain before the date of the patent application. To be sure, one can envision a patent system that rewards post-filing research efforts and even developmental work designed to achieve commercialization.²⁹⁴ Indeed, some scholars have argued that patent law should do more to facilitate taking products to market.²⁹⁵ Nonetheless, the extant approach to obviousness focuses on invention rather than commercialization, which makes it crucial for tribunals to evaluate the bearing of the proffered evidence on the state of the art at the filing date.

Notably, the Federal Circuit has taken a small step toward a more nuanced view of unexpected results in a recent opinion, *Forest Laboratories v. Sigmapharm Laboratories*.²⁹⁶ In *Forest*, the court refused to credit a claimed

291. Marion Wayne Western, *Is 35 U.S.C. 103 Applicable to Chemical Compounds?*, 8 IDEA: PAT. TRADEMARK & COPYRIGHT J. RSCH. & EDUC. 443, 451 (1964).

292. See *supra* notes 199–202 and accompanying text.

293. See Lemley, *supra* note 223, at 1388. In future work, I intend to explore an alternative vision of the nonobviousness requirement that rewards this kind of work by bolstering ex post evidence. Cf. Dmitry Karshedt, *The Completeness Requirement in Patent Law*, 56 B.C. L. REV. 949, 1021–24 (2015) (distinguishing early-stage and later-stage innovation).

294. Cf. F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 748 (2001) (describing legislative efforts influenced by the commercialization view of patent law); F. Scott Kieff, *IP Transactions: On the Theory & Practice of Commercializing Innovation*, 42 HOUS. L. REV. 727, 744 (2005) (discussing the importance of patent law rules supporting commercialization).

295. See, e.g., Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 277 (1977); Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 361 (2010); cf. Lunney & Johnson, *supra* note 112, at 88 (advocating for an ex post view of § 103).

296. *Forest Lab'ys, LLC v. Sigmapharm Lab'ys LLC*, 918 F.3d 928, 937 (Fed. Cir. 2019), *remanding to* 473 F. Supp. 3d 376 (D. Del. 2020).

chemical's low toxicity in the patentee's favor.²⁹⁷ It explained that "[w]hile we have permitted *evidence* from after the patent is granted to be considered in assessing whether there are unexpected results, the results must be 'unexpected by one of ordinary skill in the art at the time of [the] application.'"²⁹⁸ The Federal Circuit then concluded that the trial court erred in relying on this evidence because "there was nothing in the prior art" to create a baseline expectation of toxicity that the inventors overcame.²⁹⁹ But as noted above, other panels have assigned high probative value to unexpected results and did not inquire into how the timing of their discovery might bear on a PHOSITA's cognitive challenge at the time of filing.³⁰⁰ This issue thus embodies yet another intra-circuit conflict in the treatment of § 103 evidence.

2. Line-Drawing

We have now seen that classification as primary or secondary can impact how tribunals value a particular fact in a § 103 case significantly—sometimes, to the point of prejudice. A great deal, therefore, can hinge on this antecedent decision, and one would expect that the criteria for making it would be well worked out. Nevertheless, the Federal Circuit is not at all uniform in how it characterizes certain types of evidence. Unexpected results constitute one example. As I and other commentators have observed,³⁰¹ the Federal Circuit has sent mixed messages on whether such evidence falls into the primary or secondary bucket.³⁰²

297. *Id.*

298. *Id.* (second alteration in original) (first citing *Knoll Pharm. Co. v. Teva Pharms. USA, Inc.*, 367 F.3d 1381, 1385 (Fed. Cir. 2004) (per curiam); and then quoting *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997)). The court must have meant "after the patent application is filed" instead of "after the patent is granted."

299. *Id.* To be sure, the court probably did not go far enough here, and should have questioned whether the evidence of low toxicity reflects purely post-filing developments (and therefore may not be reflective of the state of the art at the time of filing even if a baseline of expectations were established). See *infra* notes 456–58 and accompanying text; cf. *Velander v. Garner*, 348 F.3d 1359, 1377 (Fed. Cir. 2003) ("[I]t would be wrong to impute later-recognized insights—or possible obstacles—to the knowledge available to those skilled in the art at the time of the invention. . . ." (quoting *Garner v. Velander*, Interference No. 104,242, Paper No. 110, at *13 (B.P.A.I. Aug. 16, 2001))).

300. *Supra* note 289 and accompanying text; see *Sanofi-Aventis Deutschland GmbH v. Glenmark Pharms. Inc.*, 748 F.3d 1354, 1361 (Fed. Cir. 2014); *Genetics Inst., LLC v. Novartis Vaccines & Diagnostics, Inc.*, 655 F.3d 1291, 1308–09 (Fed. Cir. 2011); *Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1361–63 (Fed. Cir. 2007).

301. JANICE M. MUELLER, *PATENT LAW* 478–79 (6th ed. 2020); Eisenberg, *Nonobvious Problem*, *supra* note 54, at 418–29; Karshedt, *The More Things Change*, *supra* note 281, at 1159–68; Vogt, *supra* note 283, at 309–12.

302. Compare *Hoffmann-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1334 (Fed. Cir. 2014) (discussing unexpected results without mentioning "secondary considerations" or "objective indicia"), and *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 997–98 (Fed. Cir. 2009) (analyzing unexpected results separately from secondary considerations), with *Süd-Chemie, Inc. v. Multisorb Techs., Inc.*, 554 F.3d 1001, 1008 (Fed. Cir. 2009) ("[Plaintiff]

Both positions, to be sure, can be justified. On the one hand, a chemical's properties can be viewed as an integral part of "the claimed invention as a whole,"³⁰³ and thus potentially an aspect of "the differences between the claimed invention and the prior art"³⁰⁴ within *Graham's* primary inquiry.³⁰⁵ On the other hand, this evidence may be secondary because an unexpected result is a true "objective indicium"—a real-world, historical fact purportedly untainted by an evaluative judgment of how "close" the invention is to the prior art.³⁰⁶ The conflict persists without any promise of resolution,³⁰⁷ exacerbating the problems discussed above and further illustrating the difficulties caused by a rigid implementation of the *Graham* framework.

There are other kinds of evidence that resist the primary-secondary scheme, such as teaching away and related "demotivating" evidence. Prior art statements discouraging the path toward the invention—i.e., teaching away—usually constitute primary evidence, though some opinions have classified it as secondary.³⁰⁸ But when similar information is embodied in uncodified

contends that secondary considerations, including unexpected results, copying, and commercial success indicate that the invention . . . would not have been obvious to a person of skill in the art."), and *Forest Lab's, Inc. v. Ivax Pharms., Inc.*, 501 F.3d 1263, 1267 (Fed. Cir. 2007) (calling unexpected results a "secondary consideration[']"). See also *Allergan, Inc. v. Teva Pharms. USA, Inc.*, No. 2:15-cv-1455-WCB, 2017 WL 4803941, at *47 & n.37 (E.D. Tex. Oct. 16, 2017) (Bryson, J., sitting by designation), *aff'd per curiam*, 742 F. App'x 511 (Fed. Cir. 2018) (mem.) (suggesting that there is inconsistency in the Federal Circuit case law on the issue of characterization of unexpected results and ultimately treating this evidence as primary).

303. 35 U.S.C. § 103 (2018).

304. *Id.*; see also Eisenberg, *Nonobvious Problem*, *supra* note 54, at 418 ("Evidence of surprising or unexpected properties is unlike these other sources of 'market' evidence that indicate obviousness only through a chain of inferences. It is primary, technological evidence going directly to the statutory inquiry as to 'the differences between the subject matter sought to be patented and the prior art.'" (quoting 35 U.S.C. § 103 (a) (2000))); Note, *Standards of Obviousness and the Patentability of Chemical Compounds*, 87 HARV. L. REV. 607, 607–09 (1974) (explaining the difference between these two views of a chemical's properties in the context of § 103 analysis).

305. See generally *In re Kaslow*, 707 F.2d 1366 (Fed. Cir. 1983) (discussing the consideration of subject matter as a whole as a key concept in the obviousness inquiry).

306. See *supra* notes 119–20 and accompanying text. Nevertheless, this evidence can still be somewhat manipulable. Karshedt, *The More Things Change*, *supra* note 281, at 1152–59.

307. Although, in 2014, several Federal Circuit judges pointed out tensions in the court's approaches to unexpected results (and other aspects of nonobviousness analysis) and called for en banc action to resolve them, the court has not yet done so. See *Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 769 F.3d 1339, 1352–59 (Fed. Cir. 2014) (mem.) (Taranto, J., joined by Lourie and Reyna, JJ., dissenting from denial of rehearing en banc).

308. See, e.g., *Merck & Cie v. Gnosis S.P.A.*, 808 F.3d 829, 836–37 (Fed. Cir. 2015) (considering "teaching away" separately from objective indicia); *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1357 (Fed. Cir. 2013) (similar); see also Darrow, *Secondary Considerations*, *supra* note 54, at 71–72 (describing teaching away as primary evidence). But see *Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1379–80 (Fed. Cir. 2000) (addressing teaching away under secondary considerations); *Miles Lab's, Inc. v. Shandon Inc.*, 997 F.2d 870, 878 (Fed. Cir. 1993) (categorizing teaching away as part of "objective indicia"); see also John Paul Putney, *Are Secondary Considerations Still "Secondary"?: An Examination of Objective Indicia of Nonobviousness Five Years After KSR*, 4 AM. U. INTELL. PROP. BRIEF, no. 2, 2012, at 43, 48 & n.43 (citing 2-5 DONALD S. CHISUM,

opinions of industry players, then it is typically viewed as secondary if the classification is mentioned at all.³⁰⁹ It is odd that this technical evidence is grouped with economic, market-based evidence such as commercial success, rather than with teaching away, because the views of scientific experts are usually more, well, technical than economic. As one Federal Circuit opinion put it, teaching away and expert skepticism are not different in kind: “In effect, ‘teaching away’ is a more pointed and probative form of skepticism expressed in the prior art.”³¹⁰ But the pull of the *Graham* silos is strong, and teaching away and skepticism are in fact typically treated as belonging to separate evidence categories.

But that is not all. Let us take non-prior art evidence that directs a PHOSITA to work towards the claimed invention. It would seem that, by symmetry with non-prior art facts pointing in the opposite direction—e.g., skepticism of experts—such evidence should also logically be secondary.³¹¹ Nevertheless, as we already learned from *KSR*, design need and market pressure pushing the field toward the invention appear to be a part of the primary inquiry.³¹² Indeed, the Supreme Court gave these factors a central role in the motivational calculus while chiding the Federal Circuit for its rigid prior art-focused TSM test.³¹³ The rationale behind this categorization difference is difficult to pin down, and the tension between how pro- and anti-patent evidence that is not in the prior art is classed suggests that *KSR*’s “expansive and flexible approach” may well be inconsistent with a reading of *Graham* that mandates rigid evidentiary silos.³¹⁴ The next Section further explicates this point.

C. ELIMINATING THE SILOS

Before laying out the scheme for replacing the primary-secondary framework with a time-based approach to § 103, this Article must address whether the evidentiary tiers purportedly created by *Graham* can be validly eliminated and superseded given the controlling law. This Section entertains the view that these silos are mandated by statute or Supreme Court precedent

CHISUM ON PATENTS § 5.05 (Matthew Bender ed., 2012)) (classifying teaching away as a secondary consideration); Holte & Sichelman, *supra* note 211, at 157 & n.265 (same).

309. *But cf.* Darrow, *Secondary Considerations*, *supra* note 54, at 71–74 (noting the similarity of skepticism and teaching away in terms of what these types of evidence mean for nonobviousness).

310. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 885 (Fed. Cir. 1998); *see also* *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (“Obviousness may be defeated if the prior art indicates that the invention would not have worked for its intended purpose or otherwise teaches away from the invention.”).

311. Meanwhile, near-simultaneous invention by another or others, which suggests a “teaching toward,” is a secondary consideration that can be probative of obviousness. *See, e.g.*, *Geo. M. Martin Co. v. All. Mach. Sys. Int’l LLC*, 618 F.3d 1294, 1304–05 (Fed. Cir. 2010).

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

313. *Id.* at 418–22.

314. *Id.* at 415.

and shows that these arguments can be overcome. Indeed, both the language of § 103 and the Supreme Court case law, fully considered, actually support eliminating the silos.

1. Statutory Language

One argument for keeping the tiers is based on the statute. Section 103 specifically calls out prior art disclosures, directing tribunals to ask whether “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious,”³¹⁵ and says nothing about objective indicia. This explicit mention of prior art would appear to suggest that the first three *Graham* factors are more important than secondary considerations.

In addition, the reference point for obviousness is novelty, codified in § 102.³¹⁶ The anticipation inquiry under this section is generally technical and rule-like, and invalidity for lack of novelty requires the identity of “limitations” (i.e., components of the claim that the inventor is attempting to obtain)³¹⁷ between a single reference and the claimed subject matter.³¹⁸ This feature of the statute also appears to imply that non-prior art evidence is potentially less important or at least different in kind from the other evidence. In a typical obviousness case, after all, one reference discloses nearly all the elements of the invention the would-be patentee is trying to claim—and the initial assessment of the closeness of the lead reference and the claim frames the § 103 inquiry.³¹⁹

The argument for the primacy of the prior art can be pressed further. To underscore the seeming similarity between § 102 and § 103 in terms of the central role of the prior art, courts often appear to treat obviousness as “almost-anticipation.” Opinions refer to “combin[ing] references,”³²⁰ “supply[ing] a missing limitation,”³²¹ or “modifying” the prior art to come up with the invention.³²² For example, in *Apple*, a prior art touchscreen was

315. 35 U.S.C. § 103 (2018).

316. *Id.* § 102.

317. The Supreme Court in *KSR* uses the term “elements” instead of “limitations.” *KSR*, 550 U.S. at 415–21. For purposes of this Article, the two terms are synonymous.

318. *See, e.g., In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999).

319. *See, e.g., In re Dillon*, 919 F.2d 688, 692 (Fed. Cir. 1990) (en banc).

320. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009).

321. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016); *Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1195–96 (Fed. Cir. 2003).

322. *Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1360 (Fed. Cir. 2007); *see also In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017) (“Whether a rejection is based on combining disclosures from multiple references, combining multiple embodiments from a single reference, or selecting from large lists of elements in a single reference, there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful, otherwise a skilled artisan would not arrive at the claimed combination.”). *But cf. K/S HIMPP v. Hear-Wear Techs., LLC.*, 751 F.3d 1362, 1366 (Fed. Cir. 2014) (distinguishing

“combined” with a graphical toggle switch; in *Graham*, the “sandwiched” shank in the lead reference was “modified” into the claimed free-flex alternative; in *Adams*, a zinc electrode was “changed” into a magnesium one; and in *Agrizap*, a mechanical-switch rat trap was “reworked” to make a trap with a resistive switch.³²³ It thus appears that § 103, concerned as it is with a particular reference and the differences between it and the claim, contemplates a principally prior art-based inquiry. Some commentators take this view, maintaining that the first three *Graham* factors speak directly to the invention’s “technical superiority” embodied in a non-trivial technical advance over the prior art,³²⁴ while secondary considerations are only circumstantial evidence of it.³²⁵

Nevertheless, this vision of § 103 is not inevitable. Although, as Part IV explains, the direct-circumstantial distinction has its place in the law of obviousness, it does not align with the primary-secondary framework. It is true that, in the initial stages of analyzing validity under § 103, a fact-finder must make the technical determinations of what a prior art reference discloses and how the claims differ from that reference.³²⁶ But the motivation and reasonable expectation subtests underlying the ultimate “differences” question require judgment beyond a mere comparison between the claim’s limitations and the prior art.³²⁷ The differences must be understood in the

scenarios “involv[ing] the lack of evidence of a specific claim limitation” from “combinability of references where the claim limitations were in evidence”).

323. See *supra* notes 18–19, 101–02, 145–49 & 268–69 and accompanying text. I use quotes to indicate that the inventors in all those cases were not actually changing the prior art to come up with the claimed subject matter.

324. Merges, *Commercial Success*, *supra* note 53, at 875.

325. Rich, *supra* note 112, at 39.

326. Cf. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1363–65 (Fed. Cir. 2008) (setting forth similarities and differences between anticipation and nonobviousness).

327. See generally *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007) (laying out the complexities of the § 103 inquiry). Cf. *Datascope Corp. v. SMEC, Inc.*, 776 F.2d 320, 324 (Fed. Cir. 1985) (“[Defendant] misperceives the patent law in urging that we focus solely on the ‘differences’ between the subject matter of the claims and the prior art, as though those ‘differences’ were the claimed invention. . . . ‘The “difference” may be slight . . . , but it may also have been the key to success and advancement in the art resulting from the invention.’” (quoting *Jones v. Hardy*, 727 F.2d 1524, 1528 (Fed. Cir. 1984))); *Saf-Gard Prods., Inc. v. Serv. Parts, Inc.*, 532 F.2d 1266, 1272 (9th Cir. 1976) (Kennedy, J.) (“Even a minor change may produce a patentable invention, where the result could not have been readily predicted beforehand by one skilled in the art.”).

context of “the art to which the claimed invention pertains”³²⁸ and the characteristics of a PHOSITA, both statutory terms.³²⁹

This § 103 language supports the value and importance of evidence beyond the prior art. As *KSR* makes clear, sources outside “scientific literature” that reflect “the wide range of needs created by developments in the field of endeavor”³³⁰ are highly probative of the state of the art and can thus inform the level of patentable advance.³³¹ In sum, while superficially similar, § 102 and § 103 could not be more different: The former is mainly about the identity between a single prior art reference and the claim, and the latter is centrally about ex ante risk and the cognitive challenge of inventing with a piece of prior art as the starting point.³³² Although the steps of analyzing the prior art and comparing it to the claims are surely an essential part of the § 103 inquiry, critical evidence of what it would take to bridge the gap and come up with the claim at issue can often be found in varied non-prior art sources.

2. Supreme Court Case Law

As a second line of attack, one may contend that *Graham* mandates the tiers of evidence, and the Federal Circuit is simply not free to adopt the holistic approach unless Congress, or the Supreme Court itself, chooses to overturn the primary-secondary scheme. *Graham*’s decision to use the word “secondary,” the argument may proceed, suggests that non-prior art evidence is less important or should be considered only after the “primary” evidence has been evaluated.³³³ The proponent of this argument may also point to two of the § 103 cases that the Court decided between *Graham* and *KSR*, which made the statement that secondary considerations “without invention will not make patentability.”³³⁴ This characterization plausibly indicates that such

328. 35 U.S.C. § 103 (2018); see *In re Kubin*, 561 F.3d 1351, 1360–61 (Fed. Cir. 2009); see also *id.* at 1359 (explaining that the inquiry into whether “a skilled artisan merely pursues ‘known options’ from a ‘finite number of identified, predictable solutions’” is in line with *KSR* (quoting *KSR*, 550 U.S. at 421)).

329. See generally Joseph Scott Miller, *Level of Skill and Long-Felt Need: Notes on a Forgotten Future*, 12 LEWIS & CLARK L. REV. 579 (2008) [hereinafter Miller, *Forgotten Future*] (showing how long-felt need evidence can help construct a PHOSITA).

330. *KSR*, 550 U.S. at 419, 424; see also *Tights, Inc. v. Acme-McCrary Corp.*, 541 F.2d 1047, 1058–59 (4th Cir. 1976) (highlighting the importance of a PHOSITA’s perspective).

331. Sarah A. Geers, Comment, *Common Sense and the Fact Finder Without Skill in the Art: The Role of Objective Evidence in Achieving Proper Technology Specificity*, 40 SETON HALL L. REV. 225, 254 (2010); Miller, *Forgotten Future*, *supra* note 329, at 583.

332. *MERGES & DUFFY*, *supra* note 2, at 643 (illustrating differences between these two patentability requirements using the doctrine of analogous art).

333. *Lunney & Johnson*, *supra* note 112, at 64; *Rhodes*, *supra* note 153, at 1061–62.

334. *Anderson’s-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61 (1969) (quoting *Great Atl. & Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 153 (1950)); see also *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 278 (1976) (adopting a similar approach).

evidence is best viewed as merely an afterthought or even a kind of a tie-breaker to be used mainly in close cases.

Of course, if one accepts all these implications of *Graham*, but nonetheless believes in the soundness of the cognitive framework and agrees that secondary considerations should be an integral part of the § 103 inquiry, one can turn to Congress or the Supreme Court to overrule *Graham*. For example, Jonathan Darrow argued that secondary considerations should be codified in a new § 103A to ensure that they are considered fully and properly.³³⁵ The question here, though, is whether there is wiggle room under extant binding precedent for lower courts to adopt a holistic approach.³³⁶

Given the history of the invention requirement, the antecedent of nonobviousness,³³⁷ there is more than just wiggle room. Pre-1952 Supreme Court case law, though not always consistent on how much value it accorded to non-technical or non-prior art facts,³³⁸ did not speak of categories of evidence. For example, *Loom Co. v. Higgins*,³³⁹ a nineteenth-century Supreme Court opinion known for its early articulation of the problem of hindsight bias,³⁴⁰ noted the importance of long-felt need and failure of others in the obviousness calculus: “[I]t is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skilful [sic] persons.”³⁴¹ To a similar effect is the previously discussed case of *Smith v. Goodyear Dental Vulcanite*, which blurred the line between the silos by addressing what today might be called long-felt need and teaching away in the same breath.³⁴² *Graham* did not hold that Congress rejected these opinions—rather, its principal conclusion was that § 103 largely codified the invention precedents—and the Court itself decidedly did not treat the primary-secondary distinction as a break from prior case law.³⁴³

Moreover, to the extent *Graham* offered a framework, it has been modified by *Adams* and *KSR*. As earlier discussion suggests, *Adams* implicitly pushed back on *Graham* by ignoring the Court’s own primary-secondary heuristic and giving equal time to the discouragement coming both from the prior art and from the skepticism of experts.³⁴⁴ While *Graham* and *Adams* had

335. Darrow, *Secondary Considerations*, *supra* note 54, at 92.

336. *But cf.* Timothy R. Holbrook, *Obviousness in Patent Law and the Motivation to Combine: A Presumption-Based Approach*, WASH. U. L. REV. SLIP OPS. (Mar. 30, 2007) (manuscript at 5–9) (offering a defense of the use of presumptions in § 103 cases), <https://papers.ssrn.com/abstract=976695> [<https://perma.cc/JPV4-UAP2>]

337. *See supra* Section II.A.

338. Sirilla, *supra* note 76, at 463–69.

339. *Loom Co. v. Higgins*, 105 U.S. 580, 591–92 (1881).

340. Sirilla, *supra* note 76, at 464–65.

341. *Loom Co.*, 105 U.S. at 591.

342. *Smith v. Goodyear Dental Vulcanite Co.*, 93 U.S. 486, 495 (1876).

343. *See supra* notes 90–94 and accompanying text.

344. *United States v. Adams*, 383 U.S. 39, 51–52 (1966); *see supra* Section II.B.3.

the same author, Justice Tom Clark, he apparently felt no need to analyze the patent in *Adams* pursuant to the scheme that he had just set up in the *Graham* opinion. And although *KSR* rightly treated *Graham* as the foundational modern case on obviousness,³⁴⁵ the *KSR* Court notably relied on *Adams* when it provided substantive guidance for analyzing § 103 in the form of the “reason-to-combine” subtest.³⁴⁶

Indeed, *KSR* built principally on *Adams* (and on lower-court case law), rather than on *Graham*, when it ruled that there is more to § 103 than adding up elements from disparate prior art references.³⁴⁷ The Court relied on *Adams* for the proposition 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”³⁴⁸ and then highlighted *Adams*’s critical facts: the consensus in the field that the invention could not be achieved and the result that it worked well against all expectations.³⁴⁹ *KSR*, to be sure, cited two of the Court’s other post-*Graham* § 103 cases downplaying objective indicia, but not for that proposition. Instead, the Court characterized those opinions as “elaborat[ing] on [*Adams*’s] approach” that, without evidence of unexpected results, close similarity between the patent and the prior art may signal lack of “risk[.]”³⁵⁰

Given *KSR*’s heavy reliance on *Adams*, perhaps we should be talking about “the *Adams-KSR* framework” in addition to or even instead of “the *Graham* factors.” Moreover, it is worth underlining once again *KSR*’s (and *Adams*’s) insight that in the context of the cognitive framework, evidence outside of prior art matters as much as disclosures in the references do. Just as it makes little sense to minimize or ignore motivational evidence that does not come from a specific reference,³⁵¹ non-prior art *demotivational* evidence should, under *KSR*, logically be on equal footing with analogous pro-patent prior art-based evidence, such as teaching away.³⁵²

* * *

345. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406–07 (2007).

346. *Id.* at 416, 418.

347. *Id.* at 418 (citing *In re Bergel*, 292 F.2d 955, 956–57 (C.C.P.A. 1961)).

348. *Id.*; see also *id.* at 418–19 (“[I]nventions 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.”).

349. *Id.* at 418.

350. *Id.* at 416–17 (first citing *Anderson’s-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969); and then citing *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273 (1976)).

351. *Cf. Darrow, Secondary Considerations*, *supra* note 54, at 54 (“The Supreme Court more recently increased the relevance of secondary considerations in *KSR International Co. v. Teleflex Inc.* . . .”).

352. *Cf. Durie & Lemley*, *supra* note 3, at 991–92 (arguing that nonobviousness standards should be more sensitive to what real scientists having limited information before them would think and do when faced with the problem addressed by the claimed invention).

The totality of the Supreme Court's invention and nonobviousness precedent, therefore, does not mandate rigid evidentiary silos, and neither does the language of § 103. The holistic judges have it right, and the Federal Circuit should abandon the formal primary-secondary distinction that several judges on that court currently adhere to with great stringency. The Article now turns to Part IV, which shows why the proposed *ex ante*/*ex post* framework belongs in its place and lays out the procedural steps that the court can take to eliminate the old framework and ensconce the new one into law.

IV. TOWARD A TIME-BASED OBVIOUSNESS FRAMEWORK

One possible next step after the elimination of the primary-secondary framework is simply to consider all nonobviousness evidence as it comes in, without any categorization—a completely holistic approach. This Part explains, however, that this treatment of the § 103 inquiry would be a mistake because the evidence termed here “*ex ante*” differs from its “*ex post*” counterpart in a salient way. As a result, *that* distinction would be useful to introduce as an aid to reasoned § 103 analysis. If the statutory command to determine obviousness “before the effective filing date of the claimed invention”³⁵³ is to be implemented rigorously, then a new way of classifying the evidence is needed. Accordingly, the proposed scheme offers a comprehensive evidentiary framework for structuring the obviousness inquiry around the critical dimension of time.

The organizing principle underlying the *ex ante*/*ex post* classification parallels the general distinction between direct and circumstantial evidence in the context of how a particular fact relates to the time of filing within the obviousness inquiry.³⁵⁴ Because it appears in the art independently of the patented invention and generally before the date of the patent application, *ex ante* evidence bears in a temporally direct way on the cognitive challenge facing a PHOSITA in a § 103 case. In contrast, *ex post* evidence concerns societal value of the invention after it has “matured” in the process of further, post-filing development or commercialization. Thus, the bearing of *ex post* evidence on the pre-filing state of the art is temporally indirect in the sense that its relevance depends on a showing that the invention's demonstrated value actually corresponds to a non-trivial *ex ante* difficulty of coming up with that invention.

The analogy between the proposed *ex ante*/*ex post* categorization and the direct/indirect evidence distinction has its limits. Obviousness is not a fact, but a legal judgment, and a PHOSITA is not a real person, but a construct. One cannot directly observe motivation the way that a witness

353. 35 U.S.C. § 103 (2018).

354. See generally Kevin Jon Heller, *The Cognitive Psychology of Circumstantial Evidence*, 105 MICH. L. REV. 241, 247–55 (2006) (distinguishing direct and circumstantial evidence).

watches an accident, nor does one infer reasonable expectation of success in the sense that a fact-finder can infer distracted driving from the absence of skid marks.³⁵⁵ Still, the analogy helps pave the way to a more disciplined analysis by reminding parties and decision-makers of the need to link the evidence to the state of the world before filing.

This Part develops a time-based scheme for evaluating obviousness. First, it lays out in greater detail the theories of relevance for both pre- and post-filing evidence within the cognitive framework. Second, it explains how specific extant types of obviousness evidence should be realigned after the primary-secondary framework is abandoned, and how their relevance and weight would be established under this Article's timing proposal. Third, it illustrates the framework in action and shows how the Federal Circuit can adopt the proposal as a practical matter.

A. RELEVANCE THEORIES FOR OBVIOUSNESS EVIDENCE

The filing date of a patent application is a critical benchmark for ascertaining claim validity.³⁵⁶ Under the current version of the Patent Act,³⁵⁷ one generally compares the date of the reference with the filing date to decide if it constitutes prior art.³⁵⁸ To be sure, tribunals must sometimes decide, for example, at what point a reference became sufficiently accessible to the public to qualify as a "printed publication" within the meaning of § 102, an inquiry

355. "Obviousness is [ultimately] a question of law based on underlying factual findings," including the subsidiary *Graham* factors and the inferences of motivation and reasonable expectation of success (or lack thereof). *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012). For a critique of treating motivation as factual, see generally Joshua L. Sohn, *Re-Thinking the "Motivation-to-Combine" in Patent Law*, 48 AIPLA Q.J. 1 (2020).

356. See 35 U.S.C. § 100(i) (defining "effective filing date"); see also *supra* note 56 and accompanying text (discussing the concept of a "priority" date).

357. Under the law prior to the AIA, when the U.S. patent system was under the so-called "first-to-invent" regime, inventors could avoid prior art by "antedating" the potentially invalidating reference by proving an earlier invention date. See MPEP § 2150 (9th ed. Rev. 10.2019, June 2020) (comparing the relevant dates in pre-versus post-AIA obviousness analyses). Now, with some exceptions, any proper reference dated earlier than the filing date qualifies as prior art. 35 U.S.C. § 102(b) (setting forth those exceptions). Although patents subject to the pre-AIA regime are still being litigated, the old rules are becoming increasingly less significant with the passage of time. See generally Michael F. Martin, *The End of the First-To-Invent Rule: A Concise History of Its Origin*, 49 IDEA: INTELL. PROP. L. REV. 435 (2009) (discussing the transition from first-to-invent to first-to-file). Still, while the anchoring date has changed from invention to filing, the cases involving pre-AIA patents (like *Graham* and *KSR*) remain relevant to post-AIA § 103 because of their substantive analyses.

358. 35 U.S.C. § 102(a)(1) (stating that a reference qualifies as prior art and may defeat novelty if it was dated "before the effective filing date of the claimed invention"). An exception to this rule involves a scenario in which the inventor "publicly disclosed" the patented subject matter before the date of the reference and one year or less before the effective filing date. See *id.* § 102(b)(1)(B).

that can turn complicated.³⁵⁹ But once the date is set, all one usually has to do is look at the calendar.

Prior art that qualifies under § 102 generally also counts as prior art for § 103 purposes.³⁶⁰ But the filing date also matters for obviousness in another, though related, way. Because § 103 asks if “the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention,”³⁶¹ obviousness must be measured in view of the state of the invention’s field as of that date. The filing date, therefore, also frames the motivation-expectation inquiry.

The “at the time of filing” question under § 103, however, is much more challenging than for § 102 because the former requires much more mental gymnastics and judgment.³⁶² Because a determination of whether a claim would have been obvious must always be conducted after the filing date—sometimes long after—as a practical matter, tribunals must rely on prior art disclosures, expert opinions in and out of court,³⁶³ and other evidence to help them evaluate the claimed invention in the context of the state of the art at the proper time. This is a treble difficult exercise because it calls for a highly technical inquiry from the perspective of a hypothetically constructed individual at some point in the past.³⁶⁴ But all three components are essential to an accurate § 103 analysis.

359. See, e.g., *GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 693–96 (Fed. Cir. 2018).

360. The references, to be sure, must be from the “field of the invention” or be “pertinent to the problem” solved by the patent under the analogous art doctrine. See *Sci. Plastic Prods., Inc. v. Biotage AB*, 766 F.3d 1355, 1359–60 (Fed. Cir. 2014); Michal Shur-Ofry, *Connect the Dots: Patents and Interdisciplinarity*, 51 U. MICH. J.L. REFORM 55, 89 (2017) (discussing circumstances under which connecting different technical disciplines requires special insight). See generally Jacob S. Sherkow, *Negating Invention*, 2011 BYU L. REV. 1091 (highlighting the importance of properly applying the analogous arts doctrine for accurate obviousness determinations).

361. 35 U.S.C. § 103.

362. The timing inquiry for § 103, moreover, is also not black-and-white in the way that the § 102 inquiry is: It may matter, for example, if a need for an invention existed for a long period of time or a short one. See, e.g., *Abramowicz & Duffy*, *supra* note 1, at 1599 (explaining that the goal of § 103 is “to cover only those inventions that, but for the inducement of a patent, would not have be[en] disclosed or devised for a substantial period of time”); see also *Chiang*, *supra* note 9, at 69 (discussing the potential relevance of how long it would take other inventors to come up with the patented solution in the § 103 analysis).

363. Although it has been argued that skepticism and professional approval may be forms of hearsay, see EDMUND W. KITCH & HARVEY S. PERLMAN, *LEGAL REGULATION OF THE COMPETITIVE PROCESS* 882 (rev. 4th ed. 1991), such evidence is routinely accepted in § 103 cases. See, e.g., *Asetek Danmark A/S v. CMI USA, Inc.*, No. 13-cv-00457-JST, 2014 WL 12644295, at *1–2 (N.D. Cal. Nov. 19, 2014) (concluding that such evidence is non-hearsay because it is offered not for the truth of the matter asserted, but rather simply to establish that the statements of praise were made). *But cf.* *Order at 5–7*, *Sonos, Inc. v. D&M Holdings Inc.*, Civil Action No. 14-1330-WCB (D. Del. Dec. 8, 2017), ECF No. 504 (Bryson, J., sitting by designation) (qualifying the admissibility of this evidence), <https://delawareiplawblog.files.wordpress.com/2020/05/03bdd-sonos-14-1330-mils.pdf> [<https://perma.cc/R4U5-P3KR>].

364. See Alan L. Durham, *Patent Symmetry*, 87 B.U. L. REV. 969, 971 (2007); Janice M. Mueller, *Chemicals, Combinations, and “Common Sense”: How the Supreme Court’s KSR Decision is Changing*

There is another tricky distinction between prior art and other kinds of obviousness evidence. Although the date of a reference must, by definition, precede filing, this does not have to be true for other evidence of the pre-filing state of the world for § 103 purposes. For example, in *In re Copaxone*, the Federal Circuit properly held that certain clinical trial documents that did not qualify as prior art were nonetheless admissible to establish invalidity because they were evidence of “the state of the art.”³⁶⁵ It explained that, though not publicly available prior to the filing date, these materials could still shed light “on the motivations of those having ordinary skill in the art at the [appropriate] time.”³⁶⁶

Like the documents in *Copaxone*, evidence generated after filing, but directly indicative of the pre-filing state of the invention’s field, is not unusual. Indeed, many § 103 cases feature some form of litigation-developed expert testimony on a PHOSITA’s time-of-filing tacit knowledge and similar evidence.³⁶⁷ To be sure, such testimony may end up being self-serving or distorted by hindsight (given that the patent at issue is known to the testifying experts),³⁶⁸ but it is routinely admissible and directly probative of the pre-filing state of the world. Such evidence is allowed because a PHOSITA is presumed to be omniscient—aware of all the pertinent references and other relevant pre-filing information that could be probative of motivation and reasonable expectation of success (or lack thereof), even if it is not widely available to the public or to the inventor.³⁶⁹

Evidence that paints the picture of the world prior to filing (whenever generated) can be contrasted with evidence that appears during post-filing development of the invention or in response to it. Such truly belated, *ex post* information commonly includes after-discovered unexpected results and the market’s reaction to the invention in the form of commercial success of the patented product.³⁷⁰ Even an omniscient PHOSITA cannot predict the future

Federal Circuit Obviousness Determinations in Pharmaceutical and Biotechnology Cases, 35 N. KY. L. REV. 281, 281 (2008); see also Whelan, *supra* note 154, at 374 (discussing the need to ascertain a PHOSITA’s “state of mind” at the time of filing).

365. *In re Copaxone* Consol. Cases, 906 F.3d 1013, 1020 (Fed. Cir. 2018).

366. *Id.*; see *In re Koller*, 613 F.2d 819, 824 & n.5 (C.C.P.A. 1980) (setting forth circumstances in which non-prior art documents can directly speak to the pre-filing state of the art); see also *Ex parte* Varadhachary, No. 2008-3921, 2009 WL 577039, at *4 (B.P.A.I. Mar. 5, 2009) (explaining that, though published after the filing date of the patent application at issue, a document “is available to teach the state of the art at the time of [the applicants’] claimed invention”).

367. Eisenberg, *Nonobvious Problem*, *supra* note 54, at 402–03.

368. See Mandel, *Hindsight Bias*, *supra* note 57, at 1443–44.

369. *But cf.* Durie & Lemley, *supra* note 3, at 1015 (suggesting an alternative approach to the obviousness inquiry that is based on facts that may be realistically knowable to skilled artisans).

370. See Abramowicz & Duffy, *supra* note 1, at 1670–71 (discussing unexpected results together with commercial success).

and learn what took place after filing, so the first instinct may be to argue that this kind of evidence is categorically irrelevant to § 103.³⁷¹

A concurrence in the denial of en banc rehearing in *Bristol-Myers Squibb v. Teva Pharmaceuticals*, which two Federal Circuit judges signed onto, took this view.³⁷² The case dealt with the question of whether a post-filing discovery that a prior art compound was toxic and thus unsuitable for therapeutic applications supported nonobviousness of a patent on a structurally similar (but less toxic) chemical.³⁷³ While the controlling panel opinion discounted this evidence on case-specific grounds,³⁷⁴ the en banc denial concurrence went further. It maintained that “the pertinent knowledge is that possessed at the time of the invention” because § 103 “provides that an invention is not patentable if it ‘would have been obvious *before the effective filing date* of the claimed invention.’”³⁷⁵ Thus, the concurrence concluded that the statute and case law “does not allow consideration” of belated unexpected results evidence.³⁷⁶

The categorical irrelevance view, however, is incorrect as a matter of logic and evidence doctrine. As Maggie Wittlin explained, courts properly rely on what she usefully termed “hindsight evidence” in many areas of law.³⁷⁷ Consider a long-standing problem in contract law—enforceability of liquidated damages clauses.³⁷⁸ The test for whether such clauses hold up is the reasonableness of the agreed-upon damages amount as judged at the time of contract formation, which makes actual damages hindsight evidence.³⁷⁹ Although courts are split on the issue, Wittlin argued persuasively that actual

371. Darrow explored another theory of relevance of commercial success, but it aligns more with the commercialization theory of patent law mentioned above. See Darrow, *Secondary Considerations*, *supra* note 54, at 86 (“There is an alternate rationale, however, by which commercial success reflects patentability that does not depend on any inferences. Commercial success provides direct evidence, not of the state of mind of the inventor, but of the social value present in the invention.”); see also *supra* notes 293–95 and accompanying text (mentioning commercialization and other ex post theories of nonobviousness).

372. *Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 769 F.3d 1339, 1340–41 (Fed. Cir. 2014) (mem.) (Dyk, J., joined by Wallach, J., concurring in denial of rehearing en banc).

373. See *Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 752 F.3d 967, 974 (Fed. Cir. 2014).

374. *Id.* at 977–78.

375. *Bristol-Myers Squibb*, 769 F.3d at 1341 (Dyk, J., joined by Wallach, J., concurring in denial of rehearing en banc) (quoting 35 U.S.C. § 103).

376. *Id.* See generally Douglas L. Rogers, *Obvious Confusion Over Properties Discovered After a Patent Application*, 43 *AIPLA Q.J.* 489 (2015) [hereinafter Rogers, *Obvious Confusion*] (exploring this problem in depth).

377. Maggie Wittlin, *Hindsight Evidence*, 116 *COLUM. L. REV.* 1323, 1327 (2016); see also Lunney & Johnson, *supra* note 112, at 49–50, 89–94 (arguing that there is value and relevance to “hindsight evidence,” including evidence of the inventor’s own path that brought him or her to the claimed invention). See generally Rachlinski, *supra* note 167 (discussing safeguards for using hindsight information in judging).

378. See Wittlin, *supra* note 377, at 1378–84 (describing areas of law in which hindsight evidence is used extensively).

379. *Id.* at 1379–80.

damages can be probative of ex ante reasonableness and that those jurisdictions “that universally deem this evidence irrelevant are mistaken.”³⁸⁰ This is because “[a] knowledgeable party has some ability to predict damages accurately, so reasonable stipulations are more likely to approximate actual damages than unreasonably low stipulations.”³⁸¹

Wittlin’s argument is well-founded.³⁸² Relevance is a low bar,³⁸³ and actual damages can usually clear it readily because the purpose of non-punitive (i.e., reasonable) liquidated damages clauses is to approximate actual damages.³⁸⁴ However, such evidence is not foolproof in terms of timing: For example, the damages might be unforeseeably high because of an unexpected spike in the price of some input for making a product specified in the contract, or other changes in the market.³⁸⁵ Thus, the relevance of belated or ex post evidence—here, actual damages—to the parties’ reasonable expectations at the time of contracting cannot simply be assumed, and other information can undercut the inferential link to the past. As a result, although such evidence is not categorically irrelevant, the pertinence of ex post evidence is more readily defeasible than that of ex ante evidence based on timing considerations.³⁸⁶

Consistent with these intuitions, courts have already allowed hindsight evidence (which this Article has been calling “ex post” evidence) with proper safeguards to inform inquiries in other areas of patent law. For example, in the context of analyzing enablement and written description under 35 U.S.C. § 112(a), courts have repeatedly concluded that post-filing events and other after-developed evidence that may reflect further research in the invention’s field can properly bear on validity³⁸⁷—even though, as with § 103, compliance with § 112(a) must be formally measured as of the time of filing.³⁸⁸ While some types of after-arising evidence in § 112(a) cases (e.g., additional data on experiments conducted before filing) may speak directly to the PHOSITA’s

380. *Id.* at 1383.

381. *Id.*; *see also id.* at 1334 (“When one occurrence tends to lead to another, evidence of the second occurrence is suggestive of the first.”).

382. *Cf. Leo Katz, Before and After: Temporal Anomalies in Legal Doctrine*, 151 U. PA. L. REV. 863, 864 (2003) (“[W]e know that people are prone to an irrational hindsight bias that makes certain outcomes seem more inevitable ex post than they did ex ante, and might prompt them to judge the defendant’s actions as negligent in hindsight when they would not do so in advance.”).

383. FED. R. EVID. 401.

384. Wittlin, *supra* note 377, at 1383.

385. *See, e.g., Tongish v. Thomas*, 840 P.2d 471, 476 (Kan. 1992).

386. *Cf. Sinclair Refin. Co. v. Jenkins Petroleum Process Co.*, 289 U.S. 689, 697 (1933) (addressing related issues in the context of patent infringement damages and acknowledging the relevance of the ex post “book of wisdom” evidence).

387. *See, e.g., Consol. Elec. Light Co. v. McKeesport Light Co.*, 159 U.S. 465, 474 (1895) (analyzing post-filing evidence disproving enablement); *Amgen Inc. v. Sanofi*, 872 F.3d 1367, 1373–75 (Fed. Cir. 2017) (noting post-filing evidence that potentially shows that the claims are not adequately described).

388. *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1370–72 (Fed. Cir. 1999).

ability to make and use the invention or to appreciate that it is adequately described, at least one court recently recognized that even evidence unquestionably classifiable as *ex post* can and sometimes should bear on whether the claims satisfy the enablement and written description requirements.³⁸⁹ And while courts can be particularly suspicious of post-filing evidence bolstering validity,³⁹⁰ even that sort of evidence has been allowed in appropriate circumstances.³⁹¹ There is thus both logical and precedential support for not categorically excluding *ex post* evidence of obviousness too, so long as its relevance with respect to state of the art at the time of filing can be established. Again, however, the proponent must connect such *ex post* evidence to the time of filing.

B. REALIGNING THE EVIDENCE

1. Ex ante Evidence

Having discussed general theories of relevance for the *ex ante* and *ex post* categories, this Article now considers how specific types of evidence should be properly classified in the context of the proposed framework. It is submitted that the scheme outlined below will lead to more rigorous analysis of obviousness evidence and thus improve the quality and accuracy of § 103 patentability determinations. The tables below summarize the current state of the world under *Graham*'s primary-secondary heuristic (Table 1),³⁹² and then outline the proposed realignment (Table 2). The key moves are indicated in italics in Table 2.

389. *Sprint Commc'ns Co. v. Charter Commc'ns, Inc.*, Nos. 1:17-cv-01734-RGA, 1:18-cv-00536-RGA, 2019 WL 1082067, at *4 (D. Del. Mar. 7, 2019). *See generally* Janet Freilich, *The Replicability Crisis in Patent Law*, 95 IND. L.J. 431 (2020) (calling for more extensive utilization of post-filing evidence to determine if patent claims are enabled and adequately described); Timothy R. Holbrook, *Patent Disclosures and Time*, 69 VAND. L. REV. 1459 (2016) (similar); Sean B. Seymore, *Patenting Around Failure*, 166 U. PA. L. REV. 1139 (2018) (similar); Jacob S. Sherkow, *Patent Law's Reproducibility Paradox*, 66 DUKE L.J. 845 (2017) (similar).

390. *See, e.g., In re Rasmussen*, 650 F.2d 1212, 1213-14 (C.C.P.A. 1981) (discussing the "new matter" problem); *see also* Bayer Healthcare LLC v. Baxalta Inc., 989 F.3d 964, 983 (Fed. Cir. 2021) ("We agree that post-priority knowledge . . . cannot support the jury verdict of enablement.").


391. As one court explained, post-filing data "does not render an insufficient disclosure enabling, but instead goes to prove that the disclosure was in fact enabling when filed." *In re Brana*, 51 F.3d 1560, 1567 n.19 (Fed. Cir. 1995); *see also* Gould v. Quigg, 822 F.2d 1074, 1078 (Fed. Cir. 1987) (considering post-filing evidence relating to validity under § 112).

392. Question marks next to "unexpected results" reflect inconsistent classification of this evidence. *See supra* notes 301-07 and accompanying text.

Table 1. *Graham's Primary-Secondary Framework*

Primary Evidence	Secondary Evidence
Content of the prior art and the differences between it and the claimed invention	Commercial success
Prior art teachings "away" or "toward" from the claimed invention	Failure of others
Comparison of the properties of the claimed invention with those of the prior art, including unexpected results (?)	Long-felt need
	Expert skepticism
	Copying of the claimed invention, licensing, and other forms of industry acquiescence
	Industry praise (or disbelief)
	Simultaneous invention
	Unexpected results (?)

Table 2. Proposed Time-Based Scheme



Ex ante evidence (relating to state of the art facing a PHOSITA at time of filing)	Ex post evidence (in reaction to or during further development of the invention)
Content of the prior art and the differences between it and the claimed invention	Commercial success
Prior art teachings “away” or “toward” from the claimed invention, <i>as well as market pressures and design needs</i>	Copying of the claimed invention, licensing, and other forms of industry acquiescence
Comparison of the properties of the prior art with those of the claimed invention, including unexpected results, <i>if discovered before filing</i>	Comparison of the properties of the prior art with those of the claimed invention, including unexpected results, <i>if discovered after filing</i>
<i>Failure of others</i>	Industry praise (or disbelief)
<i>Long-felt need</i>	
<i>Expert skepticism</i>	
<i>Simultaneous invention</i>	

In this frame, ex ante evidence speaks directly to the state of the art at the relevant time and the level of challenge a PHOSITA would have faced in coming up with the claimed invention. As an initial matter, this type of evidence concerns much of the subject matter that now falls into the first three *Graham* factors.³⁹³ Thus, it includes *Graham*’s primary evidence, such as prior art disclosures and the differences between them and the claimed invention, with the important caveat that only the differences that have been ascertained prior to filing count as ex ante evidence.³⁹⁴

More specifically, this information encompasses comparisons between the lead prior art reference and the claims to see which limitation is “missing” and the content of any secondary references or other sources that would supply that limitation.³⁹⁵ This analysis concerns both structural and functional similarities or differences—think a working battery compared to prior art

393. See *supra* notes 108–09 and accompanying text.

394. See generally Rogers, *Obvious Confusion*, *supra* note 376 (making the distinction between pre- and post-filing unexpected results).

395. See *supra* notes 320–23 and accompanying text.

batteries that explode, or drugs that heal compared to those that are toxic. Similarities or dissimilarities between the prior art and the claimed invention are relevant to both motivation and reasonable expectation of success—and the closer the similarity, the more likely the claim is to be obvious.

This setup effectively subsumes pre-filing unexpected results. While, as discussed above, courts struggle mightily with this evidence,³⁹⁶ the proposed approach gets rid of the unhelpful tiers and focuses on what matters: time. If a result was demonstrated and disclosed by the time of filing, then it can directly support the case for validity.³⁹⁷ The easy case for relevance arises when the result is actually a part of the patent claim at issue, as is sometimes the case with recited therapeutic properties of pharmaceutical methods or compositions.³⁹⁸ In this scenario, the claim itself fairly embodies “the differences” between the prior art and the claimed invention within the meaning of § 103. If the result is unclaimed but at least disclosed in the patent’s specification,³⁹⁹ however, it is still competent time-of-filing evidence suggestive of unpredictability in the path to the claimed invention.⁴⁰⁰

Other § 103 evidence in the ex ante category includes statements in the prior art indicating whether the path toward the invention would be expected

396. *Supra* Section III.B.1.ii; see MOY, *supra* note 279, § 9:76 (addressing some challenges with this evidence).

397. *Cf. In re Merck & Co.*, 800 F.2d 1091, 1096 (Fed. Cir. 1986) (“To show obviousness, it was necessary to determine from knowledge already available in the art at the time of [the] invention that one skilled in the medicinal chemical art would have expected [the claimed compound] to be useful in the treatment of depression in humans.”).

398. See, e.g., *Sanofi v. Watson Lab’s Inc.*, 875 F.3d 636, 647–50 (Fed. Cir. 2017).

399. Or knowable to a PHOSITA given the information available in the patent’s specification in view of the state of knowledge in the art at the time of filing. See *In re Khelghatian*, 364 F.2d 870, 875–76 (C.C.P.A. 1966) (analyzing the problem of inherent disclosures). *But cf.* Robert A. Choate, *Invention and Unobviousness—“Afterthoughts”—Reliance on Features and Advantages Undisclosed at Original Filing*, 49 J. PAT. OFF. SOC’Y 619, 619–20 (1967) (discussing the problem of unexpected results that are not apparent from reading the patent’s specification).

400. See Lemley, *supra* note 223, at 1388 (maintaining that unexpected results are “evidence that hints that an invention was not well understood until it was made”). A difficult question arises when the unexpected result, even if ascertained by the time of filing, eventuates through complete serendipity. Is it probative of a PHOSITA’s cognitive challenge, or does crediting such evidence in the inventor’s favor constitute windfall for pure luck? In the frame of this Article, recognition of a serendipitous result before the time of filing might itself be evidence that the inventor has overcome a complex problem in the field, making it reasonable to conclude that the result should favor patentability. *Cf.* Sean B. Seymore, *Serendipity*, 88 N.C. L. REV. 185, 192, 194–95 (2009) (arguing that “to associate an unexpected finding with irrationality is improper” and noting that “unknown properties of compounds can only be uncovered through actual experimentation”). *But cf.* *Pfizer Inc. v. Teva Pharms. USA, Inc.*, 460 F. Supp. 2d 659, 667 (D.N.J. 2006) (“The fact that the hypothetical person of ordinary skill would have been surprised to learn that the particular combination of elements created an unexpected benefit completely unrelated to the desired outcome does not logically imply that it would not have been obvious to combine those elements to achieve the desired result.”); MOY, *supra* note 279, § 9:77 (expressing doubt that this evidence should favor the patentee). I thank Kevin Collins for suggesting that I make this point.

to bear fruit and other disclosures encouraging or dissuading a PHOSITA to work towards the invention. The latter could, for example, include technical information suggesting that the invention was a matter of routine optimization, as in *KSR*, or, to the contrary, that it would have been expected to be inoperable or at least difficult to develop, as in *Adams*.⁴⁰¹

In addition, in line with *KSR*, courts have recognized various types of ex ante evidence falling outside specific prior art references. It includes market pressures, design needs, as well as the general complexity (or lack thereof) of the relevant field or the problem being solved, which can be introduced via expert testimony.⁴⁰² For example, under the obvious to try doctrine, a patent challenger could successfully identify a path to the claimed invention based on the motivation created by the need for a more efficient solution to a known problem and a reasonable expectation of success due to a small number of potential research options for solving it.⁴⁰³

Next comes a clear break from the *Graham* regime. As noted above, pre-filing non-prior art evidence types currently falling within the secondary tier—failure of others, long-felt need, expert skepticism, and simultaneous invention—can be directly probative of nonobviousness (or, for simultaneous invention evidence, of obviousness) based on their timing.⁴⁰⁴ This evidence matters for the same reasons that prior art evidence and “*KSR* evidence” of design need and market pressure does: It is indicative of a PHOSITA’s state of knowledge at the time of filing.⁴⁰⁵ The relevance of industry expert views, which can teach toward or away from the invention just as much as the prior art itself can, is particularly easy to establish. As we have seen in cases like *Broad Institute*, skepticism can be especially probative of the lack of reasonable expectation of success: Before the invention was made, top scientists in the field literally suggested that the path toward it would have been difficult and fraught with technical risk.⁴⁰⁶

401. See *supra* notes 198–202 (discussing *KSR*); *supra* notes 139–49 and accompanying text (discussing *Adams*).

402. See *supra* notes 186–89 and accompanying text (discussing *KSR*).

403. See *In re Kubin*, 561 F.3d 1351, 1359–60 (Fed. Cir. 2009); Rogers, *Gobbledygook*, *supra* note 189, at 85.

404. See *supra* notes 340–42 and accompanying text (explaining the concept of teaching away); Duffy, *Timing Approach*, *supra* note 9, at 361, 371. To be sure, for failure of others and long-felt need to count in favor of validity, a nexus to the technical challenge of coming up with the invention must be established. See Merges, *Commercial Success*, *supra* note 53, at 862–66, 872 (discussing the need to establish a technical nexus for this evidence).

405. See Whelan, *supra* note 154, at 360 (discussing the importance of various secondary considerations evidence in ascertaining a PHOSITA’s “state of mind”); see also Robert W. Harris, *The Emerging Primacy of “Secondary Considerations” as Validity Ammunition: Has the Federal Circuit Gone Too Far?*, 71 J. PAT. & TRADEMARK OFF. SOC’Y 185, 189, 197 (1989) (arguing that some types of non-prior art evidence should in theory count against the patentee).

406. See *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291–95 (Fed. Cir. 2018); *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 885 (Fed. Cir.

The relevance of failure of others to nonobviousness may be less straightforward to demonstrate in spite of the temporal directness of this evidence (in that it concerns pre-filing experience in the field).⁴⁰⁷ As Merges explained, in order to have failure of others count in its favor, the patentee must show that other inventors were actually engaged in a serious pursuit of the problem eventually solved by the patentee.⁴⁰⁸ The failure must thus be due to cognitive or technical challenges presented by the invention,⁴⁰⁹ and not because, for example, the failed project was under-resourced due to poor business judgment or alternative research priorities.⁴¹⁰

Evidence of long-felt but unmet need, which Merges viewed as generally less probative than failure of others, can still be relevant in a direct way to a PHOSITA's pre-filing motivation and reasonable expectation of success if the proponent establishes its connection to the claimed invention's technical merit.⁴¹¹ Thus, the inventor may be able to demonstrate that other firms did not attempt to address the technical challenge solved by the patent because the art viewed the solution as too difficult to even try pursuing,⁴¹² or perhaps that the patent met the extant need by an insightful reformulation or even recognition of the problem.⁴¹³ The entity arguing against patentability could, however, undermine or defeat the relevance of such evidence by showing, for example, that the problem went unsolved because of a once-pricy input that suddenly became less expensive, leading readily to the claimed solution once the inventing firm used its managerial (rather than technical) acumen to take advantage of this development.⁴¹⁴

1998); Cotropia, *Predictability*, *supra* note 179, at 429 (maintaining that some secondary considerations can serve as evidence of unpredictability).

407. As Merges maintained, such evidence may properly be considered circumstantial from the technical perspective. Merges, *Commercial Success*, *supra* note 53, at 863. Nevertheless, as this Article argues, it is direct in the temporal sense.

408. *See id.*

409. *See* PAUL H. BLAUSTEIN, *LEARNED HAND ON PATENT LAW* 106 (1983).

410. Merges, *Commercial Success*, *supra* note 53, at 826–27, 862–66 (discussing the challenges for establishing nexus for failure of others evidence).

411. *Id.* at 830.

412. *See id.* at 830, 872.

413. *See* *Eibel Process Co. v. Minn. & Ont. Paper Co.*, 261 U.S. 45, 68 (1923) (“The invention was not the mere use of a high or substantial pitch to remedy a known source of trouble. It was the discovery of the source not before known and the application of the remedy for which Eibel was entitled to be rewarded in his patent.”); *In re Spinnoble*, 405 F.2d 578, 585 (C.C.P.A. 1969); *In re Antonson*, 272 F.2d 948, 949 (C.C.P.A. 1959); *see also* Duffy, *Timing Approach*, *supra* note 9, at 372 n.117 (discussing *Eibel Process* and related opinions). *See generally* Pedraza-Fariña, *Innovation Failures*, *supra* note 133 (noting the critical role of problem recognition for nonobviousness).

414. *See* Duffy, *Timing Approach*, *supra* note 9, at 352–53; Merges, *Commercial Success*, *supra* note 53, at 857–58; *see also* *Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1484 (Fed. Cir. 1997) (providing an example of an exogenous development that might diminish the value of this evidence). *But cf.* *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1382–83 (Fed. Cir. 1986) (seemingly ignoring the nexus requirement for commercial success).

The mirror image of failure of others and of long-felt but unmet need is simultaneous, or near-simultaneous, invention of the claimed subject matter by others. This evidence may point toward patent invalidity by tending to establish that the claims embodied no special technical challenge because PHOSITAs have already converged on that solution.⁴¹⁵ But this type of evidence, too, has its limitations. Consider, for example, the scenario of two eventual Nobel laureates coming up with the same invention at about the same time, which hardly proves that it was readily within a PHOSITA's grasp.

Here, a clarifying observation is in order. It is possible for evidence such as simultaneous invention to materialize at some point after the effective filing date, rather than before it. Indeed, because it is highly unlikely for someone else to come up with the same subject matter on precisely the same date that the patentee filed the application, the "simultaneous" invention would in practice be made shortly before or after filing. No matter on which side of the filing date this activity falls, however, it is still *ex ante* evidence tending to show directly that the patented invention would have been obvious. This is because the other inventors worked within the same state of the art available to a PHOSITA as the patentee, which of course did not include the discovery embodied in the patent at issue. Regardless of the precise point in time that the simultaneous invention materialized, the competing inventors developed it not in response to the patent, but independently from it.⁴¹⁶

More generally, while the filing date presents a convenient default dividing line, the specific date when the evidence comes into being relative to that date is not determinative of its *ex ante* or *ex post* status—what matters mainly is its independence from the invention. This can be true for simultaneous invention, documentary evidence that does not qualify as prior art in cases like *In re Copaxone*,⁴¹⁷ testimony prepared for litigation, and even failure of others. Thus, even if the failure is fully confirmed after filing,⁴¹⁸ such evidence is still actually *ex ante*, because it continues to mainly reflect pre-filing challenges and risks facing the field without the knowledge of the

415. See *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018).

416. Cf. Chiang, *supra* note 9, at 69 (suggesting that the incentive of a patent may not be necessary in a patent-race scenario). The Federal Circuit missed this point in *Hybritech*, 802 F.2d at 1380 n.4 (holding that evidence that "the invention was contemporaneously developed and disclosed in at least five publications and patent applications . . . and dated well after the filing date of the . . . patent but before its issuance is irrelevant . . . because obviousness must be determined as of the time the invention was made"). The error is all the more notable because the court elsewhere in the opinion enthusiastically embraced the post-filing evidence of commercial success. *Id.* at 1382–83.

417. See *supra* notes 365–66 and accompanying text.

418. Because patent applications typically publish 18 months after the effective filing date at the earliest, 35 U.S.C. § 122(b)(1)(A) (2018), a competitor may not know that someone else has come up with a solution to the problem at issue and could thus keep working on it (rather than abandon the project after losing the race).

invention at issue.⁴¹⁹ If anything, if the failure of others materialized post-filing,⁴²⁰ such evidence would be more probative of validity relative to a pre-filing failure because the problem the patent ended up solving has continued to be challenging even as more knowledge presumably accumulated in the world.

2. Ex post Evidence

In this Section, I enumerate the various kinds of ex post obviousness evidence and address the burdens of demonstrating its relevance for the § 103 inquiry.⁴²¹ With the exception of the odd case of unexpected results, which have been characterized inconsistently,⁴²² ex post evidence comprises the objective indicia that are responsive to the invention.⁴²³ Ex post evidence potentially relevant to obviousness runs the gamut from largely economic—namely, commercial success—to largely technical—namely, after-discovered properties of the claimed subject matter.⁴²⁴ Further, the secondary considerations of professional approval, acquiescence through licensing, and copying of the patent have both technical and non-technical characteristics. But whatever its technical provenance, the proponent of ex post evidence must do some work to connect it to the cognitive and technical challenges facing a PHOSITA at the time of filing in order for it to count.⁴²⁵ The proponent, in short, must show that ex post evidence has a nexus to the time of filing. While courts currently rely on the nexus construct mainly to determine if the proffered objective indicia relate to the technical merit of the claimed invention,⁴²⁶ this Article extends it to timing considerations.

Let us take these one at a time, starting with commercial success.⁴²⁷ This evidence includes data such as high sales volume of a patented product,

419. The key, once again, is independence of the evidence from the invention, with the effective filing date serving as a default diving line between ex ante and ex post evidence.

420. Cf. Duffy, *Timing Approach*, *supra* note 9, at 371.

421. Cf. Whelan, *supra* note 154, at 374–75.

422. See *supra* notes 301–07 and accompanying text.

423. It possible for some of this responsive evidence (e.g., commercial success or praise for an invention on which a patent application has not yet been filed) to materialize prior to the filing date, but it is still ex post in the scheme of this proposal. Cf. *supra* notes 367–69 and accompanying text (discussing the flip-side scenario of ex ante evidence that is generated after filing).

424. Cf. Whelan, *supra* note 154, at 377–80 (questioning the relevance of this evidence).

425. Cf. Abramowicz & Duffy, *supra* note 1, at 1604–12 (explaining that, while economic considerations can come into play under the current approach to obviousness, the analysis is still based mainly on cognitive inquiries).

426. See, e.g., *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016); *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983) (discounting evidence of commercial success where the patentee “failed to show that [it] . . . was due to anything disclosed in the patent in suit which was not readily available in the prior art”).

427. For an alternative approach to commercial success, see Darrow, *Secondary Considerations*, *supra* note 54, at 86 (explaining that this evidence can be probative of obviousness based on its

profitability of this product, rapid growth in market share attributable to the embodiments of the claimed invention, and so on.⁴²⁸ Commentators have long argued that establishing the relevance of commercial success to nonobviousness requires multiple showings on the part of the patentee.⁴²⁹ The facially plausible theory of relevance is that, if there was easy money to be made with the invention at issue, then someone would have already come up with it—and the fact that no one has managed that until the patentee did tends to establish that things were not so straightforward.⁴³⁰ This evidence is Wittlin’s hindsight evidence: belated, but still potentially relevant. The theory of its relevance, however, requires some unpacking.⁴³¹

As others have noted, commercial success can be rather attenuated from the ex ante challenge of coming up with the claimed invention.⁴³² As an initial matter, to support validity, commercial success must be due to the technical quality of the innovation at issue and should not be attributable to, for example, a particularly persuasive advertising campaign or a feature of the product not covered by the patent at issue.⁴³³ Moreover, and closer to the

indication of intrinsic social value of the claimed invention rather than on a chain of inferences with respect to the pre-filing state of the art); and Abramowicz & Duffy, *supra* note 1, at 1670–72 (similar). *But cf.* Kitch, *New Standards for Patents*, *supra* note 53, at 331–35 (questioning decisions to count commercial success in favor of validity based on these considerations).

428. See generally Andrew Blair-Stanek, *Increased Market Power as a New Secondary Consideration in Patent Law*, 58 AM. U. L. REV. 707 (2009) (discussing this evidence).

429. Kitch, *New Standards for Patents*, *supra* note 53, at 332–35; Merges, *Commercial Success*, *supra* note 53, at 829–32.

430. DONALD S. CHISUM, TYLER T. OCHOA, SHUBHA GHOSH & MARY LAFRANCE, UNDERSTANDING INTELLECTUAL PROPERTY LAW 77 (3d ed. 2015) [hereinafter CHISUM ET AL., UNDERSTANDING INTELLECTUAL PROPERTY LAW].

431. Notably, the commercial success of the defendant (of other firms) in using the claimed invention should not be credited in favor of the patentee if those firms did not copy the patent, because such evidence actually points against an inference of any special difficulty of coming up with the invention that the patentee has overcome. See Duffy, *Timing Approach*, *supra* note 9, at 373 (“[C]ommercial success by others—parties not licensed by the patentee, and especially those who have independently created the patented subject matter—tends to provide affirmative evidence of obviousness.”). See generally Spencer H. Boyer, *Commercial Success as Evidence of Patentability*, 37 FORDHAM L. REV. 573 (1969) (reviewing the rationale behind the doctrine of commercial success as evidence of patentability and suggesting that it is mainly the patentee’s success that matters). *But cf.* Ethicon Endo-Surgery, Inc. v. Covidien LP, 812 F.3d 1023, 1034–35 (Fed. Cir. 2016) (rejecting a commercial success argument, but not on the grounds that the success did not involve the plaintiff’s device); see also Reed W.L. Marcy, Note, *Patent Law’s Nonobviousness Requirement: The Effect of Inconsistent Standards Regarding Commercial Success on the Individual Inventor*, 19 HASTINGS COMM’NS & ENT. L.J. 199, 214–15 (1996) (suggesting that commercial success achieved by the infringement of the patented invention should be in favor of the patentee, but without making clear whether independent invention would still count).

432. Merges, *Commercial Success*, *supra* note 53, at 854–55. *But cf.* Holbrook, *Possession*, *supra* note 186, at 1032 (“Commercial success . . . suggests that, if the invention was commercially successful, other inventors would have been highly motivated to create the innovation, and the patentee, who was the first to get there, is ultimately deserving of the patent.”).

433. See *FOX Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019); *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988); Merges, *Commercial*

central point of this paper, some commentators have maintained that commercial success can be truly probative of nonobviousness only if linked to long-felt need or failure of others,⁴³⁴ a connection that would anchor the evidence in the pre-filing state of the world. This approach essentially deprives commercial success evidence of independent significance in implying that, by itself, it cannot speak to the pre-filing challenge facing a PHOSITA.

There are, however, ways in which the requisite link to the time of filing can be made without subsuming commercial success under other recognized categories of obviousness evidence. For example, as Abramowicz and Duffy suggested, the patentee can point to failed attempts to secure venture capital or similar facts, if available, as evidence showing that the patented product's commercial success was a result of a risky research path.⁴³⁵ In addition, the patentee could try to demonstrate that its competitors have had a track record of prior accomplishments, and thus would have been unlikely to pass up an opportunity to make some easy money. Thus, the inventor can build the case for relevance of commercial success evidence with pre-filing information (and other kinds of foundation) in order to establish that the success was indicative of a PHOSITA's challenge at the time of filing.

While commercial success represents the market's reaction, professional approval and industry praise generally capture the ex post take of competitors and other technical experts.⁴³⁶ Unlike ex ante evidence such as pre-invention industry skepticism, these indicia may be tainted by post-hoc rationalization—or even by the necessity of saving face to one's shareholders and colleagues. Thus, it is important for the patentee to demonstrate that this evidence should bear, even if indirectly, on a PHOSITA's pre-filing fund of knowledge.⁴³⁷

Here, temporal debiasing may be successful if the patentee shows that participants in the industry at issue are fierce competitors who are generally not effusive about the successes of others unless the research in question embodies a true advance that overcame serious cognitive and technical

Success, *supra* note 53, at 826–27; Edward Philip Walker, *Objective Evidence of Nonobviousness: The Elusive Nexus Requirement (Part I)*, 69 J. PAT. & TRADEMARK OFF. SOC'Y 175, 176 (1987).

434. Merges, *Commercial Success*, *supra* note 53, at 830; *see also* Geers, *supra* note 331, at 254 & n.129 (arguing that ex post evidence is merely “corollary and corroborative of the failure of others in the field”).

435. *See* Abramowicz & Duffy, *supra* note 1, at 1676 (“The evidence of unexpected commercial success that may thus be most relevant is evidence about the difficulty of obtaining funding for a research project. . . . At times, relatively objective evidence of this, such as rejections from venture capitalists or memoranda indicating considerable skepticism within an organization about a particular approach, may be available, and such evidence could even be made available to patent examiners.”).

436. *Demaco Corp.*, 851 F.2d at 1391 (“The rationale for giving weight to the so-called ‘secondary considerations’ is that they provide objective evidence of how the patented device is viewed in the marketplace, by those directly interested in the product.”).

437. *Institut Pasteur v. Focarino*, 738 F.3d 1337, 1346–47 (Fed. Cir. 2013).

barriers.⁴³⁸ Indeed, this theory of relevance of ex post praise is related to the exception to the rule against admissibility of hearsay for statements against interest.⁴³⁹ Because competitor praise may help the patentee under current obviousness law, it may well be unlikely to be distorted by hindsight and thus trustworthy.⁴⁴⁰ In addition, in many cases, the relevance might be more readily established if the praise or approval materializes immediately after the invention is publicized rather than some time after it has become entrenched.⁴⁴¹ If the positive reaction is only slightly belated,⁴⁴² it may be more likely to bear on the pre-filing state of affairs rather than reflect “contamination” by post-filing information.⁴⁴³

Licensing of the patent, copying of the patented invention, and other forms of industry acquiescence are closely related to praise.⁴⁴⁴ Some commentators believe that this evidence is generally weak because it may be cheaper to tolerate a patent that one actually thinks is invalid than to challenge it.⁴⁴⁵ But each case turns on its own facts, and the patentee may be able to develop an evidentiary foundation that supports the relevance and probative value of acquiescence. Thus, discovery may reveal that competitors

438. See Edward Philip Walker, *Objective Evidence of Nonobviousness: The Elusive Nexus Requirement (Part II)*, 69 J. PAT. & TRADEMARK OFF. SOC'Y 229, 236–40, 245–46 (1987) (discussing “acclaim” and “admissions” of nonobviousness); see also *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1334 (Fed. Cir. 2016) (“Industry participants, especially competitors, are not likely to praise an obvious advance over the known art.”).

439. FED. R. EVID. 804(b)(3).

440. Cf. *Heidelberger Druckmaschinen AG v. Hantscho Com. Prods., Inc.*, 21 F.3d 1068, 1072 (Fed. Cir. 1994) (“[T]he litigation argument that an innovation is really quite ordinary carries diminished weight when offered by those who had tried and failed to solve the same problem, and then promptly adopted the solution that they are now denigrating.”).

441. See Duffy, *Timing Approach*, *supra* note 9, at 364 (explaining how the timing gap between the obviousness evidence and the filing date can help establish or disprove obviousness).

442. Notably, if the approving statements take the form of “this would have been difficult at the time of filing,” rather than merely “this is a great invention,” they should be characterized as ex ante evidence. This kind of praise is analogous to the situation in which the defendant’s experts, after having analyzed the claims at issue, opine on the pre-filing state of the art. The evidence is created with the knowledge of the invention, but it is still ex ante. Cf. *Institut Pasteur*, 738 F.3d at 1346–47 (discussing the evidence of praise, but without parsing which of these forms it specifically took).

443. However, to the extent that ex post praise of the invention reflects a general consensus that it reflects a major achievement that has stood the test of time, such ex post evidence might still be quite probative of patentability. See *infra* notes 449–51 and accompanying text.

444. See, e.g., *Liqwd, Inc. v. L’Oreal USA, Inc.*, 941 F.3d 1133, 1137–39 (Fed. Cir. 2019).

445. See, e.g., CRAIG ALLEN NARD, *THE LAW OF PATENTS* 439 (5th ed. 2020) [hereinafter NARD, *THE LAW OF PATENTS*] (making this point); see also *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) (rejecting licensing evidence); *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1015, 1027–28 (Fed. Cir. 1985), *abrogated on other grounds by Midwest Indus., Inc. v. Karavan Trailers, Inc.*, 175 F.3d 1356 (Fed. Cir. 1999) (expressing skepticism of copying evidence); James Gibson, *Risk Aversion and Rights Accretion in Intellectual Property Law*, 116 YALE L.J. 882, 928–30 (2007) (identifying a bootstrapping effect that may occur when such evidence is accepted too readily).

licensed or even copied the patent because they viewed the claims to be directed to a genuine technical achievement (with the usual caveats about post-filing hindsight “contamination” of such ex post evidence),⁴⁴⁶ rather than because they thought the claims were bad, but expensive to invalidate.

From there, similar to praise, one may then make a further inference that a PHOSITA could have reasonably viewed the invention as non-trivial ex ante, making imitation the sincerest form of flattery, or even capitulation to the patentee’s success, in the case’s particular circumstances.⁴⁴⁷ Indeed, if the invention truly revolutionized the field and became an industry standard, the fact that it presented a pre-filing technical challenge can be reasonably inferred without any need for additional foundation.⁴⁴⁸ Still, if the cognitive framework is to be faithfully implemented, tribunals must keep in mind that such evidence is only good for what it shows about the pre-filing state of the world, and refrain from relying on it to bolster patentability as a reward for the invention’s eventual success and value to society.

What about ex post unexpected results? The critical difference from ex ante unexpected results has to do with the way they signal motivation and reasonable expectation of success. While properties ascertained before filing are “part of the inventive concept” indicative of the difficulties in understanding the invention at the time of filing,⁴⁴⁹ ex post unexpected results evidence is more similar to commercial success. As noted above,⁴⁵⁰ one general relevance theory for ex post evidence is “the lure of easy money”: In the words of an intellectual property treatise, its relevance “is inferential in the sense that the prior art’s failure to reveal the claimed invention despite its advantageous qualities tends to confirm that it was unexpected and unobvious,” as “[i]t would be contrary to normal economic incentives for obvious, advantageous

446. See *supra* notes 442–43 and accompanying text.

447. See, e.g., *Crocs, Inc. v. Int’l Trade Comm’n*, 598 F.3d 1294, 1311 (Fed. Cir. 2010) (“Copying may indeed be another form of flattering praise for inventive features.”); see also *Holbrook, Possession*, *supra* note 186, at 1032 (“Copying . . . creates an inference that others were not in possession of the invention because they had to rely on the patentee to create the device.”).

448. In one opinion, Judge Learned Hand came close to saying that hindsight may in fact be a part of the reason why ex post evidence is valuable. See *Safety Car Heating & Lighting Co. v. Gen. Elec. Co.*, 155 F.2d 937, 939 (2d Cir. 1946) (“Courts, made up of laymen as they must be, are likely either to underrate, or to overrate, the difficulties in making new and profitable discoveries in fields with which they cannot be familiar; and, so far as it is available, they had best appraise the originality involved by the circumstances which preceded, attended *and succeeded* the appearance of the invention.” (emphasis added)); cf. *supra* notes 118–19 and accompanying text (explaining that one reason that secondary considerations caught on was the belief that lay people could not handle technical evidence in patent cases). This view, however, may be somewhat outdated in the age of patent-specialist entities like the Federal Circuit, the PTAB, and district judges who focused on patent cases under the “patent pilot” program.

449. CHISUM ET AL., UNDERSTANDING INTELLECTUAL PROPERTY LAW, *supra* note 430, at 77; see also Lemley, *supra* note 223, at 1388 (explaining that unexpected results show that the field of the invention was not well understood).

450. See *supra* notes 430–31 and accompanying text.

subject matter to remain dormant.”⁴⁵¹ As with commercial success, however, the dots to the time of filing must still be fully connected.⁴⁵²

Thus, the propriety of the “easy money” inference can be probed with certain questions. For example, was there really a pre-filing baseline of negative expectations that the patentee was up against?⁴⁵³ In addition, could it be that this belated evidence was a product of the inventor’s diligence in creating post-filing knowledge, rather than reflective of the fact that the patentee overcame a significant pre-filing challenge? Related, did the full appreciation of the invention’s benefits come about thanks to post-filing growth in the field, or, instead, are the benefits actually indicative of gaps in understanding that were present at the time of filing?⁴⁵⁴ These questions may not be easy to answer, but they must be addressed in order to evaluate the post-filing unexpected results properly. In all, by keeping straight the notion that the probative value of ex post unexpected results (and of other types of ex post evidence) is ultimately to shed light on the state of the world at the time of filing, courts can ensure that they are performing the proper relevance analysis. This approach should, in turn, help improve the accuracy of ultimate § 103 judgments in the context of the cognitive framework.

Moreover, a regime mandating that the relevance of ex post evidence to the state of the art at the time of filing cannot simply be assumed—as courts now often allow it to be⁴⁵⁵—would encourage inventors to develop the necessary data as early as possible. This approach may help reduce the disjunction that often manifests itself between § 103 evidence during patent prosecution as opposed to litigation, after the patentee has devoted additional

451. CHISUM ET AL., UNDERSTANDING INTELLECTUAL PROPERTY LAW, *supra* note 430, at 77; *cf.* Pedraza-Fariña, *Sociology of Innovation*, *supra* note 45, at 870–72 (questioning the evidentiary value of unexpected results discovered after filing with respect to the issue of motivation in the nonobviousness inquiry).

452. *Cf.* Darrow, *Secondary Considerations*, *supra* note 54, at 72 (discussing the relationship between unexpected results and skepticism). *But cf. id.* at 75 n.171 (“[I]n the pharmaceutical industry, the prior art might not teach away from a particular compound, but the compound’s combination of beneficial properties could nevertheless constitute unexpected results.” (citing *Ortho-McNeil Pharm., Inc. v. Mylan Lab’ys, Inc.*, 348 F. Supp. 2d 713 (N.D. W. Va. 2004))). In this sense, if the prior art taught away from the invention’s properties, they must logically be unexpected. *Cf.* C. Dylan Turner, Note, *In Cyclobenzaprine, an Objective Failure to Reach a Long-Felt Need in Secondary Considerations Jurisprudence*, 13 NW.J. TECH. & INTELL. PROP. 359, 372 (2015) (explaining that “one with skill in the art would not reasonably expect success knowing of the previous failed attempt” (citing *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1083 (Fed. Cir. 2012))).

453. *Cf.* *Forest Lab’ys, LLC v. Sigmapharm Lab’ys, LLC*, 918 F.3d 928, 937 (Fed. Cir. 2019). To be sure, even unexpected results revealed before filing might be challengeable on this basis. *See supra* note 400 and accompanying text.

454. *See Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 752 F.3d 967, 978–79 (Fed. Cir. 2014).

455. *See, e.g., Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1378–39 (Fed. Cir. 2012); *see also supra* notes 289 & 300 and accompanying text (discussing this dynamic with unexpected results).

resources to the invention.⁴⁵⁶ Related, the proposed scheme also takes on the incongruity of the claim subject matter’s “shift” in patentability as a function of time thanks to post-filing developments.⁴⁵⁷ As a result, the timing framework should promote earlier generation and disclosure of technical information—which is something that many believe the patent system should encourage.⁴⁵⁸

C. THE ULTIMATE § 103 QUESTION AND THE PATH FORWARD

1. Weighing the Evidence

The categorization scheme proposed in this Section is intended to foster discipline in the process of establishing relevance of various facts proffered to prove or disprove obviousness. But relevance, of course, is only the first step in evidence evaluation. Even if the proponent establishes a link between the evidence and a PHOSITA’s technical and cognitive challenges at the time of filing, a tribunal must still weigh the various pieces of evidence against one another to reach a judgment on obviousness. For example, if the patentee barely overcomes the relevance hurdle for ex post evidence like commercial success, it may be only weakly probative of motivation and would probably not stand up against other evidence suggesting that the invention was within a PHOSITA’s ready grasp.⁴⁵⁹

Indeed, as with any other legal determination, the various pieces of obviousness evidence put forth by the parties will often conflict. Thus, there could be clashing evidence within the ex ante category, as well as across the two categories.⁴⁶⁰ One example of the first kind of a clash occurred in the well-

456. See generally Greg Reilly, *The Complicated Relationship of Patent Examination and Invalidation*, 69 AM. U. L. REV. 1095 (2020) (analyzing the implications of this disjunction to reform of the examination process); Reilly, *Decoupling Patent Law*, *supra* note 245 (noting this disjunction and proposing reforms).

457. Harris, *supra* note 405, at 199–200 (flagging the oddity of having the patent validity change as a function of time); Western, *supra* note 291, at 451 (same).

458. See, e.g., Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 542–44 (2009); Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 624–27 (2010). One potential problematic effect of this rule is that patent filing may be delayed, but there are already many rules encouraging early patenting. See Christopher A. Cotropia, *The Folly of Early Filing in Patent Law*, 61 HASTINGS L.J. 65, 88 (2009).

459. Lemley, *supra* note 223, at 1372–73.

460. Clashes within the ex post category do not seem possible because all this evidence favors the patentee—with the exception, perhaps, of *expected* results, which can be probative of obviousness whether ex ante or ex post. See, e.g., *In re Gershon*, 372 F.2d 535, 538 (C.C.P.A. 1967). As some commentators have suggested, this is a strange state of affairs, and perhaps there should be more recognized forms of ex post evidence against validity (such as commercial failure). See, e.g., Harris, *supra* note 405, at 188–89; see also Kitch, *New Standards for Patents*, *supra* note 53, at 333–34 (suggesting that perhaps commercial success should count *against* the patentee); cf. 1 PETER S. MENELL, MARK A. LEMLEY, ROBERT P. MERGES & SHYAMKRISHNA BALGANESH, *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE: 2020*, at 233 (2020).

known case of *Transocean Offshore Deepwater Drilling v. Maersk Drilling USA*, in which evidence of industry skepticism conflicted with prior art literature stating that the various “concerns [about pursuing the invention] were unfounded.”⁴⁶¹ Relying on the two-step approach, the Federal Circuit concluded that the skepticism evidence helped the patentee “rebut a prima facie case of obviousness”⁴⁶²—based, of course, on the prior art—to reach the rare result of a nonobviousness judgment supported solely by secondary considerations.

As discussed above,⁴⁶³ some panels could well have written the skepticism off once the prima facie case was established, but *Transocean* did not—which is what makes the case so unusual that it quickly made its way into casebooks.⁴⁶⁴ Under the proposed scheme, instead, the tribunal would weigh skepticism against the purportedly contrary statements in the literature and decide whether, given all this evidence, motivation and reasonable expectation of success have been established. This approach should reduce the incidence of lumping errors that sometimes take § 103 determinations off track.⁴⁶⁵

Likewise, ex ante evidence can clash with ex post evidence. Again in *Transocean*, while statements in the prior art supported both motivation and reasonable expectation of success, ex post evidence told a different story. For example, the plaintiff cited an “article . . . prais[ing] the development of [its invention] as one of the fifty key events or technologies in history that shaped the offshore drilling industry.”⁴⁶⁶ The court, in the prima facie/rebuttal mode, explained that this “impressive accolade” tended to show nonobviousness and thus supported a jury verdict in favor of the patentee.⁴⁶⁷ In the frame of the proposal, praise sufficiently relates to the time of filing here because it describes where the invention fits in the field’s trajectory. Thus, as with skepticism, a jury would be entitled to weigh praise directly

(discussing success of others as a potential flip-side of failure of others that could be probative of obviousness).

461. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1352 (Fed. Cir. 2012).

462. *Id.* at 1349, 1355.

463. See *supra* notes 264–77 and accompanying text.

464. KIMBERLY A. MOORE, TIMOTHY R. HOLBROOK & JOHN F. MURPHY, *PATENT LITIGATION AND STRATEGY* 711–19 (5th ed. 2018); NARD, *THE LAW OF PATENTS*, *supra* note 445, at 428–35; see also *Transocean*, 699 F.3d at 1354 (“Few cases present such extensive objective evidence of nonobviousness, and thus we have rarely held that objective evidence is sufficient to overcome a prima facie case of obviousness.”).

465. See *supra* Section III.B.1.

466. *Transocean*, 699 F.3d at 1351.

467. *Id.* at 1351, 1359.

against the prior art-based case for motivation and reasonable expectation of success.⁴⁶⁸

More generally, it is up to the decision-maker to consider the evidence on both sides of the scale and decide which is stronger.⁴⁶⁹ Any piece of relevant evidence may be weak and thus vulnerable to being outweighed by a contrary proffer.⁴⁷⁰ The case for predictability may be infected with hindsight bias,⁴⁷¹ the need for a solution that the invention provided may have existed for only a short time,⁴⁷² commercial success may only be minimal,⁴⁷³ or an assessment of a compound's properties could show only a slight improvement over what would have been expected.⁴⁷⁴ Clearly, the probative value of any particular type of evidence can be high or low.⁴⁷⁵

In sharp contrast with some Federal Circuit panels, however, *ex ante* evidence under this Article's proposal is not divided into tiers that implicitly suggest higher or lower probative value for particular forms of evidence. Indeed, the proposal eschews any framework under which evidence could get automatically discounted or bolstered, and the proposed distinction is mainly there to police relevance. Although it may be tempting, within the context of the proposed scheme, to make a rough generalization that the *ex post* evidence should carry little weight,⁴⁷⁶ that sort of a shortcut is not justified.⁴⁷⁷

468. Or other decision-makers, such as a district judge in a bench trial or a panel of administrative patent judges at the PTAB.

469. See generally Darrow, *Secondary Considerations*, *supra* note 54 (proposing a methodical approach for evaluating and weighing various objective indicia).

470. See Todd R. Miller, *Motivation and Set-Size: In re Bell Provides a Link Between Chemical and Biochemical Patent Claims*, 2 U. BALT. INTELL. PROP. L.J. 89, 92–95 (1993) (discussing the evidence-weighting process in § 103 cases).

471. See generally Mandel, *Hindsight Bias*, *supra* note 57 (providing evidence for hindsight bias in obviousness determinations).

472. See Abramowicz & Duffy, *supra* note 1, at 1627–31. Indeed, among other indicia of persuasiveness, the “distance” of the evidence from the filing date may affect its weight. See Duffy, *Timing Approach*, *supra* note 9, at 363 (“Normally, a pretty strong case of nonobviousness would be made out where several years passed during which (1) a market need for the relevant innovation existed and (2) all of the necessary components for the innovation were present in the prior art.”); Michal Shur-Ofry, *IP and the Lens of Complexity*, 54 IDEA: INTELL. PROP. L. REV. 55, 67 (2013) (flagging the importance of immediate success in the commercial success inquiry). In all, the various types of *ex ante* and *ex post* evidence proffered in obviousness cases exists on a continuum of probative value, which is influenced by considerations such as when the particular piece of evidence came into existence.

473. See, e.g., *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1222–23 (Fed. Cir. 2016).

474. See, e.g., *Galderma Lab's, L.P. v. Tolmar, Inc.*, 737 F.3d 731, 739 (Fed. Cir. 2013).

475. Cf. *Acorda Therapeutics, Inc. v. Roxane Lab's, Inc.*, 903 F.3d 1310, 1337–38 (Fed. Cir. 2018) (explaining how another factor, a “blocking” patent, can reduce the probative value of certain nonobviousness evidence).

476. Cf. *Merges, Commercial Success*, *supra* note 53, at 833–34 (distinguishing weight and relevance of secondary factors).

477. One commentator argues, however, that tools that increase researchers' facility and ease of coming up with new inventions will soon essentially overwhelm *ex post* evidence, and render everything obvious. See generally Ryan Abbott, *Everything Is Obvious*, 66 UCLA L. REV. 2 (2019)

As in any other area of law—think of errors in direct eyewitness testimony that may make it less reliable than some indirect or circumstantial evidence, such as a smoking gun⁴⁷⁸—ex ante and ex post evidence each has its own weaknesses and the best a tribunal can do is to stay cognizant of them. These challenges aside, this Article nonetheless moves the ball by fully articulating relevance theories for various § 103 evidence based on the key dimension of time.

One may, to be sure, encounter recurring scenarios in which one kind of obviousness evidence might usually outweigh another. Mark Lemley, for example, identified “a number of circumstances in which a simple change known to those of skill in the art has the predictable, but not deterministic, possibility of producing different results,” including a pattern of cases involving the separation of certain types of chemicals.⁴⁷⁹ Lemley maintained that, assuming the separation process is straightforward, the inventor should not be credited for coming up with a product that exhibits surprisingly good properties—and the claim to that product should generally be held obvious.⁴⁸⁰ This analysis provides an example of an established fact pattern in which the evidence of motivation and reasonable expectation of success based on the path charted out by the prior art may simply be overwhelming as a factor against patentability. Nonetheless, as Lemley acknowledged, weak evidence that the claimed invention would have been obvious to try may be outweighed by relevant unexpected results, so the analysis must ultimately still be case-specific.⁴⁸¹

2. Implementing the Proposal

If, as argued above,⁴⁸² this proposal is not foreclosed by Supreme Court precedent, the Federal Circuit can implement it via the en banc process in an appropriate case. How might such a case come up? As to the first aspect of the proposal, a disappointed patentee in a case like *Agrizap*, after seeing its evidence of failure of others discounted, may petition for en banc rehearing.⁴⁸³ The questions to be presented to the full court have already been articulated in Judge Reyna’s dissent in *Apple* and concern both the sequence of analysis of the various evidence and the weight to be assigned to

(suggesting that most claims must be obvious under one interpretation of this test); see also Brenda M. Simon, *The Implications of Technological Advancement for Obviousness*, 19 MICH. TELECOMM. & TECH. L. REV. 331 (2013) (discussing the interplay of research technologies and § 103 standards).

478. See, e.g., Henry F. Fradella, *Why Judges Should Admit Expert Testimony on the Unreliability of Eyewitness Testimony*, 2 FED. CTS. L. REV. 1, 20 (2007) (summarizing why direct evidence may be so unreliable that expert testimony should be required to provide support for it); Heller, *supra* note 354, at 252–53.

479. Lemley, *supra* note 223, at 1377.

480. *Id.* at 1377–79.

481. *Id.* at 1369–70.

482. See *supra* Section III.C.2.

483. See *supra* notes 268–76 and accompanying text.

secondary versus primary considerations.⁴⁸⁴ The Federal Circuit should answer them by holding that the primary-secondary distinction is not material, and should not dictate the sequence of analysis or control the weighing of the evidence.⁴⁸⁵

What about the second aspect of the proposal? One way the question can be preserved is through an evidentiary challenge. For example, a proffer of commercial success could be contested by a defendant under Federal Rule of Evidence 401 via a motion *in limine* if there is an argument that it is not relevant to the state of the art at the time of filing. Here, again, en banc action is needed because numerous Federal Circuit panels have endorsed the use of ex post evidence without a clear tie to the filing date.⁴⁸⁶ While both issues are unlikely to be raised in the same litigation, the court could grant rehearing petitions on them in two separate appropriate cases and consider them together. This consolidation would be useful because the two issues are related and, indeed, interdependent. The en banc court, notably, would not have to start from scratch for this aspect of the proposal either. Thus, the recent *Forest* opinion adverted to importance of timing for the relevance of unexpected results,⁴⁸⁷ and Judge Taranto's important dissent from denial of rehearing en banc in *Bristol-Myers Squibb* laid out a number of tensions in the court's post-filing evidence jurisprudence that could eventually be addressed and resolved by the by the full Federal Circuit.⁴⁸⁸

If the proposals are adopted by the Federal Circuit, trial courts could aid juries in heeding this approach to § 103 by providing appropriate instructions based on the new framework. The PTO, too, could create procedures to facilitate proper consideration of various obviousness evidence in both prosecution and in PTAB trials.⁴⁸⁹ Appellate courts have created the

484. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1089 (Fed. Cir. 2016) (en banc) (Reyna, J., dissenting).

485. To be clear, some features of the staged approach may need to be retained at the PTO based on timing and burdens of production during prosecution. *See In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1080 n.7 (Fed. Cir. 2012); *see also supra* note 245 and accompanying text (discussing special problems faced by the PTO when evaluating obviousness).

486. *See, e.g., supra* notes 425–26 and accompanying text.

487. *See supra* notes 296–98 and accompanying text. To be sure, the *Forest* court still treated unexpected results as a secondary consideration. *Forest Lab'ys, LLC v. Sigmapharm Lab'ys, LLC*, 918 F.3d 928, 937 (Fed. Cir. 2019); *see also Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 752 F.3d 967, 976–77 (Fed. Cir. 2014) (similar).

488. *See Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 769 F.3d 1339, 1352–59 (Fed. Cir. 2014) (mem.) (Taranto, J., joined by Lourie and Reyna, JJ., dissenting from denial of rehearing en banc).

489. Even at the PTO, where the realities of patent prosecution may force the use of the prima facie/rebuttal framework, it is still possible to consider all the evidence without relying heavily on primary and secondary silos. *See In re Rinehart*, 531 F.2d 1048, 1052 (C.C.P.A. 1976); *cf. supra* note 245 and accompanying text (discussing information-forcing problems during examination).

nonobviousness requirement, and they can take ownership of it once again with corrective measures that could resolve conflicts over the handling of the evidence to create a uniform, and more appropriate, framework for evaluating patentability under § 103 in the lower tribunals.⁴⁹⁰

V. CONCLUSION

The law of nonobviousness is ever evolving, from courts' early attempts to define the contours of the invention requirement to the Federal Circuit's recent efforts to structure the § 103 inquiry after *KSR*. Since *Graham* was decided in 1966, the primary-secondary framework has been an important part of the obviousness inquiry, but it has diverted the courts' attention to the wrong questions. Rather than continue with disagreements over whether a holistic or two-step inquiry is appropriate, the Federal Circuit should scrap the silo-based approach and focus on the timing of the proffered evidence as the first step in determining whether the invention was challenging enough to be patentable as of the time of filing, which is what § 103 requires.

490. While a pessimistic response might be that tribunals develop a gut feeling for what is obvious (or not) and bring the proffered evidence into line with their bottom-line conclusions, courts have the responsibility to assure that fact finders are at least properly instructed on the analytical framework.