Motivation for the Federal Circuit Test

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Introduction

The teaching-suggestion-motivation (TSM) test is currently used by the United States Court of Appeals for the Federal Circuit to determine if two or more prior art references can legitimately be combined[2] during the § 103 obviousness inquiry.[3] The TSM test enjoys a long, rich history predating the Federal Circuit, and even its predecessor the United States Court of Customs and Patent Appeals (CCPA). With the changing conceptions of "invention/obviousness," originally coined "invention" and later codified as "obviousness," the TSM test coevolved.[4] The primary benefit of this co-evolution is a test for obviousness that operates in a manner consistent with the principles of *Graham* while at the same time providing a pragmatic method which could be used in proceedings of the patent office and courts alike.[5]

The TSM test was identified early-on as one method of evaluating the legitimacy of combining multiple references.[6] The other important recurring concepts relevant to "invention/obviousness" were also identified surprisingly early; most before 1900.[7]

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[2] The TSM test is not the only test that is available to determine whether a claimed invention is obvious, just the one used when two or more references need to be combined to show the claimed invention. A claimed invention may be an obvious extension to the prior art. Only a single reference and a reasoned argument of why the extension is obvious is necessary. The TSM test does not play a role, because there is no combination of multiple references, and therefore no need for a motivation to combine. See *Orthopedic Equipment Company v. All Orthopedic Appliances,* 707 F.2d 1376, 1382 (Fed. Cir. 1983).

In other instances, the "combination" may not be a combination at all, but merely a collection of parts well-known in the art and each performing their common function without any significant interaction. See *Anderson's-Black Rock v. Pavement Salvage*, 396 U.S. 57 (1969). Before the Patent Act of 1952, this grounds for rejection was termed "aggregation." See *In re Gustafson*, 331 F.2d 905, 908-910 (CCPA 1964) for a discussion by Judge Rich of obviousness as the replacement for aggregation. The determination of whether a claimed invention is merely an aggregation is a prelude to applying the TSM test, because there is no requirement for stating a motivation to combine when there is no real combination in the claimed invention.

[3] See for example *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc*., 776 F.2d 281, 297 n. 24, (Fed.Cir.1985) (stating that the knowledge of one skilled in the art may provide the "teaching, suggestion, or inference" to combine references), cert. denied, 475 U.S. 1017, (1986). *In re Dembiczak*, 175 F.3d 994, 999, (Fed.Cir.1999) ("We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved") citing *Pro– Mold & Tool Co. v. Great Lakes Plastics, Inc*., 75 F.3d 1568, 1573, (Fed.Cir.1996), *Para– Ordnance Mfg. v. SGS Importers Intern., Inc*., 73 F.3d 1085, 1088, (Fed.Cir.1995).

[4] The Patent Act of 1952 codified the judicially created requirement of "invention." Because obviousness was meant to act as a more precise formulation of "invention," it is reasonable for purposes of this paper to equate the two.

[5] *In re Huang*, 100 F.3d 135, 138 (Fed.Cir.1996) ("The ultimate determination as to whether or not an invention is obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness.") citing *Graham v. John Deere Co.*, 383 U.S. 1, 17– 18, (1966).

[6] *Topliff v. Topliff*, 145 U. S. 156, 161, (1892) ("Their device evidently approached very near the idea of an equalizer; but this idea did not apparently dawn upon them, nor was there anything in their patent which would have *suggested* it to a mechanic of ordinary intelligence, unless he were examining it for that purpose.") Emphasis added.

[7] Discussed extensively below.

However, consistent use of the TSM test would not come about until much later starting in the Court of Customs and Patent Appeals. It is fair to say increased reliance on the TSM test is largely in response to the pernicious problem of hindsight reconstruction. As patent litigation continued to evolve in the CCPA and then Federal Circuit, so did the rigor with which the TSM test was consistently applied. Applied rigorously, the TSM test proved to be a valuable tool for reaching rational, defensible obviousness determinations consistent with *Graham* while avoiding hindsight reconstruction.

The elegance of the TSM test can best be appreciated by tracing its development, and observing TSM's development as the courts consistently battled with hindsight reconstruction. A discussion of the principles undergirding the TSM test will prove invaluable for framing its development. Fundamentally, the TSM test is a search for objective indicia of obviousness.[8] Section 103 gives a right to a patent unless "subject matter as a whole *would have been obvious* at the time the invention was made to a person having ordinary skill in the art."[9] This requires the court or examiner to go back in time mentally, before the invention became known, and decide if what the inventor accomplished would have been obvious given the state of the art at the time.

Of course, the court or examiner has the unfortunate benefit of knowing the invention before the obviousness analysis is carried out. With this knowledge, almost all inventions appear obvious. It becomes almost impossible to avoid reconstructing the invention by picking and choosing its different elements from the prior art. However, if the court or examiner is required to provide a plausible rationale, explaining precisely why an invention would have been obvious, and that rationale is based on objective indicia found in the prior art, then the problem of hindsight reconstruction is substantially mitigated.

The TSM test is simply this – a requirement of providing a plausible rationale that an invention would have been obvious. Of course, to be plausible, the rationale must be sufficiently precise and be based on objective evidence. This requirement is nothing new to well accepted § 103 jurisprudence. The Supreme Court identified the requirement of a plausible, reasonable obviousness determination supported by objective indicia in *Graham*.[10] The TSM test is simply one way of expressing the *Graham* requirements in an effective and administrable test.

While the TSM test itself is simple, it not necessarily simple to apply. The key to a successful application of the TSM test is a proper articulation of the reason why an invention is considered obvious. The articulation must be reasonable and thorough, providing a rationale based on proper objective evidence. Finally, the rationale must meet the burden of persuasion applicable to the particular context.[11] Failure to provide

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[8] To be distinguished from Graham's secondary factors which are also often referred to as objective indicia of obviousness. The principle is the same though. Both search for objective evidence that support a determination of obviousness.

[9] 35 U.S.C. § 103. Emphasis added.

[10] *Graham v. John Deere Co*., 383 U.S. 1, 17-18, (1966)("Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.")

[11] A preponderance of the evidence during the patent examination and on appeal from an examination unfavorable to the applicant. This is to be distinguished from deference due to the determination of the

sufficient articulations in judicial or administrative determinations is often the source of subsequent angst. Unfortunately, when this does happen it can all too easily appear to be a failing of the test, while the test is in fact quite sound. Only the application of the test is wanting.

Early Decisions – 1850 to 1929

"Invention" Invented

The TSM test is a tool used in the "invention/obviousness" inquiry. As such, a logical point of departure for the historical journey is the creation of the "invention" requirement. Unlike the present Patent Act which requires novelty, utility, and nonobviousness,[12] the Patent Act of 1836 required only novelty and utility. The third requirement, "invention," was created in the seminal case of *Hotchkiss v. Greenwood.*[13]

> No one will pretend that a machine, made, in whole or in part, of materials better adapted to the purpose for which it is used than the materials of which the old one is constructed, and for that reason better and cheaper, can be distinguished from the old one; or, in the sense of the patent law, can entitle the manufacturer to a patent.
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> The difference is formal, and destitute of ingenuity or invention. It may afford evidence of judgment and skill in the selection and adaptation of the materials in the manufacture of the instrument for the purposes intended, but nothing more.[14]

The TSM test is predicated on the combination of two or more prior art references. This is different from the novelty inquiry which relies on a single prior art reference. Hotchkiss not only introduces the "invention" requirement, but also implicitly acknowledges that "invention" is to be evaluated using two or more sources of prior art.

> [A]s was admitted on the argument[]that knobs of metal, wood, &c., connected with a shank and spindle, in the mode and by the means used by the patentees in their manufacture, had been before known, and were in public use at the date of the patent; and hence the only novelty which could be claimed on their part was the adaptation of this old contrivance to knobs of potter's clay or

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PTO as mandated by *Dickinson v. Zurko*, 527 U.S. 150 (1999). The burden of persuasion is something else, usually considered to be clear and convincing, when obviousness of an issued patent is reevaluated under § 103 by a trial court. For a discussion of the unfortunate tendency of courts to apply clear and convincing in a blanket fashion to all questions of patent validity including § 103 see, Lee Hollaar and John Knight, "Unclear and Unconvincing: How a misunderstanding led to the heightened evidentiary requirement in patent litigation," http://digital-law-online.info/papers/jk/unclear.htm.

[12] For an excellent description by Giles Rich of the three requirements see *Application of Bergy*, 596 F.2d 952, (1979).

[13] 52 U.S. 248 (1850).

[14] 52 U.S. at 266.

> porcelain; in other words, the novelty consisted in the substitution of the clay knob in the place of one made of metal or wood, as the case might be.[15]

The court's curious use of the term "novelty" in the passage above should be clarified. From a modern perspective, novelty denotes § 102,[16] the judicial test of which is a single prior art reference containing each and every element of the claimed invention. Historically, novelty was a looser standard, blurring into the realm of "invention/obviousness." Fortunately, the context of the discussion usually indicates whether the court is speaking of novelty as defined in the modern sense under § 102 or instead "invention/obviousness" under § 103.

"Invention" as a test proved difficult, requiring more definition to be administered consistently and practically. The court provided insight into a more definite and administrable test in *Tucker v. Spalding*,[17] pointing to a "suggest[ion] to the mind of an ordinary skilful mechanic" as one way of identifying those creations reaching the threshold of "invention." The Tucker court was considering an adaptation of a known device to a different context.

> The court in rejecting the patent of Newton seems to have been mainly governed by the use which was claimed for it, and also that no mention is made of its adaptability as a saw. But if what it actually did, is in its nature the same as sawing, and its structure and action suggested to the mind of an ordinarily skilful mechanic this double use to which it could be adapted without material change, then such adaptation to the new use, is not a new invention, and is not patentable.[18]

Though the court did not frame the issue in the way a modern court would – looking for a TSM to combine references – it is clear from the context the court was nonetheless looking for a "suggestion" in the prior art to determine the question of "invention."

While "invention/obviousness" was viewed as one of "invention" at the time, the context clearly indicates the court could just as easily have been talking about the "obviousness" of the claimed invention instead. While the question of "invention" versus "obviousness" is not the subject of this history, it is an important component. "Obviousness" did not replace 'invention' as the statutory codification of "invention/obviousness" until 1952. The modern TSM test is often viewed as reaching the concept of "obviousness" not "invention." Despite the change from "invention" to "obviousness" the earlier cases decided under the "invention" standard still provide valuable insight into the TSM test today.

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[15] 52 U.S. at 265.
[16] 35 U.S.C. § 102.
[17] 80 U.S. 453 (1871).
[18] 80 U.S. at 455-456.

The Problem of Hindsight

Ten years after *Tucker v. Spalding* the court identified hindsight reconstruction as a critical component of the "invention" analysis in *Loom v. Higgins*.[19] Indeed, as the court points out, when the invention consists of a combination of old elements and thus appears "obvious," as many inventions do, hindsight reconstruction can often be to blame. The court carefully notes that in such a case, objective indicia explaining why it would have been obvious to make this particular combination of elements should be sought. Pointing ahead over eighty years, the court identifies such objective indicia in the form of commercial success and superior results; later these will be similarly identified in *Graham*.

> It is further argued, however, that, supposing the devices to be sufficiently described, they do not show any invention; and that the combination set forth in the fifth claim is a mere aggregation of old devices, already well known; and therefore it is not patentable. This argument would be sound if the combination claimed by Webster was an obvious one for attaining the advantages proposed, – – one which would occur to any mechanic skilled in the art. But it 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 persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. Who was the first to see it, to understand its value, to give it shape and form, to bring it into notice and urge its adoption, is a question to which we shall shortly give our attention. At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. Now that it has succeeded, it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention. It was certainly a new and useful result to make a loom produce fifty yards a day when it never before had produced more than forty; and we think that the combination of elements by which this was effected, even if those elements were separately known before, was invention sufficient to form the basis of a patent.[20]

It is important to note the profound connections between the "obviousness" of an invention in light of hindsight reconstruction, and the ensuing need for objective indicia. Though they will not always be discussed together, courts will consistently return to the problem of hindsight reconstruction. As the body of experience grows, courts will lean on the TSM test with more regularity and in the process resolve the question of

[19] 105 U.S. 580 (1881)
[20] 105 U.S. at 591-592.

"invention" by identifying a reasonable, articulated rationale of why it was or was not obvious to combine various prior art elements.

Only two years later, the court in *Atlantic Works v. Brady*,[21] would drive home the importance of both hindsight reconstruction and objective indicia to counter it with what would later be coined the Winslow Tableau. This is the image of an inventor creating an invention while having the analogous prior art before him.[22]

> What, then, did he invent? Did he make a selection and combination of these elements that would not have occurred to any ordinary skilled engineer called upon, with all this previous knowledge and experience before him, to devise the construction of a strong dredge– boat for use at the mouth of the Mississippi? We think not. We think that there is no reasonable ground for any such pretension.[23]

Judge Giles Rich writing for the court in *Winslow* is most often credited with this particular framework for evaluating "obviousness," though the framework clearly existed much earlier.

Implicit in the popular image of the Winslow Tableau is a concern for hindsight and as a consequence a strong statement for objectivity in the "invention" analysis. Hindsight is to be prevented by placing oneself back in time at the time of "invention." Objectivity is accomplished by looking at "all this previous knowledge and experience." If rigorously applied,[24] it is fully consistent with *Graham* and § 103, since it is, in

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[21] 107 U.S. 192 (1883).

[22] *Application of Winslow*, 365 F.2d 1017, 1020 (1966), "Appellant presents the usual argument that hindsight reconstruction has been employed by the examiner and the board. We disagree with that position. We think the proper way to apply the § 103 obviousness test to a case like this is to first picture the inventor as working in his shop with the prior art references – which he is presumed to know – hanging on the walls around him. One then notes that what applicant Winslow built here he admits is basically a Gerbe bag holder having air– blast bag opening to which he has added two bag retaining pins. If there were any bag holding problem in the Gerbe machine when plastic bags were used, their flaps being gripped only by spring pressure between the top and bottom plates, Winslow would have said to himself, "Now what can I do to hold them more securely?" Looking around the walls, he would see Hellman's envelopes with holes in their flaps hung on a rod. He would then say to himself, "Ha! I can punch holes in my bags and put a little rod (pin) through the holes. That will hold them! After filling the bags, I'll pull them off the pins as does Hellman. Scoring the flap should make tearing easier."

[23] 107 U.S. at 202.

[24] With an important modification found in "*In re Antle,* 444 F.2d 1168, (CCPA 1971), where it was pointed out that the prior art on the wall consists only of those patents one of ordinary skill in the art would have selected without the advantage of hindsight or knowledge of the invention." *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1576 (Fed.Cir.1984). Giles Rich would later regret the "overly picturesque" language, in his own words, of Winslow. *Kimberly– Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1452 (Fed.Cir.1984). He felt the language improperly focused attention away from the language of § 103 and *Graham*. Rich most likely realized the Winslow imagery caused courts to engage in hindsight reconstruction despite the fact he originally introduced it as a way to prevent hindsight. If the court did not carefully place itself mentally back in time before the invention was known, it is easy to see how a court could would misconstrue Winslow and engage in hindsight reconstruction. See generally *Kimberly– Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, (Fed.Cir.1984).

essence, simply a method of identifying a rationale for why a combination of known elements is or is not "obvious."

But, the Winslow Tableau is only consistent with *Graham* if rigorously applied. One must place oneself at the time before the invention was known. Failure to do so is catastrophic to a legitimate analysis. The ultimate goal is to determine whether it *would have been* obvious to combine elements found in the prior art and create the invention. In most cases, knowledge of the invention makes the invention facially obvious, providing a blueprint for picking and choosing the elements from the prior art.

Unfortunately, long experience proves hindsight reconstruction almost inevitable with the Winslow Tableau approach, since placing oneself back in time before the invention was known is so difficult. The courts responded by refining the analysis by consistently asking for objective evidence found in the prior art and a reasonable articulation of why those elements would have been obvious at the time of the inventive process to combine. In other words, the TSM test.

Origin of the Teaching, Suggestion, or Motivation

Probably the most difficult and contentious aspect of the current TSM test is the precise origin of the teaching, suggestion, or motivation. The court provided valuable insight in *Hollister v. Benedict Manufacturing*,[25] identifying "the suggestion of that common experience" as a valid source of the reason why "invention" would not be found.

> [The invention] seems to us not to spring from that intuitive faculty of the mind put forth in the search for new results, or new methods, creating what had not before existed, or bringing to light what lay hidden from vision; but, on the other hand, to be the suggestion of that common experience, which arose spontaneously and by a necessity of human reasoning, in the minds of those who had become acquainted with the circumstances with which they had to deal.[26]

The court was considering the question of "invention" and not a specific TSM to combine prior art elements. However, the reasoning in *Hollister* is directly relevant to the TSM test since the TSM test is simply a way of articulating the requirement of a clear reason for judging an invention as "obvious" or lacking in "invention."

As will be seen in later decisions, the modern articulation of the concepts identified in *Hollister* is phrased in terms of "knowledge of one skilled in the art" and "the nature of the problem." Of course, the other source of a TSM can be found in the prior art, in which case the prior art in some manner identifies the desirability of the particular combination of elements found in the invention. These concepts are also identified by later courts and commentators as implicit and explicit.

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[25] 113 U.S. 59, (1885).
[26] 113 U.S. at 72.

Much angst will be expressed in decisions over application of these principles, with a repeated tendency of claimants to focus the court's attention on an explicit TSM in the form of a textual reference which "teaches" the claimed invention. The court consistently responds that this approach to the exclusion of an implicit TSM is incorrect. An implicit TSM - knowledge of the practitioner or the problem itself - may also satisfy the TSM test. Regardless of whether an implicit or explicit TSM is the basis of the claim of obviousness, the court will consistently focus on the reason and evidence in support of that reason as the determining factors. It is important to recognize that even if the court couches its decision in these cases in terms of a TSM to combine, the substance of the decision is a search for a reasonable rationale for obviousness supported by the prior art and/or *Graham* secondary factors.

Thus far, the context in which "invention" was defined was largely the combination of two or more elements from different pieces of prior art. There is however an additional context in which "invention/obviousness" arises. This is where one prior art reference discloses a device that is very similar to the device in question. The issue in such cases is not one of novelty as defined by the modern view in that the prior art disclosure does not have each and every element of the device in question.

Instead, the device is very similar, but somehow modified, often in the process of transferring it from one commercial context to another. The question is then if that modification qualifies is an "inventive" act. Often the court would use the term novelty when discussing this situation, but from a modern perspective it is more fairly characterized as an analysis of "invention/obviousness." This situation could have been characterized as a problem of equivalents, though it is not often discussed in this manner.

This particular situation, which arises often, was addressed in *Topliff v. Topliff*.[27] As with previous similar situations, the court framed the analysis in terms of what the device "suggested" to an ordinary mechanic skilled in the art.

> The duplicate of the model from the patent office contains no suggestion of this kind, nor do the other models of the same patent, offered in evidence. While it is possible that the Stringfellow and Surles patent might, by a slight modification, be made to perform the function of equalizing the springs which it was the object of the Augur pattent to secure, that was evidently not in the mind of the patentees, and the patent is inoperative for that purpose. Their device evidently approached very near the idea of an equalizer; but this idea did not apparently dawn upon them, nor was there anything in their patent which would have suggested it to a mechanic of ordinary intelligence, unless he were examining it for that purpose. It is not sufficient to constitute an anticipation that the device relied upon might, by modification, by made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such functions.[28]

[27] 145 U.S. 156 (1892).
[28] 145 U.S. at 161.

From a modern perspective, the court in *Topliff* was discussing both the "nature of the problem" and "knowledge as one skilled in the art" as bases for finding a device lacking "invention." As with most decisions in this area, the *Topliff* court engages in a detailed analysis of the precise reasons *why* the prior art suggested or failed to suggest the invention in question. This is very different from simply asserting that the art suggested the combination without discussing the rationale. In addition, it should be noted that through the language, "unless he were examining it for that purpose" the court once again specifically recognized the pernicious problem of hindsight reconstruction as something to guard against during the "invention" analysis.

Finally, the court in *Topliff* also returned to *Graham* factors as indicia of 'invention'.

> While the question of patenable novelty in this device is by no means free from doubt, we are inclined, in view of the extensive use to which these springs have been put by manufacturers of wagons, to resolve that doubt in favor of the patentees, and sustain the patent.[29]

Schism Between Administrative and Trial Law

For several years after *Topliff*, we see the Supreme Court actively reviewing patent cases and reiterating the principles it had developed up to this point, but not breaking substantially new ground. By about 1895 we see a marked drop in "invention/obviousness" cases before the Supreme Court, from several per year to one every couple of years. This trend marks the beginning of a new trend in the developing law, namely substantially divergent views among the Federal Circuits and the D.C. Circuit.

One rarely noted ramification is the resulting schism created between administrative patent law and trial court patent law. Administrative patent law is the law developing out of appeals from decisions of the patent office. These cases are often interference or validity proceedings. Trial court patent law on the other hand is the law developing from contests between parties where a patent has already issued. These are usually infringement claims with invalidity of the patent offered in defense.

A third scenario is also possible, but not common. In situations where an aggrieved party wishes to contest a patent office decision, it was and still is, possible to file suit against the patent office in District Court instead of pursuing an administrative appeal. While these cases are litigated in District Court, they contribute to the body of administrative patent law instead of "trial" patent law – and they are relatively rare, not warranting any further special discussion.

The D.C. Circuit was given exclusive jurisdiction over appeals from the Commissioner of Patents in 1870. However, the Supreme Court was very active on the topic of "invention" in the years of 1850 to 1895, providing meaningful precedent for both administrative and trial court patent law. After about 1895 though, with the marked decrease in Supreme activity, the D.C. Circuit becomes the authoritative source of

[29] 145 U.S. at 164.

guidance for administrative decisions, while the various circuits begin developing "trial" patent law.

The focus of this discussion is administrative decisions out of the D.C. Circuit and decisions from the Supreme Court. The reason for focusing on administrative decisions of the D.C. Circuit is a result of the evolution of patent courts and choice of precedent. Currently, the most authoritative appellate court for patent law, other than the Supreme Court, is the Federal Circuit – which handles both administrative and "trial" law. The Federal Circuit was the successor to the Court of Customs and Patent Appeals adopting in whole the CCPA's body of caselaw as its own for purposes of precedent.[30] The D.C. Circuit was the predecessor of the CCPA, thus focusing our attention on the D.C. Circuit for now.

The early separation of the law between appeals of the administrative decisions of the patent office and infringement litigation affects modern patent litigation. The CCPA, and prior, the D.C. Circuit, handled only the administrative branch of the law, and not "trial" law. With the adoption of CCPA precedent the Federal Circuit adopted an entire body of law specifically developed for use in administrative decisions of the PTO. Thus, modern patent law as practiced by the Federal Circuit has inherited as its basis law that was not originally designed for direct application to the "trial" context.

General principles developed in the administrative context apply equally in both contexts. However, differences in the function each venue is meant to perform necessitate a nuanced application of those principles leading to substantive differences in specific circumstances, such as the required deference afforded patent office decisions. The failure to recognize subtle, but critical differences between these two contexts has unfortunately lead to inappropriate interpretations of precedent and significant deleterious effects on the modern patent system as a whole. See for example, Lee Hollaar and John Knight, "Unclear and Unconvincing: How a misunderstanding led to the heightened evidentiary requirement in patent litigation."[31]

Shift in Focus From Supreme Court to D.C. Circuit

Hindsight Condemned

Returning to the historical analysis, we return to 1895 and the D.C. Circuit, and look at the evolution of the law up to the creation of the CCPA in 1929. Initially, the Supreme Court and D.C. Circuit focused on reiterating the doctrines already developed.[32]

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[30] In re Sernaker, 702 F.2d 989, 994 (Fed.Cir.1983). Since the Circuit courts were so fractionated in their views it was not possible to adopt any one Circuit as representative of the body of patent law, nor was it possible to adopt all of the Circuit's views and have a coherent body of law. Accordingly, only the law of the CCPA was adopted in whole. A second reason for this approach was the specialized nature of the CCPA, having much greater expertise in patents than any of the Circuits.

[31] http://digital-law-online.info/papers/jk/unclear.htm.

[32] "The improvement in the art involved, in our judgment, "only the exercise of the ordinary faculties of reasoning upon the materials supplied by a special knowledge, and the facility of manipulation which results from its habitual and intelligent practice; and is in no sense the creative work of that inventive faculty which it is the purpose of the Constitution and the patent laws to encourage and reward." *Hollister*

However, 1909 marks a significant shift in emphasis for both courts, first in the Supreme Court, then in the D.C. Circuit. They begin a concerted effort to explicitly reinforce the existence of the hindsight reconstruction problem in the "invention/obviousness" analysis. For instance, in *Expanded Metal v. Bradford*,[33] the court said:

> It is suggested that Golding's improvement, while a step forward, is nevertheless only such as a mechanic skilled in the art, with the previous inventions before him, would readily take; and that the invention is devoid of patentable novelty. It is often difficult to determine whether a given improvement is a mere mechanical advance, or the result of the exercise of the creative faculty amounting to a meritorious invention. The fact that the invention seems simple after it is made does not determine the question; if this were the rule, many of the most beneficial patents would be stricken down. It may be safely said that if those skilled in the mechanical arts are working in a given field, and have failed, after repeated efforts, to discover a certain new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor. There is nothing in the prior art that suggests the combined operation of the Golding patent in suit. It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result, entitles the inventor to the protection of a patent.[34]

In addition to hindsight reconstruction, the court reiterates the concepts of the Winsleau Tableau, TSM, and mechanic skilled in the art. Also notable is the recognition by the court of a link between obviousness and "invention."

Similarly in *Diamond Rubber Co. New York v. Consolidated Rubber Tire Co.*[35] the court focused considerable attention on hindsight reconstruction as a problem to be avoided.

> It possesses such amount of change from the prior art as to have received the approval of the Patent Office, and is entitled to the presumption of invention which attaches to a patent. Its simplicity should not blind us as to its character. Many things, and the patent law abounds in illustrations, seem obvious after

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v. Benedict Mfg. Co., 113 U. S. 59, 73; *Thompson v. Boisselier*, 114 U. S. 10, 13; *Burt v. Evory*, 133 U. S. 349, 358.," *In re Musgrave*, 10 App.D.C. 164, (1897). "In our opinion this transfer does not rise to the dignity of invention. We repeat what we said in *Potts v. Creager*…," 177 U.S. 485, 493, *Mast Foos v. Stover*, (1900). "[T]he applicability of the old device to the new use would occur to a person of ordinary mechanical skill, within the case of Potts v. Creager…," *Hobbs v. Beach*, 180 U.S. 383, 390 (1901). "We cannot better conclude this opinion than by the following extract from the opinion of Mr. Justice Bradley in *Webster Loom Co. v. Higgins*…," *Carnegie Steel v. Cambria*, 185 U.S. 403, 446 (1902). "We think appellant concedes this in the statement taken from his brief. *In Smith v. Nichols*, 21 Wall. 112, 22 L. ed. 566, it is said…," *In re Hobbs*, 28 App. D. C. 525, (1907).

[33] 214 U.S. 366 (1909).

[34] 214 U.S. at 381. (citations omitted)

[35] 220 U.S. 428, (1911).

> they have been done, and, 'in the light of the accomplished result,' it is often a matter of wonder how they so long 'eluded the search of the discoverer and set at definance the speculations of inventive genius.' Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. But the law has other tests of the invention tha subtle conjectures of what might have been seen and yet was not. It regards a change as evidence of novelty, the acceptance and utility of change as a further evidence, even as demonstration. And it recognizes degrees of change, dividing inventions into primary and secondary, and as they are, one or the other, gives a proportionate dominion to its patent grant. In other words, the invention may be broadly new, subjecting all that comes after it to tribute; it may be the successor, in a sense, of all that went before, a step only in the march of improvement, and limited, therefore, to its precise form and elements, as the patent in suit is conceded to be. In its narrow and humble form it may not excite our wonder as may the broader or pretentious form, but it has as firm a right to protection. Nor does it detract from its merit that it is the result of experiment and not the instant and perfect product of inventive power. A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor.[36]

Subsequently, we see the D.C. Circuit embrace the importance of hindsight reconstruction, and continue to equate obviousness with 'invention' in *In re Pupin*.[37]

> We cannot hold that, after Steinmetz's disclosure, appellant's apparatus became obvious to any one skilled in the art. To say that would simply mean that, faced by a crying need for a device which would remove the objectionable hum from sound– reproducing systems, inventors of electrical appliances and those skilled in the art were blind to the aggressively apparent for more than six years after the announcement of the Steinmetz formula. Problems which vex the brain for many a weary hour and many a weary year become obvious to all the world, once they are solved; but their obviousness after the fact does not necessarily prove their obviousness before the fact.[38]

[36] 220 U.S. at 434-435. (citations omitted)
[37] 55 App.D.C. 14, (D.C.Cir.1924).
[38] 55 App.D.C. at 16.

Explicit Use of the TSM Test

During this same period, the D.C. Circuit often utilizes the TSM test as the relevant inquiry for evaluating the legitimacy of combining references in the 'invention' analysis. In addition, the relationship between obviousness and "invention" is further reinforced.

> The references cited indicate the antiquity of the art. Numerous attempts have been made to solve the problem, but the step applicant took seems not to have suggested itself to any of them.[39]
>
> ***
>
> The extent to which he modified or altered existing inventions is unimportant, since he accomplished a new and beneficial result not so obvious as to suggest itself to those skilled in the art.[40]

> If the Corey, Piek, and Eastwood inventions taught Rowell the things embodied in the claims we are considering, why did not their inventors perceive what they had to reveal and inculcate before Rowell disclosed his conception? Why should those inventions speak to Rowell but not to those who had conceived them? Corey, Piek, and Eastwood were searching for just what Rowell found, but they derived no assistance from their previous discoveries, or at least not enough to guide them to the desired thing. Rowell solved the problem which up to his time had puzzled men skilled in the art. It would seem that his achievement must have in it the element of invention.[41]

> During this period no skilled mechanic succeeded in making the changes which the Examiner believes, and the Examiners in Chief think, might be necessary to produce the Wilson device. If the changes were taught by the references, is it not somewhat singular that no one had learned how to make them prior to Wilson's time?[42]

> The article clearly suggests the use of blast furnace gas for running gas engines and the surplus for running steam generating boilers. In other words, this article suggests everything covered by these claims except the storage receptacle. Each of the tribunals of the Patent Office reached the conclusion that, inasmuch as a storage receptacle functioning substantially as does appellant's accumulator was disclosed in the Halpin (January 30, 1894, No. 513,922) and the Kitchen (May 23, 1911, No. 992,881 and October 22, 1912, No. 1,041,810) patents, it involved no invention to include such a receptacle in carrying out the idea suggested in the 'Power' article.[43]

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[39] *Re Harbick*, 39 App.D.C. 555, 558 (D.C.Cir.1913).
[40] 39 App.D.C at 564.
[41] *In Re Rowell,* 48 App. D.C. 238, 240 (D.C.Cir.1918).
[42] *In re Wilson*, 49 App. D.C. 76, (D.C.Cir.1919).
[43] *In re Ruths*, 53 App.D.C. 64, 64 (D.C.Cir.1923).

Importance of Objective Indicia

Finally, we see the continued use of *Graham* factors as indicia of "invention" by both courts. An example which cites other relevant precedent is *In Re Rowell*.[44]

> "There is nothing in the record to show that any special effort was made to place the Rowell magnet in commercial use; yet it is employed extensively and has in effect displaced all other magnets. This is significant. A discovery which is "generally accepted as so great an advance over any process known before that, without puffing or other business exploitation, it promptly came into extensive use, *** and that, because of its economy and simplicity, it has largely replaced all earlier processes," furnishes "persuasive evidence of that invention which it is the purpose of the patent laws to reward and protect." This court has spoken to like effect in *Re Thomson*, 26 App. D. C. 419, 425, wherein it is said: "The testimony going to show the practical success of the applicant's combination, the truth of which is substantially conceded, is entitled to material weight. Owing to the very serious difficulties which appear to have been successfully overcome by the applicant, other electrical train– lighting systems have not gone into general use. The demand for an improved system has been an urgent one for years, and yet no other inventor, or electrical expert, with all the knowledge afforded by prior patents and constructions, has succeeded in devising a system answering this demand. *** It may be laid down as a general rule, though perhaps not an invariable one, that, if a new combination and arrangement of known elements produce a new and beneficial result never attained before, it is evidence of an invention." Judge Sanborn, speaking for the court in *Luminous Unit Co. v. Freeman– Sweet Co.*, 249 Fed. 876, 877, said in response to an attack on the patentability of an invention: "Where many failed, one has succeeded, and in so brilliant a fashion as to suggest the presence of the magic touch which is invention." With some modification the same language may be applied to Rowell in the present case.[45]

The CCPA – 1929 to 1982

Important Traditions of the Court

In 1929, the United States Court of Customs and Patent Appeals (CCPA) assumed exclusive jurisdiction over appeals from the patent office. The CCPA retained jurisdiction until 1982 when the Federal Circuit was created. During the fifty-three year period the CCPA refined TSM and related concepts to some extent, but did not substantially change them. In addition, the CCPA firmly fixed several important traditions in patent law regarding precedent and discussions found in CCPA decisions. Decisions of the D.C. Circuit indicate the D.C. Circuit was already practicing these

[44] 48 App. D.C. 238, (D.C.Cir.1918).
[45] 48 App. D.C. at 240-241. (citations omitted)

traditions, but under the CCPA they are more clearly present. In addition, the Federal Circuit appears to have continued these traditions, at least initially, which helps to explain what may appear to be an insular approach to patent jurisprudence.

"Failure" to Cite Precedent

The first tradition found in CCPA decisions is a failure to cite precedent in support of important concepts. For instance, the court will often assert that a test or concept is well established, but provide no reference to judicial decisions in support of the assertion. Decisions taken alone, such instances leave the reader with the impression the court is without a substantive basis for these assertions. However, when put in the context of a full history of decisions on point, it becomes clear these assertions are almost always supported by a rich history of precedent and discussion. This is one of the reasons why it is important to consider the history as a whole, and not simply a few isolated cases.

There are likely a couple aspects of CCPA patent litigation contributing to this unusual behavior. First, as a specialist court, expert in a technical area, the justices and litigants were intimately familiar with a highly specialized area of law. It is likely that they simply did not realize what was apparent to them at the time of the decision, would not be apparent to a wider audience in following years. Second, appeals to the CCPA were not in a vacuum; they were framed by the procedures of the patent office. Patent office procedures and customs were and still are highly complex and nuanced. In many of the CCPA decisions, knowledge of these procedures and customs is apparently taken for granted.

As such, what may now appear to be an unsupported assertion in a decision was in fact only a simple restatement of widely known – at the time, to patent practitioners – customs and procedures. Unfortunately, to the modern reader this tradition contributes to a perception that the TSM test is ad hoc, incomplete, or inconsistent with other doctrine such as *Graham*, because important concepts in a particular decision may not relate back to an easily identifiable trail of precedent. Worthy of note is the Federal Circuit's attention to citing precedent, particularly in later cases. As is discussed below, the Federal Circuit takes a much more rigorous and thorough approach, providing references to previous decisions on almost all relevant legal doctrines implicated in any particular decision.

"Cursory" Opinions

In addition to omitting valuable citations to precedent, CCPA decisions rarely provide a complete discussion of each and every element of the applicable law. CCPA decisions, at least on the question of obviousness, usually focus narrowly on the particular facts and assertions of the parties. The decisions often fail to recite all of the applicable components of the law. Instead, they "jump" to the particulars of the quarrel and discuss only the minimum amount necessary to resolve it. This tradition is in striking contrast to most recent Federal Circuit decisions which recite every element of the law, and then methodically apply the facts to the law.

The effect of this tradition on perceptions of the TSM test is substantial. Because decisions often fail to recite each element of the law, they provide an incomplete picture of what the law is. Consequently, any single opinion will usually expose only a limited number of facets of the TSM test. Read alone, a particular decision may imply the TSM test fails to appropriately resolve a different fact pattern. Read in conjunction with a limited number of other decisions, the TSM test could appear ad hoc and inconsistent with itself and other relevant decisions.

In contrast, if decisions recited each element of the law – even those elements not the focus of the particular case – then all of the facets of the TSM test would be exposed in a single writing. This would provide a complete picture of the TSM test with important nuances and explanations. The tendency of the court to write cursory opinions combined with the tendency not to cite important precedent makes it all the more difficult to gain a thorough and satisfying understanding of the workings of the TSM test.

"Insular" Jurisprudence

The third tradition well established in CCPA decisions is to cite almost exclusively CCPA decisions when discussing a point. This may seem a bit odd since the CCPA was only one of several courts considering patent issues. Each of the Circuits, and of course the Supreme Court, also considered patent issues on a regular basis. Given the number and variety of cases considered by these other courts, the frequency with which the CCPA cites these other courts appears to be extremely low. Two factors are likely responsible for this phenomenon – and arguably support its legitimacy.

First, the CCPA was the only specialist court for patents, literally working with them on a daily basis. The CCPA's expertise in such matters gives its decisions and their rationales significant weight. In addition, the daily interaction with patent over the years gives the decisions of the CCPA a special continuity of development not found in any other venue. Second, the CCPA was the only court which considered administrative decisions of the patent office with regularity. Appellants would rarely seek redress from patent office decisions in circuit court. As such, the decisions of the CCPA were almost always significantly more closely aligned with subsequent cases, and accordingly, they provided more persuasive precedent.

This tradition only exacerbates the potential for misunderstanding the TSM test in light of the other traditions of failing to cite precedent and providing "cursory" decisions. Decisions of other appeallate courts generally cite precedent and recite all relevant legal doctrines. Had the CCPA been able to utilize these decisions more, then CCPA decisions would have had by incorporation more complete illustrations of the TSM test.

Caselaw Development

Two notable events occurred during this period. With the Patent Act of 1952, § 103 codified the Hotchkiss "invention" requirement as "nonobviousness." While this no doubt brought greater clarity to the "invention/obviousness" analysis, it did not

substantially alter the course of relevant caselaw. Long before the act, the CCPA was analyzing "invention/obviousness" in a manner consistent with § 103 requirements.

Indeed, this doctrinal continuity was clearly asserted in what is the second event of note during this period, the *Graham* decision. In the way § 103 focused the "invention" analysis, the *Graham* court brought clarity to § 103 analysis. One seems a natural antecedent to the other. With § 103 providing a clear restatement of the "invention" requirement, so must the court restate with equal clarity how to go about the "invention" analysis. While these two related events were major milestones, because neither changed the substance of the "invention" requirement, neither dramatically altered the course of the relevant caselaw.

The sheer number of decisions during this period makes a case-by-case analysis impractical. It is also, fortunately, unnecessary. As a whole, the relevant doctrines do not substantially change during this period. With most of the groundwork laid by the Supreme Court and D.C. Circuit, the CCPA spent most of its time applying the law but not radically changing it. As with any area of law, there are a few decisions with peculiar facts and results that stand out. However, the general trend was to largely reiterate already developed doctrine. As such, a different approach than the one used above will be taken. Instead of chronologically stepping through each case only a select few decisions of illustrating the CCPA's approach will be analyzed in some detail.

Degree of Required Specificity

Probably the single question about the TSM test that most often arises is what degree of specificity the TSM must have to legitimize a claim the TSM indicates the invention would have been obvious given the prior art. Probably the first decision to directly address this point was *In re Goepfrich*.[46]

> Upon this point appellant contends that references cannot be properly combined unless one or more of them teaches the combination claimed, and that such teaching is not found in any of the references before us.
>
> In support of this contention appellant quotes a paragraph from our decision in the case of *In re Huntzicker*, reading as follows:
>
> > We find nothing in the references to suggest that appellant's new, useful, and commercially successful device might be constructed by combining some of their elements. We are of opinion, therefore, that the appealed claims involve invention and are patentable.
>
> In our opinion said quotation should be read in connection with the paragraph immediately preceding the quotation, reading as follows:

[46] 136 F.2d 918, (C.C.P.A.1943).

> Considering the appealed claims in the light of the facts of record, we are constrained to hold that appellants combination, although defined broadly in the appealed claims, was not obvious to one skilled in the art.
>
> Reading the two paragraphs together they do not sustain appellant's contention. It is obvious the paragraph relied upon by appellant should be construed as reading "We find nothing in the references to suggest to one skilled in the art * * *."[47]

The court clarified the TSM test by making it clear absolute specificity of the TSM to the point of providing an unequivocal roadmap for the creation of the device was not the nature of the test. Indeed, as the court subsequently pointed out in *In Re Milne,*[48] to construe the TSM test in such a way would lead to an absurd result.

> Appellant contends that references may not properly be combined unless the cited art teaches how to combine the cited structures…. If appellant's contention should be sustained, then it would never be necessary to combine references to negative patentability, for if one of the references must teach the combination claimed that reference would be a complete anticipation of the invention and there would be no occasion to combine references.[49]

As the quoted passage illustrates, the clarification that a teaching in the form of literally containing each and every element is not a requirement is critical in order for the TSM test to function correctly. The TSM test was, from its very inception, never meant to require specificity in this form. Novelty, measured by single prior art references containing each element of the claimed invention, had been an accepted requirement for patentability before the third requirement was even created. Given the existence of the novelty requirement viewed in this way, it is simply a *non sequitor* to then also claim that the TSM test used in the "invention" analysis must operate through a finding of a literal and precise teaching. The court will be forced on a regular basis to reiterate this point, despite it being obvious.

Underlying Search for a Cogent and Persuasive Rationale

While a literal and complete explanation of how to combine elements is not what the TSM test requires, a cognizable reason supported by the prior art is required. Failure to articulate the reason why it would be obvious to combine the elements found in the prior art will prove fatal to a claim of obviousness. Judge Giles Rich writing for the court in *In Re Antonson*,[50] provides a valuable, if extreme, example.

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[47] 136 F.2d at 920. (citations omitted)
[48] 140 F.2d 1003, (C.C.P.A.1944).
[49] 140 F.2d at 1005.
[50] 272 F.2d 948, (C.C.P.A.1959).

> …The obvious problem was simply the failure of tires on airplanes landing at high speeds with heavy loads. Much of what we have quoted above is, in fact, appellant's own analysis of the causes of the failure which led him to the means for its solution. In cases of this kind it must not be lost sight of, as pointed out by the Supreme Court, that the inventive act which entitles an applicant to a patent resides as well in the discovery of the source of trouble as in the application of the remedy.[51]
>
> ***
>
> What seems to be the closest reference in point of disclosure of tread reinforcement, the 1911 Liais French patent, is so lacking in disclosure as to teach nothing to anyone who did not already full understand the significance of two broken lines described as "les toiles dites 'de croissant'." We do not understand it, appellant claims not to and the Patent Office has shed no further light on the subject. We feel that what light there is glows so dimly as to be totally ineffective as a suggestion which would make appellant's claimed invention obvious to anyone and certainly not to one of ordinary skill in the tire making art faced with the practical problem of preventing the destruction of airplane tires, inflated to over 200 pounds, by landings at over 200 miles per hour.[52]

Not only must there be an articulated reason, that reason must be persuasive enough to meet the burden of persuasion demanded by the procedural posture of the case. In finding the reasoning behind the TSM offered by the PTO unpersuasive, the court in *Application of Wesslau*,[53] illustrates the form of analysis required under the TSM test. The patent at issue involves the production of polyethelene.

> The sole issue in this case is obviousness under 35 U.S.C. § 103. Appellant's principal contention is that:
>
> > …since none of the reference(s) either singly or in combination teach a control of the molecular weight distribution range by specific selection of catalyst components, or even that the nature or composition of the catalyst could have an effect on this molecular weight distribution range, the subject matter of the invention as a whole could not possibly be obvious from the references….
>
> We agree.[54]
>
> ***
>
> We believe this to be a convincing demonstration that the alkoxide or aroxide moiety, when present in the catalyst systems of the appealed claims, possesses the property of conferring a significant degree of control over the

[51] 272 F.2d at 949.
[52] 272 F.2d at 953.
[53] 353 F.2d 238, (C.C.P.A.1965).
[54] 353 F.2d at 240.

ultimate molecular weight distribution of polyethylene. This property is neither taught nor suggested by the prior art.…

The fallacy of [the PTO's] reasoning is that no one of the references suggests such a substitution, quite apart from the result which would be obtained thereby. Such piecemeal reconstruction of the prior art patents in the light of appellant's disclosure is contrary to the requirements of 35 U.S.C. § 103.

The ever present question in cases within the ambit of 35 U.S.C. § 103 is whether the subject matter as a whole would have been obvious to one of ordinary skill in the art following the teachings of the prior art at the time the invention was made. It is impermissible within the framework of § 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The Anderson patent is the only reference before us which recognizes the desirability of producing polyethylene with a narrow molecular weight distribution range. Were one to follow the teachings of that patent in its entirety, he would be led to believe that control over the molecular weight distribution of polyethylene was gained independently of the catalyst system, a belief untenable in light of appellant's disclosure.

Both the board and the solicitor apparently assert the position that it is incumbent upon appellant to show that his results are outstanding as compared with the results accomplished by Anderson and Muehlbauer. If this is construed as requiring appellant to show unexpected results accruing from his claimed process, we think he has met the requirement. We perceive no teaching in the prior art of record suggesting that an alkoxide or aroxide moiety in a Ziegler– type catalytic system would produce the results obtained by appellant's process.[55]

As the passage indicates, in applying the TSM "test," it is apparent the court is simply asking for a reasonable rationale based on the prior art why it would have been obvious for an inventor to create such an invention. Since § 103 requires the evaluation of obviousness as of the time of the invention and not later, the reason offered must be consistent with the state of the art at the time. Of course, in many instances the best objective indicia of the state of the art at the time is the prior art record. If the court were to deviate from relying on these indicia, hindsight reconstruction and violation of § 103 requirements would very often be the result.

Hindsight Condemned (Again)

Another informative, if unflattering example of the problem of hindsight reconstruction and its relationship to the TSM test is found in *In Re Adams*.[56] As with

[55] 353 F.2d at 240.
[56] 356 F.2d 998, (C.C.P.A.1966)

other decisions applying the TSM test, it is valuable to note the court's insistence that a rational, cognizable reason supported by the prior art record be provided.

> The examiner in his answer said the only real issue is whether the Mencacci and Aghnides patents "can be combined in rejecting the claims." This quite common but relatively meaningless statement does not state the real issue at all and it is not now and never has been clear what the expression "can be combined" is supposed to mean. The real and only issue under 35 USC 103 is whether the invention as a whole would have been obvious to those skilled in the art at the time Adams made it in view of the state of the art as we are able to glean it from the references cited. Of course all of the references may be used to show what the art knew, and in that sense "combined" but the fact remains that neither reference contains the slightest suggestion to use what it discloses in combination with what is disclosed in the other.
>
> The Patent Office presents a number of hindsight arguments. It says Adams was not the first to use foam for heat transfer as fire departments and fire extinguisher users have been squirting foam on fires for years and housewives have been pouring aerated water on cold plates in the kitchen sink for years, in both of which operations heat transfer is inherent. Of course it is inherent, otherwise appellant's invention would not work. But patentability here does not hinge on inherency. It depends on the unexpected and unsuggested increase in heat transfer efficiency. No reference suggesting this has been produced, only ex post facto explanations as to why anyone should have been able to see that it would be more efficient to use aerated water. But even Adams, with a college degree in chemistry and a doctorate in food technology eight years before he made his invention, explained, after the completion of his invention, that it was not quite clear why the improved efficiency results. The examiner made no attempt to explain why it would be obvious, other than to say aerating or foaming rinse water is commonplace. The board opined that "it is axiomatic that heat transfer will be improved by subjecting articles to be cooled to a stream of cooling liquid with minimum waste by splashing and a stream which is so formed that the contact between the articles and the stream particles is increased." It felt using Aghnides nozzles to reduce splashing and increase contact would be an obvious change in a heat transfer method but we regard this as mere hindsight analysis of appellant's teaching with no basis at all in the absence of access to his teachings. It seems to us that one of the primary objects of Mencacci was to splash water on his cans. In his cooling method, as carried out in his cooler, the wetting is not continuous but intermittent and an important part of the cooling method as described in the Mencacci patent is in the use of air, produced by a blower, to evaporate liquid from the cans after wetting them. He says:
>
> > The cool air thus supplied displaces the warm air within the chamber and accelerates the dissipation of heat from the cans by both convection and conduction. * * * The fresh air supplied by the fan therefore promotes evaporation of moisture on the can surfaces, and

> thereby increases to a very considerable degree the amount of heat which is absorbed from each can in the process of vaporization of the moisture. Dissipation of heat by each of the three principles of heat loss by the cans and their contents is still further expedited by the tumbling * * *. [Emphasis ours.]
>
> This evaporation is a function of the machine throughout the cooling process and the machine was designed to wet the cans from all sides, the water dripping from the cans being recirculated. We see nothing to suggest any need for an improved wetting of the cans. We find no teaching, axiomatic or otherwise, to suggest the greater efficiency which Adams has discovered.
>
> Finally, the solicitor adds the argument that the superiority of appellant's heat transfer is inherent in the use of foam. Again we observe that, of course, it is. But the art does not suggest the use of foam in heat transfer of any kind and there is not the slightest suggestion that anyone knew of the existence of this inherent superiority until Adams disclosed it. After all, Bell's telephone was "inherently" capable of transmitting speech, DeForest's triode was "inherently" capable of amplification, and, to come down to date, so was the tiny transistor which is rapidly supplanting it. Two of our decisions are cited as supporting the erroneous notion that "subject matter cannot be patented on the basis of an inherent property." We think the proposition thus broadly stated and as applied here is so transparently erroneous as not to require discussion.[57]

Identification of Relevant Relationships Between Invention Elements

The Wesslau and Adams decisions illustrate the nature of the TSM inquiry. In each decision the court identified salient relationships between the elements of the claimed invention. Then, it looked to the prior art to see if those relationships are hinted at or would otherwise be obvious to one skilled in the art, based only on the prior art. When one could not reasonably identify how the prior art would cause an inventor to naturally identify one or more of the relationships between the elements, then the invention in question was nonobvious. Which relationships are salient is a highly fact specific question, depending on the invention and the area in which the invention lives.

In some cases this relationship is identified as “unexpected results” of a particular combination, in other cases it can be the lack of “inherency” of the particular combination; many other expressions of these relationships also exist. Which relationships the court will focus on is determined by the precise contours of the invention and its subject area. Given the inexorable march of technology, it is impossible to identify any particular relationship as always relevant, thus the great variety of ways of operationalizing the TSM test. The one constant in these analyses is the search for a reasonable explanation why prior art elements would have been combined, based on the prior art record.

[57] 356 F.2d at 1001-1003.

A final example from the CCPA era of the court performing the TSM test *In re Imperato*,[58] is offered which, like Adams and Wesslau, illustrates these points.

> With regard to the principal rejection, we agree that combining the teaching of Schaefer with that of Johnson or Amberg would give the beneficial result observed by appellant. However, the mere fact that those disclosures can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination. We find no such suggestion in these references.
>
> Contrast this teaching to what appellant has done. He combines two processes known to result in lump ore having high strength at low temperatures but not at high temperatures, yet obtains a lump ore having improved strength in both situations. We consider this to be unexpected and unobvious in view of the art despite the board's contention to the contrary. In fact, we think that the art suggests that no desirable effect would result from the combination as Schaefer teaches that the sulfur will be burned away as the temperature is raised and, therefore, would contribute nothing to the combination.
>
> We do not think that one skilled in the art would be led by the teachings of Russo to employ sulfur in the carbonate bond process. In the first place, Russo uses sulfur in a high temperature molding process employed to make finished articles of high strength from iron powder. The reference does not suggest that this strength is improved at high temperatures such as are encountered in the metallurgical processes for which lump ore is useful.
>
> Secondly, there is nothing in the record to suggest that the problems of powder metallurgy in any way resemble those of lump ore preparation. Therefore, if Russo would suggest that sulfur improves the strength at high temperatures of articles molded from iron powder, we think one skilled in the art would not view this to be significant in view of the contrary suggestion in Schaefer, a more pertinent reference, concerning the effect of adding sulfur to a metal ore.[59]

Importance of Context for Understanding Proper Application of the TSM Test

The three decisions discussed immediately above illustrate in some detail how the TSM test was conceptualized and applied during the CCPA era. It should not be forgotten that the TSM test operates as a component of a larger context ultimately governed by § 103 requirements. A broad but succinct summation of how the CCPA viewed this context is found in *In re Sponnoble*.[60]

> It should not be necessary for this court to point out that a patentable invention may lie in the discovery of the source of a problem even though the remedy

[58] 486 F.2d 585, (C.C.P.A.1973).
[59] 486 F.2d at 587-588. (citation omitted)
[60] 405 F.2d 578, (C.C.P.A.1969).

> may be obvious once the source of the problem is identified. This is part of the "subject matter as a whole" which should always be considered in determining the obviousness of an invention under 35 USC 103. The court must be ever alert not to read obviousness into an invention on the basis of the applicant's own statements; that is, we must view the prior art without reading into that art appellant's teachings. The issue, then, is whether the teachings of the prior art would, in and of themselves and without the benefits of appellant' disclosure, make the invention as a whole, obvious.[61]

One element not found in the summation above is the importance of the patent evaluation procedures and their relationship to subsequent review by a court. Since this discussion is still in the CCPA era, it should be remembered that the overwhelming majority of cases considered here involve appeals from the patent office from a finding of obviousness. Such appeals are necessarily framed by the procedures the PTO examiner follows. Because the TSM test is the analytical framework for evaluating obviousness, the PTO procedures interact and influence how the TSM test works. Discussion of the importance PTO procedures have on subsequent review by a court will become commonplace in Federal Circuit decisions. The CCPA more often assumed knowledge of this context on the part of those reading decisions.

However the interaction between the TSM test and PTO procedures is still evident in CCPA decisions. The key issue in appeals from a finding of obviousness by an examiner is the prima facie case. Under § 103 the inventor is entitled to a patent "unless" the PTO can demonstrate beyond a preponderance of the evidence that the patent is obvious. Thus, the inventor will petition the PTO for a patent, and it is then the responsibility of the PTO to establish a prima facie case of obviousness if the PTO wishes to deny the patent under § 103. The petitioner then must produce evidence sufficient to rebut the prima facie case, if the *prima facie* case is adequately established.

Though not often explicitly discussed, this was clearly the backdrop for CCPA decisions. Its operation can be seen in *In re Lintner*.[62]

> The sole issue before us is whether or not the claimed subject matter on appeal is obvious from the prior art relied upon within the meaning of 35 U.S.C. § 103….
>
> We agree with the solicitor that the composition herein claimed is prima facie obvious. In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification. In the present case, we are satisfied that Rheiner and Speel do suggest the use of a sugar with conventional laundry compositions such as that disclosed in Germann. The fact that appellant uses sugar for a different purpose does not alter the conclusion

[61] 405 F.2d at 585. (citations omitted)
[62] 458 F.2d 1013, (C.C.P.A.1972).

that its use in a prior art composition would be prima facie obvious from the purpose disclosed in the references.

> Differences between a patent applicant's and the prior art's motivation for adding an element to a composition may be reflected in the composition ultimately produced. A claimed composition may possess unexpectedly superior properties or advantages as compared to prior art compositions. In this way, the conclusion of prima facie obviousness may be rebutted and the claimed subject matter ultimately held to be legally nonobvious. However, in the present case we find no basis for disturbing the conclusion of obviousness. The result urged by appellant is the combination of a detergent, detergent builders and a cationic softener in a functional laundry composition thereby overcoming the various problems which arise when these several ingredients are used separately in different cycles of the laundering process. This is the very result achieved by Germann without the sugar. Accordingly, there is no departure from the prior art in terms of the result achieved by the addition of sugar, and the prima facie case of obviousness has not been overcome.[63]

Graham **and the TSM Test**

The final decision for consideration in this era is *Graham v. John Deere Co. of Kansas City***.**[64] *Graham* identified and clarified the essential framework for analyzing obviousness.

> Under § 103, 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. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.[65]

The necessary relationship of the *Graham* requirements and the TSM test is hopefully obvious. The *Graham* framework identifies the full range of obviousness under § 103, and the TSM test is the methodology used to carry out the *Graham* analysis. Validity of using the TSM test methodology hinges on consistency with *Graham*. The TSM test must neither be over or under inclusive in its results.

As the history illustrates, courts consistently apply the TSM test in such a way that consistency with *Graham* is achieved. The content on which the TSM test is predicated is the prior art determined by an evaluation of the scope of the subject matter area. The

[63] 458 F.2d at 1016.
[64] 383 U.S. 1, (1966).
[65] 383 U.S. at 17-18.

court or examiner will then identify salient differences between the prior art and the invention in question. Finally, the obviousness analysis is carried out using this prior art, focusing on the salient differences, from the perspective of one ordinarily skilled in the art.

A closer examination of the TSM test reaches the same conclusion. As the decisions cited in this history show, the TSM test is fundamentally a search for a reasonable rationale as to why an invention is obvious, based on the appropriate prior art. The courts steadfastly adhere to *Graham* by considering the invention and prior art as a whole, while at the same time guarding against the insidious problem of hindsight reconstruction by seeking out objective indicia in the prior art as a basis of the rationale. While the decisions are numerous, and a wide variety of language is used in the TSM analysis, the underlying theme is always the same; simply a search for a reasonable rationale consistent with *Graham*.

The Federal Circuit – 1982 to 2006

The TSM Test Applied with Greater Rigor

The fundamental doctrines and their application do not change much in the Federal Circuit era. What does change however is the rigor with which these doctrines are applied. Upon its creation, the court rapidly develops a strong tradition of clearly stating all applicable legal principles buttressed by citation to previous decisions. Once stated, the court then methodically applies the facts of the case to those legal principles. This differs from the CCPA in that the CCPA often operated under the assumption that it was unnecessary to state and discuss principles commonly known to the patent bar. Instead it was most important to focus on a discussion of only those facts absolutely essential to resolve the precise question.

Since the TSM test was well developed at the time of the Federal Circuit's creation, only a few cases which illustrate their approach consistent with the CCPA will be discussed. An early decision is *Interconnect Planning Corp. v. Feil* considering the obviousness of a telephone system.[66] The court begins by emphasizing the need to guard against the ever present problem of hindsight reconstruction.

> Those charged with determining compliance with 35 U.S.C. § 103 are required to place themselves in the minds of those of ordinary skill in the relevant art at the time the invention was made, to determine whether that which is now plainly at hand would have been obvious at such earlier time.
>
> The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time.
>
> The invention must be evaluated not through the eyes of the inventor, who may have been of exceptional skill, but as by one of "ordinary skill." This is not a facile statutory interpretation. The quality of non– obviousness is not

[66] 774 F.2d 1132, (Fed.Cir.1985).

> easy to measure, particularly when challenged years after the invention was made. That which may be made clear and thus "obvious" to a court, with the invention fully diagrammed and aided, in this case, by a hostile inventor seeking to eliminate his own invention, may have been a breakthrough of substantial dimension when first unveiled.
>
> The judicial application of uniform standards for determining compliance with 35 U.S.C. § 103 is essential, because the technological incentives fostered by the patent system depend on consistent interpretation of the law. To this end, faithful adherence to the patent statute and guiding precedent fosters uniformity in result….
>
> From its discussion of the prior art it appears to us that the court, guided by the defendants, treated each reference as teaching one or more of the specific components for use in the Feil system, although the Feil system did not then exist. Thus the court reconstructed the Feil system, using the blueprint of the Feil claims. As is well established, this is legal error.[67]

After a detailed discussion of the elements of the invention and identification of the salient relationships between those elements, the court demonstrates how the prior art fails to make those relationships "obvious." The conclusion of this part of the decision sums up nicely how hindsight reconstruction is often done.

> It is impermissible to first ascertain factually what appellants did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct appellants' invention from such prior art.[68]

With the problem of hindsight reconstruction and the failure of the district court to avoid it well established, the court goes on to perform the TSM test. It is important to note that in applying the TSM test, the court is very careful to adhere to the requirements of § 103 and operate within the *Graham* framework.

> 35 U.S.C. § 103 requires that obviousness be determined with respect to the invention as a whole. This is essential for combination inventions, for generally all combinations are of known elements.
>
> When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. There must be "something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination."
>
> Critical to the analysis is an understanding of the particular results achieved by the new combination. The claims here at issue are directed to a combination

[67] 774 F.2d at 1138-1139. (citations omitted)
[68] 774 F.2d at 1141.

of known components of telephone systems in an admittedly new way to achieve a new total system. Neither the district court in its opinion, nor the defendants, identified any suggestion in the prior art that the components be combined as they were by Feil or that such combination could achieve the advantages of the Feil system.

Not only must the claimed invention as a whole be evaluated, but so also must the references as a whole, so that their teachings are applied in the context of their significance to a technician at the time– – a technician without our knowledge of the solution. The defendants propounded and the district court appears to have followed an analytical method that well illustrates the "mosaic" analogy discussed in W.L. Gore & Assocs., where this court said:

> [T]he claims were used as a frame, and individual, naked parts of separate prior art references were employed as a mosaic to recreate a facsimile of the claimed invention.

Defendants refer to the decision of the Supreme Court in Sakraida v. Ag Pro, Inc.. As the Court there held, Sakraida's combination of old elements to wash barn floors with flowing water did not produce a new or different function, and affirmed the district court's holding that " 'all of the elements of [the combination] are old ... and the combination of them ... being neither new nor meeting the test of non– obviousness.' " In the Feil invention the combination was admittedly new, and it produced a new system having theretofore unavailable attributes.

Recognizing the difficulty of casting one's mind back to the state of technology at the time the invention was made, courts have long recognized the usefulness of evidence of the contemporaneous attitude toward the asserted invention. A retrospective view of the invention is best gleaned from those who were there at the time….

Although the district court remarked in its 1982 decision that evidence of commercial success "cannot be afforded any weight" "in light of my finding of obviousness," such evidence when present must be considered and afforded appropriate weight….

The requirement that "secondary considerations" be considered in determinations under section 103 aids in evaluating the state of the art at the time the invention was made. It is not pertinent that the invention was easily understood after it was made– – a factor that appears to have been considered significant by the district court– – but whether it would have been obvious to make the invention at the time. Giving due weight to the market success and contemporaneous reaction to the Feil trader turret system, the record does not contain clear and convincing evidence that the Feil invention of the reissue claims would have been obvious to one of ordinary skill in this art at the time the invention was made.[69]

[69] 774 F.2d at 1134-1144. (citations omitted)

It is clear from this decision that the TSM test is simply the name given to a broad methodology of analyzing obviousness in a manner consistent with the requirements of § 103 and the *Graham* framework. The decision illustrates that application of the TSM test requires a thorough probing of the invention in question, identifying the relationships among the elements giving the invention its claimed importance, and seeing of those relationships would have been obvious at the time of the invention's creation; all the while, diligently avoiding hindsight reconstruction. In the decision above this nuanced and expansive analysis is phrased in terms of a failure to identify a "suggestion" in the prior art making the salient relationships obvious to one skilled in the art. While the TSM test is phrased as three narrow words, it is clear the test itself is far more than those words alone imply.

A second example of the Federal Court's application of the TSM test is found in *Pro–Mold & Tool Co. v. Great Lakes Plastic, Inc.*.[70] While Interconnect focused on hindsight reconstruction, *Pro-Mold* focuses on the TSM test applied to a situation in which the TSM comes from the nature of the problem. It should be noted that, as with Interconnect, the *Pro-Mold* court carefully adheres to § 103 and *Graham* in the process of applying the TSM test.

> A determination of obviousness under 35 U.S.C. § 103 is a legal conclusion involving factual inquiries. Among these factual inquiries are secondary considerations, which include evidence of factors tending to show nonobviousness, such as commercial success of the invention, satisfying a long-felt need, failure of others to find a solution to the problem at hand, and copying of the invention by others.
>
> The district court held that there were no genuine issues of material fact pertaining to the obviousness of the invention. The district court determined that the content of the prior art included the Squeeze Tite card holder and Classic Line Thick and Thin card holders. The Squeeze Tite card holder is a two– piece card holder with a friction fit cover. It is larger than the card and thus provides a "frame" around a stored card. The Classic Line card holders are only slightly larger than the stored card and consist of a base and slide cover. The cover fits into the base by sliding into grooves in the "long" sides of the base. The Classic Line Thick card holder was designed to hold several cards, while the Classic Line thin card holder was designed to hold one card. The district court combined the size of the Classic Line Thin card holder with the friction fit cover of the Squeeze Tite card holder, and held this combination of features to have been obvious to a person of ordinary skill in the art of the design and manufacture of card holders. The district court, however, did not provide a basis for its discounting of Pro– Mold's evidence of secondary considerations.
>
> We agree with the district court that the Classic Line Thin and Squeeze Tite card holders together contain all the elements of the invention defined in independent claim 1 of the patent. The Squeeze Tite card holder contains all

[70] 75 F.3d 1568, (Fed. Cir.1996).

the elements of the invention except for its size. The Classic Line Thin card holder provided this missing element, being only slightly larger than a stored card. Pro– Mold, however, argues that the district court erred in concluding that the Classic Line card holders were prior art to the patent. See 35 U.S.C. § 102 (1988). The district court considered relevant publications advertising the Classic Line Thin card holder and corroborating deposition testimony. Because the Classic Line Thin card holder was advertised in 1988, 1989, and 1990, we conclude that the district court did not err in determining that there is no genuine dispute as to whether the prior art included the Classic Line Thin card holder.

Pro– Mold also argues that there was no reason to combine the Squeeze Tite and Classic Line Thin prior art products. We disagree. It is well–established that before a conclusion of obviousness may be made based on a combination of references, there must have been a reason, suggestion, or motivation to lead an inventor to combine those references. We start from the self– evident proposition that mankind, in particular, inventors, strive to improve that which already exists. § 103 sets the dividing line between patentability and unpatentability at what would have been obvious to one having ordinary skill in the art to which the invention pertains. If one prior art reference describes the claimed invention, it is worse than obvious in terms of patentability; it lacks novelty. If the invention is different from what is disclosed in one reference, but the differences are such that combination with another reference would lead to what is claimed, the obviousness question then requires inquiry into whether there is reason, suggestion, or motivation to make that combination.

Such a suggestion may come expressly from the references themselves. It may come from knowledge of those skilled in the art that certain references, or disclosures in the references, are known to be of special interest or importance in the particular field. It may also come from the nature of a problem to be solved, leading inventors to look to references relating to possible solutions to that problem.

In this case, the reason to combine arose from the very nature of the subject matter involved, the size of the card intended to be enclosed. There was surely a reason to combine a reference describing an elegant card holder and cover arrangement with a reference describing a card holder no larger than necessary to enclose the card. The suggestion or motivation to combine these features of the prior art was thus evident from the very size of the card itself. Card holders larger than the card had already been designed, as evidenced at least by the Squeeze Tite card holder. On the other hand, a card holder no larger than necessary clearly was desirable in order to enable the card holders to fit in a set box. It would also avoid having the cards bang around in a holder larger than needed. Accordingly, the size of the card provided the motivation to combine the features of the prior art card holders and hence modify the size of the Squeeze Tite card holder so that it was not larger or smaller than the card, but rather substantially the size of the card.

> Pro– Mold's evidence of commercial success, however, created genuine issues of material fact precluding summary judgment….[discussion of the facts concerning commercial success][71]

Pro-Mold illustrates that the TSM test need not require a specific, exacting teaching as to how to create the invention in question. In Pro-Mold the TSM comes from the nature of the problem to be solved. In essence the TSM test is a search for a reasonable rationale as to why the invention would have been obvious based on objective evidence in existence at the time of the invention's creation. Indeed, *In re Lee*,[72] indicates no less.

> As applied to the determination of patentability vel non when the issue is obviousness, "it is fundamental that rejections under 35 U.S.C. § 103 must be based on evidence comprehended by the language of that section." The essential factual evidence on the issue of obviousness is set forth in *Graham v. John Deere Co.*, and extensive ensuing precedent. The patent examination process centers on prior art and the analysis thereof. When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness.
>
> "The factual inquiry whether to combine references must be thorough and searching." It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with.
>
> The need for specificity pervades this authority[.]
>
> > "[P]articular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed";
> >
> > "[E]ven when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.";
> >
> > [T]he examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."
>
> With respect to Lee's application, neither the examiner nor the Board adequately supported the selection and combination of the Nortrup and

[71] 75 F.3d at 1572-1573. (citations omitted)
[72] 277 F.3d 1338, (Fed.Cir.2002).

> Thunderchopper references to render obvious that which Lee described. The examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher." Thus the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion.[73]

Finally, in *In re Kahn*,[74] the last decision considered in this history, the Federal Circuit clarifies application of the TSM test in view of the administrative process of patent evaluation within the PTO. The court clearly indicates the TSM test is fundamentally a search for a reasonable explanation, supported by facts, as to why the invention would have been obvious.

> [M]ere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole. Rather, to establish a prima facie case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. In practice, this requires that the Board "explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious." This entails consideration of both the "scope and content of the prior art" and "level of ordinary skill in the pertinent art" aspects of the Graham test.[75]

If the PTO is unable to provide such an explanation then the PTO fails to establish a prima facie case. Claiming that it would have been obvious to combine references, but at the same time being unable to give an explanation is the prototype of hindsight reconstruction.

> When the Board does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, we infer that the Board used hindsight to conclude that the invention was obvious. The "motivation-suggestion-teaching" requirement protects against the entry of hindsight into the obviousness analysis, a problem which § 103 was meant to confront.
>
> ***

[73] 277 F.3d at 1342-1344. (citations omitted)
[74] 441 F.3d 977, (Fed.Cir.2006).
[75] 441 F.3d at 986. (citations omitted)

> The motivation-suggestion-teaching test [] informs the Graham analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law, and helps ensure predictable patentability determinations.[76]

The facts on which the explanation may rely are found in the prior art. This does not mean there must be an explicit TSM. Instead, an implicit TSM can also satisfy the requirement so long as the explanation offered for the existence of the implicit TSM and its applicability to the situation is reasonable and satisfies the burden of proof. In addition, per *Graham* the level of skill in the art is another fact on which the explanation can rely.

> A suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references.... The test for an implicit *988 showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103.
>
> In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted the inventor before the invention was made. Therefore, the "motivation-suggestion-teaching" test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. From this it may be determined whether the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art--i.e., the understandings and knowledge of persons having ordinary skill in the art at the time of the invention--support the legal conclusion of obviousness.[77]

Conclusion

The TSM test is not a simple, mechanical test mandating a specific textual reference

[76] 441 F.3d at 986-987. (citations omitted)
[77] 441 F.3d at 987. (citations omitted)

outlining the invention with great precision. Instead, the TSM test is fundamentally a search for a reasoned rationale supported by objective evidence explaining why an invention would have been obvious. It has evolved to satisfy § 103 requirements as explained in *Graham*, while at the same time mitigating the ever-present problem of hindsight reconstruction. It does so by focusing attention on objective indicia in the form of prior art and skill level of hypothetical artisans. The TSM test then asks the examiner or court to develop a reasonable rationale explaining why the invention would have been obvious, and to support this rationale using the objective indicia. The TSM test has coevolved with refinements of "invention/obviousness" for over one hundred years. During this time it has proven itself as a means of satisfying the "invention/obviousness" requirements in sound, pragmatic, and administrable test.