

A CRITIQUE OF THE CONCEPT OF RELATIVE SIGNIFICANCE IN DETERMINING OBVIOUSNESS [na]

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I. INTRODUCTION

A difficult and perennial problem in patent law is determining the obviousness of inventions having both unexpected and expected properties. [n1] For example, in the case of *In re May*, [n2] a new chemical compound was determined to have been expected to have analgesic properties, but it was determined to have been unexpected that the compound would *224 also have the desirable property of being non-addictive. The difficulty of weighing unexpected vis-a-vis expected properties of an invention was exemplified by the two recently controversial cases of *In re Wright*[n3] and *In re Dillon*, [n4] the first involving a mechanical invention (a carpenter's level) and the second involving a chemical invention (a fuel composition). In *Dillon*, the expected property or result was dewatering of the fuel and the unexpected property was reducing soot emission; In *Wright*, the expected property was increased visibility in reading the level and the unexpected property was increased pitch-measuring capability. Commenting on these recent cases, one author recently stated, "The problem of patentability when the prima facie case of obviousness is based on a rationale for an expected [property] that differs from applicant's desired [property] has not been resolved. . . . The balance between patentability and what belongs in the public domain. . . needs to be addressed." [n5]

The concept of relative significance, developed by Blodgett, and published in an article entitled "Relative Significance -- A Concept in Chemical Structural Obviousness Cases," [n6] was a previous attempt to address the problem of determining the patentability of inventions, particularly chemical compounds, having both unexpected and expected properties. The concept stated, "In essence, a person who discovers a new compound which is structurally similar to a prior art compound may obtain a patent on the new compound if and only if the person can show that the properties and uses of the new compound are of greater significance than the significance of what would have been expected of the new compound in view of what was known about properties and uses of the old compound." [n7]

In the controversy surrounding the *Wright* and *Dillon* decisions, a series of articles in the *Journal of the Patent Office Society (JPOS)* have clearly attested to the influence of the concept of relative significance in the the U.S. Patent and Trademark Office. [n8] Also, in the wake of *Dillon*, several authorities, including the AIPLA (American

Intellectual *225 Property Law Association), [n9] have apparently independently taken the the general position that, in cases of inventions having both unexpected and expected properties, the significance of the expected properties must be balanced against the significance of unexpected properties of an invention. In the Dillon [n10] decision, the Federal Circuit in banc stated that Dillon did not "show that the prior art compositions and use were so lacking in significance that there was no motivation for others to make obvious variants," [n11] and "There was no attempt to argue the relative importance of the claimed compositions compared with the prior art." [n12] [emphasis added] The approach taken by the Federal Circuit in Dillon, with respect to rebutting prima facie obviousness, appears to be a variation of Blodgett's concept of relative significance.

A first principal purpose of this paper is to discuss and critique the concept of relative significance, as originally defined by Blodgett, and consider its validity and usefulness in determining obviousness under 35 U.S.C. 103.

A second principal purpose of this paper is to propose a revised concept of relative significance, as a useful tool in determining the obviousness of inventions having both unexpected and expected properties. In this context, the author's proposed concept of relative significance will also systematically address the balance between patentability and what belongs in the public domain, particularly as this balance relates to Constitutional principles regarding patents. In view of the inadequate and inconsistent case law on the subject, [n13] it is hoped that the revised concept of relative significance may contribute to charting the ground anew on the subject of determining the obviousness of inventions having both unexpected and expected properties. [n14]

*226 II. THE STRUCTURE AND FUNCTION OF AN INVENTION

A. Definitions

Because of the key relevance to this paper of the basic concepts of "structure" and "function," we shall first undertake a review of these important concepts, in the context of patent law. As we shall see, in determining the obviousness of inventions having both unexpected and expected properties, aspects of the claimed structure, as well as properties, may need to be balanced in determining obviousness as a whole.

The distinction between structure and function of an invention is well recognized in patent law and, in fact, is a common theme in the literature. [n15] An invention always comprises both structure and function. *227 The term structure refers to the physical embodiment of the invention when it is made and practiced. The term structure encompasses, with regard to an apparatus or device, its physical parts or "means", and with regard to a process or method, its physical operations or steps. In other words, the structure of an invention represents that which is actually constructed (with regard to an apparatus) or the set of directions, recipe, or algorithm that is followed (with regard to a process) or what must be made or synthesized (with regard to a chemical composition), in

order for one of ordinary skill in the art to practice the invention and to achieve its disclosed utility.

A heat exchanger, a pump, and a bolt are examples of physical means that may comprise the structure of an apparatus. Mixing, attaching, reacting, and heating are examples of steps which may comprise the structure of a process. A mixture of resins, a catalyst, or a pharmaceutical compound are examples of materials that may comprise the structure of a chemical composition or compound.

Structure is critical to determining the patentability of an invention, for the structure of an invention, as defined by the language of the patent claims, is generally determinative of the metes and bounds of the patent rights of the patent owner. [n16] The patent owner may exclude others from constructing or duplicating the claimed structure of the invention, but may not prevent others from achieving the same utility, results or function by means of another non-infringing structure.

In comparison to structure, the term "function," with respect to a claimed invention, has been defined as the "inherent or inevitable effects which accompany a given structure" [n17] when practicing the invention. However, less than all possible or expected functional aspects of a claimed structure need be disclosed in a patent. For example, a claim to a composition might be based on a single disclosed utility, but practicing the claimed structure for a different non-disclosed utility may still *228 infringe the claims of the patent. [n18] Not all the properties of an inventor need be disclosed or mentioned by the inventor, and in fact may not be known.

The term function, as used herein, broadly and generally encompasses the non-structural aspects of a claimed structure; function broadly includes any useful property, result, effect, synergism, advantage, problem solved, purpose or utility that would inhere in practicing the invention. [n19] In this paper, the more commonly used term "properties" will be used synonymously with the term "function" to include all functional aspects of an invention. As indicated above, the term "properties," as used herein, refers to useful properties.

Having defined structure and function (or structure and properties), an unexpected property may be defined as a property of the inventive structure which, to one of ordinary skill, would have been unexpected or surprising. Similarly, an expected property may be defined as a property of the inventive structure which would have been expected by the skilled artisan. [n20]

It is almost a truism of patent law that both structure and function are part of the invention "as a whole" referred to in 35 U.S.C. 103. For example, *In re Antoine* [n21] involved an apparatus for wastewater treatment. The structure comprised a certain ratio of dimensions. The court stated:

In this case, the invention as a whole is the ratio value of 0.12 and its inherent and disclosed property. . . Just as we look to a chemical and its properties when we examine

the obviousness of a composition of matter claim, it is this invention as a whole, and not some part of it, which must be obvious under 35 USC 103. [emphasis in original] [n22]

Thus, courts must always look to differences in both structure and function, between the invention and the prior art, when deciding the *229 obviousness of an invention. As a matter of practice, a finding of prima facie obviousness by a patent examiner may be based largely on an inference of structural similarity. [n23] The assumption is that a similar structure will result in similar or equivalent properties. In such a case, pertinent arguments and evidence of functional differences, for example unexpected properties, is typically offered in rebuttal by the patent applicant. [n24] Finally, the patent examiner will weigh all the facts and evidence anew to determine the obviousness of the "subject matter as a whole," according to 35 USC 103. [n25]

Structural and functional aspects of an invention, or more accurately the structural and functional differences between the prior art and the claimed invention, form a seamless web in the somewhat amorphous determination of obviousness. In the final analysis, the respective structural and functional aspects (including unexpected properties) of an invention cannot be considered in isolation from each other. It is well known that even a small difference in structure, between the invention and the prior art, can have great functional significance. [n26] Conversely, if the structural difference is such that it could reasonably be said that it would not have been taught or suggested by the prior art, then the fact that an invention has no new or unexpected function or properties will not prevent patentability. There is no requirement in patent law *230 that an invention possess superior or unexpected properties or that an invention be an advance in the art. [n27]

In some cases, at one end of the spectrum, there may exist a strong inference that an invention is obvious, based largely on structural similarity to the prior art. In other words, one of ordinary skill might be motivated to obtain the claimed structure for the expected properties. In such cases, evidence of unexpected properties may be used to rebut this inference. However, in other cases, at the other end of the spectrum, there may be an insufficient inference that an invention is obvious, because adequate structural similarity to the prior art is lacking. In other words, if there is insufficient teaching or motivation to obtain the claimed structure, there may exist an unbridgable difference from the prior art in terms of obviousness. In the latter case, there is theoretically no need to depend on unexpected properties for patentability. An example of such a case is *United States v. Adams*. [n28] The invention in that case related to an electric storage battery comprising both magnesium and cuprous chloride. The Court stated:

[L]ong accepted factors, when taken together, would, we believe, deter any investigation into such a combination as is used by Adams. . . . We have seen that at the time Adams perfected his invention noted experts expressed disbelief in it. [n29]

In *Adams*, prior art references led away from the invention and even unusually skilled artisans in the field corroborated the negative teachings in the prior art. Hence, there was no teaching or motivation for one of ordinary skill in the art to obtain the invention, and hence an inadequately bridged gap or difference in structure between the prior art and the

invention. Consequently, there was theoretically no need, in determining obviousness, to consider the unexpected properties of the invention, even if they were significant. Similarly, to say that a claimed invention would have been merely "obvious to try" or an "invitation *231 to try," [n30] may signify that the structure of the invention would not have been sufficiently taught by the prior art, and non-obviousness even in the absence of rebuttal evidence.

This paper is not directed to those cases such as *Adams*, at the one end of the spectrum, where the structural differences between the invention and the prior art clearly would not have been taught by the prior art. The term "structurally nonobvious" has sometimes been applied to such inventions. This paper instead concerns those many cases where, because of structural similarity, both expected and unexpected properties of an invention must be considered by the decision-maker in determining the ultimate issue of obviousness. In the past, the term "structural obviousness" has been applied to such inventions, particularly in the chemical arts. [n31]

B. Examples

The distinction between "structure" and "function" (or structure and properties) of an invention is well known in the case law, as explained above. To further illustrate this distinction, we may again refer to the case of *In re May*, [n32] where the invention related to a new analgesic or pain-relieving drug. The claimed compound had the expected property of analgesia and the unexpected property of non-addictiveness. In *May*, *232 the structure of the invention was the chemical compound itself (what was synthesized). The function, or functional aspects, of the invention included both its analgesic and non-addictive properties. In *May*, the PTO had required the applicant, in order to rebut prima facie obviousness, to provide comparative tests showing actual differences in properties, i.e., the applicant had been required to show the cited prior art compound did not possess the unexpected property possessed by the claimed compound. The CCPA explicitly balanced the unexpected and expected properties in determining obviousness of the invention as a whole.

To illustrate the distinction between structure and function in a non-chemical or mechanical case, we may refer to the Supreme Court decision of *General Electric Co. v. Jewel Incandescent Co.* [n33] (hereafter *General Electric*). In the case of *General Electric*, the invention involved an improved light bulb, the glass of which was frosted by double etching the inside surface of the bulb. According to the facts of the case, there were teachings in the prior art of light bulbs being single etched on the inside to prevent glare. The double etching of glass was also generally known for reducing glare, but no prior art references disclosed that type of frosting applied to the inside of a light bulb. The patentee in *General Electric* based his argument for patentability on the fact that his light bulb, having double etching on the inside, resulted in the unexpected property that its glass was significantly less breakable.

Looking at the facts of General Electric, the term "structure" as defined above, would refer to the physical combination of a light bulb and double etching on the inside of the bulb. The "function," or functional aspects, of the invention would refer to the properties of both preventing glare and increasing durability. In this case, the latter property was the unexpected property and the former property was the expected property or function. The infringer's argument for non-patentability was that the prior art taught the claimed structure for the expected property. The patentee's argument for patentability was that the prior art did not teach the claimed structure for the unexpected property.

In general, when there is evidence of both expected and unexpected properties as part of a claimed invention, the determination of obviousness of the invention as a whole may encompass, among others, two considerations:

(1) The motivation of one of ordinary skill in the art to obtain the claimed structure for its expected properties or function, and

*233 (2) The motivation of one of ordinary skill to obtain the claimed structure for its unexpected properties.

In some cases, both these motivations may have to be considered in determining what would have been obvious. Considering only one of these motivations, disregarding the other, would violate the mandate of 35 U.S.C. 103 to consider the invention as a whole.

III. THE ORIGINAL CONCEPT OF RELATIVE SIGNIFICANCE

A. The Background of the Concept of Relative Significance

Blodgett based his concept of relative significance most notably on the CCPA decision of *In re May*. [n34] The CCPA in *May* explicitly stated that, if both unexpected properties and "structural obviousness" existed, then "Those properties which could have been expected must be balanced against the unexpected properties." [n35] As indicated above, the invention in *May* involved an analgesic or pain-relieving drug. The inventors had discovered that their new class of compounds, in addition to possessing the expected property of analgesia, also possessed the unexpected property of non-addictiveness. The court stated, "Since the record reflects both an expected beneficial result, viz., potent analgesia, and an unexpected beneficial result, viz., nonaddictive, potent analgesia, it is necessary to determine the weight to be accorded each prior to making the ultimate determination on the issue of obviousness." [n36]

The balancing described in *May* was with regard to a chemical compound. In *In re Nolan*, [n37] a similar balance was applied to an electromechanical apparatus. *Nolan* involved an improvement in a display/memory electronic device. The CCPA again weighed the unexpected property against the expected property, stating:

Considering all of the evidence, we are not persuaded that the evidence of the unexpected higher luminous efficiency and lower peak discharge current rebuts the strong showing of obviousness. The expected higher memory margin is of particular

significance since it appears to be the most significant improvement for a memory device. Appellant has not shown that the unexpected lower peak discharge current and higher luminous efficiency have a significance equal to or greater than that of the expected higher memory margin and lower operating voltage. We recognize that this court has held claims to be unobvious where the prior art suggested the claimed structure and some of its properties but other properties were unexpected. [n38]

*234 Nolan and May suggested that the unexpected property, if it was "significant" in some way, relative to the expected properties, might result in patentability. Accordingly, the CCPA in these cases explicitly balanced the significance of the unexpected against the expected properties.

Although the balancing approach of Nolan and May appeared readily applicable to the particular facts of those cases, the law provides little guidance or clarity as to what general type of factors are involved in such a balancing, or the relation of such factors to the basic principles of the patent system. (The general and vague idea of balancing has commonly been associated with determining obviousness. [n39]) In the absence of clearer guidance, such a balancing amounts to little more than the broad holding of *In re Papesch* [n40] that all the evidence regarding the properties of an invention, both expected and unexpected, must be fully considered and weighed and/or the holding of *In re Ruschig* [n41] that the need to provide patent protection for significant contributions to the art (including the discovery of unexpected properties) must be balanced against the possibility of preventing the skilled artisan from using the claimed structure for its expected properties.

Was the methodology in May peculiar to its particular facts or was the basis of a general formula or approach created? This paper will next address one previously proposed answer to this question, the original concept of relative significance.

*235 B. The Concept of Relative Significance Revisited

The term "relative significance" has been generally credited to G.A. Blodgett, based on an article published in 1981 in the *Journal of the Patent Office Society (JPOS)*. [n42] It was evidently an influential article, for with respect to the recent controversies regarding *In re Wright* [n43] and *In re Dillon*, [n44] two articles (by PTO members) in the *JPOS* assumed that it was proper to apply a "relative significance" approach on the issue of obviousness. One of the articles, by Rollins, a member of the PTO Board of Patent Appeals and Interferences, suggested that, as a rule, the burden was on the applicant to establish the relative significance of the unexpected properties versus the expected properties. [n45] Rollins cited Blodgett's article on relative significance for having "extensively analyzed" the concept of weighing both the unexpected and expected properties or results of an invention in the determination of obviousness.

Rollins stated, with reference to the *Wright* case, as follows:

By holding that the expected beneficial property of increased visibility was not "pertinent," the Court seems to have avoided the process of weighing the relative significance of the expected property of increased visibility with the expected property of increased "pitch measuring capability," or, for that matter, the process of determining whether the pitch measuring capability was in fact unexpected. . . The weighing process would have been interesting. . . There is no indication that the Court considered the rule that the burden is generally on the applicant to establish the significance and unexpectedness of results offered in support of patentability. There certainly seems to be nothing in the Wright record concerning the relative significance of greater bubble visibility and insensitivity (ability to measure larger deviations at the expense of measurement of small deviations). [Emphasis added] [n46]

Rollins thus referred to the "rule," which he believed should have been followed by the Federal Circuit in Wright, that the burden is generally on the applicant to establish the relative significance of the unexpected versus expected properties of the claimed invention.

The PTO's brief, requesting in banc review of both Dillon and Wright, proposed that, in each case, the "relative significance" of the unexpected *236 and expected properties of the invention must be balanced. For example, the PTO Solicitor, regarding Dillon, stated:

The majority did not appear to balance the improved corrosion and freezing advantages expected from the prior art vis-a-vis appellant's claimed advantage of less pollution. . . Likewise, the majority decision conflicts with *In re Lintner*, *Nolan*, and *Solder Removal*, which require an evaluation of the relative significance of expected and unexpected advantages. The majority evaluated the significance of the unexpected advantages to the exclusion of expected advantages. . . . [n47]

Appellant, however, has presented no evidence from which an evaluation can be made of the relative significance of engine corrosion, value problems due to water freezing, and particulate reducing during combustion of fuel. . . . [n48]

We read *Lintner*, consistent with *Solder Removal*, to require an evaluation of the relative significance of expected and unexpected properties; we have not been able to find that relative significance analysis in either the Wright opinion or the majority opinion in this case. [n49] [emphasis added]

Similarly, but more broadly speaking, the AIPLA amicus curiae brief in Dillon, stated:

A key to a correct answer of the obviousness inquiry is analysis of all the evidence, followed by a proper balancing of that evidence. . . . [n50] [[emphasis in original]

Amicus is. . . concerned that . . . the panel majority's test will result in the grant of patents on compounds or compositions solely on the basis of the discovery of a relatively insignificant property or solution of a relatively insignificant problem. [n51] [emphasis added]

Before discussing the reaction of the Federal Circuit, in Dillon, to these relative significance arguments, it is first appropriate to review the original relative significance concept. The concept, as described by Blodgett was based largely on the three CCPA decisions of *In re May*, [n52] *In re Nolan*, [n53] and *In re Ruschig*. [n54] Blodgett stated

in the introduction *237 to his paper that, although "[c]ourts have neither fully articulated nor fully justified the concept [of relative significance]. . . [it] is the purpose of this paper to seek to do so." [n55] Blodgett apparently viewed the concept of relative significance as a frequently unarticulated or sub silentio analysis of obviousness under 35 U.S.C. 103, even in decisions that never mentioned it. Based on the articles written on Wright and Dillon in the JPOS, it appears that some decision-makers in the PTO may also be using this approach as an unarticulated sub silentio approach to obviousness, thereby setting the burden of proof in patent cases.

The original relative significance concept was conceived by Blodgett as (1) a necessary and sufficient test or requirement of patentability, at least with respect to "structurally obvious" compounds, which (2) placed a general burden on the applicant to prove greater significance of the unexpected properties compared to the expected properties associated with his invention.

In his article, Blodgett concluded that, "In essence, a person who discovers a new compound may obtain a patent on the new compound if and only if the person can show that the properties and uses of the new compound are of greater significance than the significance of what would have been expected of the new compound in view of what was known about properties and uses of the old compound." [n56] In the case of inventions having properties in common with the prior art, this appeared to mean that the unexpected properties must have greater significance than the expected properties. [n57] Blodgett also stated that, "In general, the concept holds that a novel but structurally obvious compound is patentable if the properties and uses of the compound are socially or commercially more significant than the properties and uses which would have been expected of the compound from knowledge about structurally similar prior art compounds. [n58] Moreover, Blodgett stated, "In applying the test of relative significance, applicant must remember *238 that the following common sense assumptions will be applied in the absence of evidence to the contrary[:] the significance of the [expected use] is equal to the significance of [the unexpected use]." [n59]

Having reviewed the original concept of relative significance, it can be seen that the Federal Circuit, in Dillon, appears to have taken an approach that can be viewed as a variation of Blodgett's concept of relative significance. The Federal Circuit specifically faulted Dillon for not arguing "the relative importance of the claimed compositions compared with the prior art." [n60] The Dillon in banc decision was, in major *239 respects, close to the PTO Solicitor's view of relative significance, as quoted above. However, the dissent, in Dillon, believed that the majority derived its "relative importance" criterion from the AIPLA brief. [n61]

Blodgett's concept of relative significance was not fully adopted by the Federal Circuit in Dillon. The Federal Circuit approach was more flexible. It did not apply its "relative importance" criterion as a necessary or sufficient test, as proposed by Blodgett. However, in one important respect, the Federal Circuit approach may be more stringent than Blodgett's relative significance test. The Federal Circuit, in Dillon, suggested that, not only is the relative significance or importance of unexpected property a factor, but the

"significance" of the prior art compositions and use must be "so lacking" that there is "no motivation for others to make obvious variants." [n62] Although unclear, the Dillon approach might be interpreted as similar to what Blodgett, in his article, described as a two step relative significance approach, which he based on *In re Murch*. [n63] Blodgett stated:

First, it must be established that the predictable aspect of the claimed invention is not significant in relation to the prior art. . . . In the second step, applicant must establish that the social significance of his claimed invention, as a whole, is greater than (or perhaps equal to) the social significance of that which would be taken out of the public domain. [n64]

Blodgett, in his article, had questioned whether the first step, establishing a lack of significance of the expected property, should be necessary in addition to the second step, establishing the relative significance of the unexpected property versus the expected property. [n65]

As explained in the next section of this paper, this author's position is that the concept of relative significance, either as defined by Blodgett or as, in various versions, applied by the PTO or the Federal Circuit, has some basic problems. The author is of the view that there should be no general burden on the applicant, with respect to *prima facie* obvious compounds or otherwise, to prove the greater significance of the unexpected properties compared to the expected properties. Various criticisms of the original concept of relative significance will be *240 discussed. In a later section of this paper, a revised concept of relative significance, which addresses these criticisms, will be proposed.

C. A Critique of the Original Concept of Relative Significance

The original concept of relative significance can be faulted for a number of reasons. Following are six basic criticisms.

1. There is no legal basis for the concept of relative significance as a general requirement of patentability or as a general presumption disfavoring the applicant for a patent.

As formulated by Blodgett, the original concept of relative significance, was a general presumption, at least with respect to "structurally obvious" compounds, that would always go against the applicant or patentee (would have favored a Patent Office rejection or invalidity of a patent in an infringement suit) when both expected and unexpected properties were allegedly present. The original concept would assume that the invention was obvious, unless the applicant or patentee could prove that the significance of the unexpected properties was greater than that of the expected properties. Such a presumption can be viewed as the opposite of another invalid presumption, the infamous "rule of doubt." [n66] Now defunct, the "rule of doubt" was a general presumption that doubts as to the patentability of an invention should be resolved in favor of a patent

applicant. In contrast, the concept of relative significance would resolve doubts against the applicant.

According to Blodgett, the applicant should be required to show greater relative significance of the unexpected properties vis-a-vis the expected properties. However, such a requirement or presumption, to be valid, must have some basis in the law. The relative significance test is not found in Constitutional or statutory law. Such a test is not found in 35 U.S.C. 103 nor *Graham v. Deere*. No patent court has explicitly stated that the applicant needs to show greater significance or importance of the unexpected properties of an invention relative to the expected properties of the prior art. *May* and *Ruschig* merely mentioned balancing the significances. *Nolan, supra*, mentioned the absence of equal or greater significance of the unexpected property. Although Blodgett showed that the factors involved in relative significance were considered, *241 or even dispositive, in a few cases, most notably *In re May*, this should not be sufficient to elevate it to a general requirement of law, as a necessary and sufficient test of patentability with respect to *prima facie* obvious compounds.

2. The term "significance" is not satisfactorily defined and overly vague.

According to Blodgett, as indicated above, the inventor must show that the "significance" of the unexpected property of an invention is greater than the significance of the expected properties. Yet, how can this burden fairly exist when the term "significance" has no clear or definite meaning? The Federal Circuit's use, in *Dillon*, of the term "relative importance" is no better. Blodgett defines the "significance" of an unexpected property of an invention as its commercial and social significance. How does one measure that kind of significance? Not only is it very subjective, but, unlike obviousness, it is not within the general expertise of the PTO. Moreover, since the vast majority of inventions before the PTO have never, as yet, been commercialized, the commercial and social significance would be highly speculative. One author has noted this problem as follows:

Relative significance as a tool in determining patentability is not without complications. The weighing process suffers from time constraints. Over time, the significance of an expected result may diminish as technology advances and the unexpected result becomes more significant. Further, it would be presumptuous to predict the impact on the art of any unexpected result. The analysis can be very subjective. People with different instinctive feelings or backgrounds can come to different conclusions. [n67]

In addition to the subjective and speculative nature of the commercial and social significance of new inventions, the term "significance," as employed by Blodgett, is so vague as to offer little guidance to a decision-maker in determining obviousness. It may also be confusing, since it encompasses distinct concepts. What is really of importance is the significance of the invention as a whole, not just each of the properties. As we shall see, the significance of the invention as a whole depends on both the significance of its properties and its structure.

3. In most cases, the relative significance of the properties of an invention is not amenable to proof; an insurmountable burden may thereby be unjustly placed on an applicant or patentee.

According to Blodgett, as indicated above, if a compound or composition is structurally obvious or prima facie obvious, the inventor must show that the significance of the unexpected property of an invention is greater than the significance of its expected property or properties. *242 Similarly, the Federal Circuit in *Dillon* in banc faulted *Dillon* for not successfully arguing the relative importance of the claimed compositions compared with the prior art. However, such a burden on an inventor seeking a patent may be insurmountable. Given the speculativeness and subjectivity of the "significance" of an invention, as explained above, it may be difficult or impossible to prove the relative significance of the properties of an invention. This may be true, in many cases, even if an invention is worthy, i.e., has made a significant contribution to progress of the useful arts. For example, in *In re Wright*, [n68] involving a carpenter's level, the concept of relative significance would have required the applicant to prove the relative significance of increased visibility versus increased pitch-measuring capability. In the case of *In re Dillon*, [n69] involving a fuel composition, the concept would have required the applicant to somehow prove the relative significance of the fuel being dewatered versus the fuel having reduced soot emissions. However, there may have been no way to prove that the unexpected property of soot reduction is more significant than the expected property of dewatering. Comparing unexpected to expected properties of an invention may be like comparing apples and oranges. The PTO, in its brief requesting in banc review of *Dillon*, stated that *Dillon* had "presented no evidence from which an evaluation can be made of the relative significance of engine corrosion, valve problems due to water freezing, and particulate [soot] reducing combustion of fuel." [n70] One wonders what evidence would have satisfied the PTO or the Federal Circuit.

In the typical absence of objective proof, the value of speculative arguments or evidence, regarding the relative significance of the properties of an invention, may be in the eye of the beholder. When the beholder is a patent examiner, he may prefer the significance of the expected property he found in the prior art. Blodgett's relative significance concept may place the inventor at the mercy of the subjective impression of the examiner.

In many cases, it is believed that the properties of an invention will be neither far more significant nor far less significant than the expected properties. In many cases, it may be a close call. Since a patent examiner's rejection may very well be upheld under *Dillon* or under a clearly erroneous standard, if the examiner does not articulate an incorrect standard of patentability, the presumption that is assumed by the concept *243 of relative significance could have a very significant effect on a large number of "middle of the spectrum" or relatively close cases.

4. The original concept of relative significance is flawed because it fails to consider the invention as a whole, including both structure and function, contrary to 35 U.S.C. § 103.

Blodgett's concept of relative significance is basically flawed because it cannot take into account the relation between the structure and function of an invention, which is essentially a seamless web in the determination of obviousness. The consideration of differences in structure, between the invention and the prior art, cannot be kept in isolation from the consideration of differences in properties or function.

In determining obviousness, the weighing of such differences in properties and structure is generally a sliding scale or continuum. In some cases, at one end of the spectrum, when structural differences are greater, then lesser functional differences may suffice for patentability. On the other hand, when structural differences are lesser, then the functional differences may need to be greater in order to establish patentability.

Contrary to Blodgett's original theory of relative significance, even if the expected and unexpected properties of an invention are of apparent equal significance, whatever that may mean, there is no reason why a difference in structure should not potentially be able to tip the scales in favor of the patentability of the invention. The concept of relative significance, however, does not allow for this, always mandating that the unexpected property must have greater significance than the expected properties. According to Blodgett's theory, either no evidence of the relative significance of the unexpected properties is required (if the invention is "structurally nonobvious" or not prima facie obvious) or the significance of unexpected property must be greater (the invention is "structurally obvious" or prima facie obvious). The original relative significance fails to take into account the middle ground (between zero evidence and preponderant evidence of significance) in considering both structure and function or the invention as a whole.

Another way of viewing Blodgett's concept of relative significance is that it suffers from the fallacy of treating an "obvious structure" as if it actually existed in the prior art, rather than a mere possibility. The concept of relative significance concludes that if the claimed structure passes the threshold of "structural obviousness," thereafter only the relative significance of the properties are considered, the structural differences no longer entering into the formulation. It fails to treat obviousness as a whole, in the final analysis.

*244 5. The relative significance concept fails to recognize that the significance of the expected properties is a mere possibility.

For reasoning similar to the above, the premise of the original concept of relative significance is flawed. Blodgett justified his relative significance balance on the public policy grounds that what the inventor has contributed to the useful arts (the significance of the unexpected properties) should be greater than what is allegedly being taken out of the public domain (the significance of the expected properties). [n71] While, on first impression, seemingly logical, this premise fails to take into account the fact that the use of the claimed structure, for the purpose of obtaining the expected properties, is merely a possibility, surmise, or contention (the issue is obviousness, not novelty). If a balance is to be made, it must be realized that the significance of an actual or existing (100 percent probability) contribution is being balanced against the significance of a mere possibility (perhaps considerably less than 100 percent probability) of withdrawing resources from

the skilled artisan. Blodgett's theory fails to clearly take this into account when balancing the significances of the unexpected and expected properties.

6. The original concept of relative significance is an oversimplification and overgeneralization.

Blodgett's concept of relative significance, by reducing the issue of obviousness, in cases of structurally obvious compounds, to a simple weighing of the relative significance of properties, is an oversimplification as a test of obviousness. As indicated above, it fails to take into account the relation between structure and function. The various diverse factors that might enter into the patentability or unobviousness of the invention as a whole are forced to reside within the broad rubric of the ill-defined "significance" of the unexpected properties.

A narrower concept of relative significance would be easier to justify, for example, if it were formulated in the reverse: if the significance of the unexpected property or result is far less than that of the expected result, then it is evidence of obviousness, because one of ordinary skill in the art would be motivated, relatively speaking, to practice the claimed structure of the invention for the expected property. However, such a factual situation would be unusual. The CCPA in *Solder Removal Co. v. United States Int'l Trade Commn.*, [n72] conversely stated that, *245 "Where the reason for the practice suggested by the prior art is much less significant than the reason derived from the inventor's solution to another problem, the results may be so unexpected as to support a conclusion of nonobviousness." [n73] [Emphasis added]

IV. A Revised Two-part Relative Significance Concept in Determining Obviousness

A. Introduction

The concept of relative significance is apparently appealing to some decision-makers, as shown by its influence. It may be because decision-makers feel a need for more guidance on how to weigh or balance the various factors, including the various properties of an invention, in the multifaceted and, to some extent, amorphous determination of obviousness. Perhaps the appeal of the concept of relative significance, to some PTO decision-makers, is that it is easy to apply: unless an applicant carries the burden of showing the greater significance of the unexpected properties of an invention versus its expected properties, then the applicant loses.

However, despite the simplicity of the original concept of relative significance, there is no simple formula, no general solution to determining patentability in cases of inventions having both unexpected and expected properties. There is no way to avoid carefully balancing all the relevant and countervailing facts of a case in determining obviousness. Even so, it may not be possible to clearly resolve all cases, which may unavoidably result in the greater influence of subjective factors.

Certainly, some of the considerations that led to the original concept of relative significance have merit. It is certainly true that, if possible, it is in the inventor's favor to show and emphasize the significance of his contribution to the art, which may reside to a large degree in an unexpected property (the significance of the unexpected property). It is also true that the less important, the less significant an expected property of an invention, relative to the inventor's contribution, the better the inventor's case before an examiner or judge. A revised concept of relative significance may be useful, not as a test, but as one possible consideration in determining nonobviousness. Such a revised concept of relative significance is proposed below.

B. In re May Re-Analyzed

It is helpful to reconsider the facts in *In re May*, [n74] in which the unexpected property of non-addictiveness in a drug was accorded great weight *246 vis-a-vis the expected property of analgesia. On the one hand, the court pointed to several factors as enhancing the weight of the unexpected property. They included: (1) the social value of the unexpected property; it would allegedly eliminate a major medical problem, the addictiveness of morphine [n75] and (2) affidavit evidence of a systematic study of numerous apparently equivalent compounds. The study showed that out of 21 compounds, which would also be expected to have analgesic activity in view of the prior art, only two possessed the unexpected property of non-addictiveness.

On the other hand, the court in *May* did not attach much weight to the significance of the expected property (analgesia) of the invention. There were numerous other known or available compounds, including isomers, homologues, and analogues of the prior art compound, which possessed the expected property. Other compounds, apparently equivalent or better in terms of analgesia alone, were generally available to persons of ordinary skill in the art. There was relatively little need for the person of ordinary skill in the art to obtain the claimed (inventive) structure solely for its expected property. The court stated:

[We] regard the above findings. . . as uncontroverted evidence that the *raison d'etre* for research by those skilled in the art was, and still is, not simply to produce another analgesia compound, but to produce one which would exert this therapeutic value while at the same time being non-addictive. This, in our view, diminishes the significance that should be attached to the expected beneficial result of potent analgesia. . . and enhances the significance that should be attached to appellant's unexpected result of non-addictive, potent analgesia. . . . [n76]

The above facts in *May* suggest a revised concept of relative significance, as explained below.

C. A Revised Relative Significance Concept

As mentioned in the last section, the court in *May* stated that the significance of the unexpected property (non-addictiveness) was "balanced against" the significance of the expected property (analgesia) of the claimed compound. The court did not weigh heavily the significance of the claimed structure as merely "another analgesia."

Consistent with the above, it is proposed that a more precise interpretation of the facts of *May* and similar cases, as well as a more useful approach to address the balance between patentability and what belongs in the public domain, would involve a two-part relative significance concept. *247 This concept would involve weighing or balancing both the significance of the unexpected property relative to the significance of the expected property and the relative significance of the claimed structure for (the purpose of) obtaining the expected property versus the unexpected property. The significance of a property per se would therefore be moderated by a second factor, the significance of the claimed structure for obtaining the property. In the case of an invention having an unexpected property P sub1 and an expected property P sub2 , four different factors may thus be involved: (1) the significance of the unexpected property (abbreviated SP sub1); (2) the significance of the expected property (abbreviated SP sub2);(3) the significance of the claimed structure for the purpose of obtaining the unexpected property (abbreviated SS sub1); and the significance of the claimed structure for the purpose of obtaining the expected property (SS sub2). In terms of a formula, this two-part relative significance concept may be written as follows:

$$(SP \text{ sub1 }) (SS \text{ sub1 }) \text{ v. } (SP \text{ sub2 }) (SS \text{ sub2 })$$

The left side of the latter formula can be generally related to the inventor's contribution to the art. The right side can be generally related to the possibility and potential significance of diminishing the resources of the skilled artisan.

The significance of a property per se may be simply defined as its usefulness in general. This would include either its potential or actual social or economic usefulness. [n77]

By significance of the claimed structure for obtaining a property is meant the need of the claimed structure relative to other non-claimed known or obvious structures, for the purpose of obtaining the property. This could be alternatively defined as the motivation or lack thereof for the skilled artisan to obtain the claimed structure, relative to other non-claimed structures, for the (purpose of) obtaining the property.

The significance or need of the claimed structure for obtaining a property, either unexpected or expected, would rationally involve the existence, number, and availability of known or obvious equivalent or alternate structures, in the prior art and public domain, for obtaining that *248 property. [n78] The evaluation of such factors would generally be made from a pre-invention perspective, in accordance with 35 U.S.C. 103.

The significance of a structure for obtaining expected properties is to some extent commonly ascertained by decision-makers in determining the obviousness of inventions. For example, in *May*, discussed supra and infra, it was clear that the significance of the claimed structure for obtaining the expected property of analgesia was relatively low. The

evidence was that there were numerous other known or obvious compounds having the expected property of analgesia. Such compounds were either equivalent or superior, in terms of the expected properties alone. They were readily available. Just another analgesia was not greatly needed.

Applying the two-part relative significance formula to the facts of May, we can see that the significance of the unexpected property of non-addictiveness (SP sub1) was high. Although the significance of the expected property (SP sub2) of potent analgesia per se was also highly significant, it is believed that the CCPA "factored in" that the significance of the claimed structure for obtaining this expected property (SS sub2) was relatively low. The person of ordinary skill in the art could readily, relatively speaking, have obtained another compound comparable or equivalent, if not better, to May's claimed compound merely for the expected property of analgesia. In other words, there was relatively little motivation to obtain the claimed structure in May for the expected property.

The significance of a structure for obtaining unexpected properties may be, relatively speaking, less readily ascertained. In May, it was clear that there was a need for an analgesic drug that had the property of non-addictiveness; it solved a problem. Clearly there were not many available equivalent compounds in terms of non-addictiveness. In general, the fact that the claimed structure had been sought for the purpose of obtaining the unexpected property is evidence of the significance of the claimed structure. In general, evidence of a "problem solved" may be probative of the significance and uniqueness (non-equivalence to prior art structures) of the claimed structure for obtaining the unexpected property or properties.

As discussed in section D below, the revised two-part relative significance concept can be used to better balance, on the one hand, the need to adequately reward inventors for their contributions to the useful arts against, on the other hand, the possibility of preventing skilled artisans from practicing what is in the public domain. Such a balance has been expressed by the Supreme Court, in interpreting the Constitutional patent clause, and by the CCPA, in interpreting 35 U.S.C. 103.

According to the proposed two-part relative significance concept, even if, in a given case, the significance of an unexpected property (SP sub1) of an invention were less than the significance of an expected property (SP sub2), then a grant of a patent could still provide a net benefit to the public, if the significance of the claimed structure for obtaining the expected result were low. Assume that if the claimed structure were the only (unique) means of obtaining a property P, then the significance of the claimed structure (SS) would be assigned a value equal to 1 on a scale of zero to one (0 to 1). Then, based on that scale, consider the following hypothetical. The significance of the claimed structure for obtaining the unexpected property (SS sub1) is equal to 1 (the claimed structure is the only means of obtaining the unexpected property) and the significance of the claimed structure for obtaining the expected property or result (SS sub2) is 1/10 on the same scale (For example, there were 250 many equivalent, or even superior, alternate structures for obtaining the expected property). Then, even if the

significance, or potential usefulness, of the unexpected property (SP sub1) in general were 1/2 that of the expected property (SP sub2) and even if it were prima facie obvious to use the claimed structure for the expected property, the public may potentially have a large net usefulness gain or benefit by means of the invention. Also, it is to be remembered that granting a patent in view of such a public gain deprives the public of nothing it actually had, but only of a mere possibility.

As another example, a decision-maker may "instinctively" feel that the significance of the claimed structure for the expected property (SS sub2) is very low because the art is crowded and there are apparently numerous equivalent means of obtaining the expected properties (the skilled artisan would not be motivated to obtain the particular claimed structure for the expected property). For example, a claimed compound may be a single species in a large prior art genus or Markush group. Then the relative significance concept may in effect be reduced to merely ascertaining that a significant or useful unexpected property (SP sub1) exists.

As described above, the proposed two-part relative significance concept is not a test, sub-test, or requirement of patentability. It is merely a set of considerations or factors, among possible others, which may be weighed in determining obviousness, in cases of inventions having both unexpected and expected properties. This proposed concept may serve as a possible analytic guide to assist the decision-maker to recognize and balance a multiplicity of pertinent countervailing factors in a case. As we shall see in the following sections, this proposed relative significance concept can be readily applied, in determining obviousness, to the facts of two recently controversial cases, *In re Wright*, [n79] in the mechanical area, and *In re Dillon*, [n80] in the chemical area. We shall also see that the proposed two-part relative significance concept is applicable to claim drafting and the presenting of rebuttal evidence to prima facie obviousness during patent prosecution. Finally and most importantly, we shall see that the proposed two-part concept of relative significance, within the boundaries of 35 U.S.C. 103, can better fulfill the purpose of the Constitution regarding patents. Unlike the approaches in the case law, it can rationally and effectively address the issue of balancing what belongs in the public domain against what deserves or justifies the grant of a patent.

*251 1. The PTO Expertise in Relative Significance

In determining the obviousness of an invention having both unexpected and expected properties, a decision-maker may typically weigh the relative usefulness of the unexpected versus the expected properties of the invention. However, as a general matter, it is believed that decision-makers in the Patent Office may also, explicitly or not, weigh the relative significance (or insignificance) of the claimed structure for obtaining the expected versus unexpected properties. For example, if the art to which the invention pertains is crowded, this might suggest the ready availability of many alternative prior art structures for obtaining the expected properties, [n81] and the consequent insignificance of the claimed structure for that purpose. This might be particularly true when the claimed invention is in a mature industry; not only might the art be crowded, but many of

the patents may have expired. On the other hand, the case may be that there are only a limited number of ways, needed to achieve a certain expected property, one of which may be the claimed structure. This may be particularly true in an emerging area of research, where it may be possible to obtain broad coverage to an essential basic technological process or means. Such coverage may be deserving for a pioneer invention, or it may not be deserving when the claimed invention makes obvious use of relatively recent developments in the art.

In some fields of research, such as systematic pharmaceutical research, exemplified by *In re May*, discussed supra, the fact that numerous alternative or equivalent structures are available for obtaining the expected property of an invention, may be readily amenable to presentation by the inventor to the decision-maker. This may take the form of statistical or other objective evidence, for example, by showing that the inventor, as one skilled in the art, actually tested many numbers of compounds, all potentially available to the public, which compounds were apparently equivalent to the prior art in terms of expected properties. In other cases, determining the significance of a claimed structure for achieving an expected property of an invention may be more a matter of general impression, especially by one who is familiar with the relevant art and *252 its patents and who represents the person of ordinary skill in the art, for example, a patent examiner. [n82]

In contrast to a patent examiner, a judge in a case, having no prior knowledge or familiarity with the pertinent art, is not representative of the skilled artisan. The judge will typically review only a selected few patents, which are presented by the PTO or an infringer, as the case may be, which patents allegedly render the invention obvious. Accordingly, unless adequately informed by the parties in the case, the judge may not be able to get a sense of the significance or insignificance of the claimed structure for the expected property. A limited sample of a few patents may not very well reflect whether the art is crowded or the availability of alternative structures for obtaining the expected properties. In contrast, an examiner may be more aware on a first-hand basis that certain limitations in a claim may make it quite easy for one of ordinary skill in the art to obtain the expected properties by means of a non-infringing structure. Alternatively, the patent examiner may believe, based on his familiarity with the art, that the applicant is trying to unduly preempt some new or emerging area of development.

In view of the above, evaluating the significance of a claimed structure for obtaining a property is generally within the expertise of a patent examiner as one of ordinary skill in the art. Since the patent examiner is well adapted to be aware of both sides of the relative significance balance, this would add justification to the deference normally given the PTO by the courts, according to which, in regard to factual findings, the Federal Circuit will not reverse the PTO unless its conclusions are "clearly erroneous." [n83] The affirmance statistics for the Board of Appeals reflect a high degree of deference to the expertise of patent examiners. The statistics for the Federal Circuit, and previously the *253 CCPA, also reflect a reasonable degree of deference to Patent Office determinations. [n84]

As an illustration of the effect in practice of the proposed two-part concept of relative significance, it is well-known that patent prosecution is often a compromise between the applicant and the patent examiner. The examiner typically may want more limitations in the claims in order to better distinguish over the prior art. These limitations typically may have the effect of more easily allowing persons of ordinary skill in the art to obtain the expected properties of the claimed structure by means of a related non-infringing structure, by merely dropping a limitation from the claims. [n85] In contrast, the applicant usually wants as few limitations in a claim as possible, and seeks the broadest, strongest "iron-clad" claim possible, a claim that cannot be designed around. A typical compromise involves incorporating only "critical" limitations, which are both necessary to achieve the unexpected properties of the invention and unnecessary to achieve solely the expected properties of the prior art. The matter of introducing certain limitations to a claim may be related to the reduction of the significance of the claimed structure for an expected property. To wit, if a person of ordinary skill in the art could obtain equivalent expected properties in another non-claimed structure, by eliminating any one or more of the structural differences expressed as limitations in a claim (which limitations may be considered by applicant to be critical to what the applicant considers the invention), then the significance of the claimed structure for obtaining the expected properties would generally be relatively low. Therefore, the invention may be patentable, even without a high relative significance of the unexpected properties versus the expected properties.

2. Application to In re Wright

In the recent controversial decision of *In re Wright*, [n86] the Federal Circuit held patentable a new structure for a carpenter's level that had the unexpected property of enhanced pitch-measuring capability. As is *254 familiarly known, a carpenter's level is an elongated rectangular instrument, having embedded in its top mid-section a transparent vial containing a bubble in a liquid. When the bubble is centered, the surface being measured by the instrument is level. The Wright invention comprised the combination of a vial with a barrel-shaped inside surface and a core pin centered in this vial. A barrel-shaped vial by itself was disclosed in one prior art patent (to Vaida). The core pin was disclosed in a second prior art patent (to Bishop). In the latter patent, however, the core pin was centered in a cylindrical-shaped vial and used to improve the visibility of the bubble (the expected property). Although Wright's new structure might be said to be a combination of elements that had been in the prior art, there was no suggestion in the prior art that this combination, if made, would have the unexpected property discovered by Wright of enhanced pitch-measuring capability. The court held the invention patentable, with the explanation that there was no suggestion or motivation to make this combination in order to solve the problem of increasing pitch-measuring capability.

Several commentators, reading the Wright decision, have been troubled or dissatisfied by the court's over-ruling the PTO's determination of obviousness. This dissatisfaction may have been due to the court not articulating sufficient concern or consideration for the possibility that a patent on the claimed structure might be withdrawing from the public

domain the use of the claimed structure for the alleged non-inventive purpose or property of increased visibility. The Wright decision leaves the reader in the dark regarding the significance of the claimed structure for the expected property of increased visibility. For example, was Wright's vial of significance to the person of ordinary skill for obtaining the expected properties, including increased visibility? Were there many other non-claimed alternate levels for achieving this property? Or was there a reason that the barrel-shaped vial and core pin combination might have been preferred for the expected properties? At the time of the invention, what would have been the motivation of the person of ordinary skill to use a barrel-shape versus another shape in a level and what would have been the motivation to increase visibility by means of a core pin? Various authors have commented on these kinds of issues. These questions or considerations may have been, and to some extent, probably were considered by the PTO and the Federal Circuit in their respective determinations of obviousness. However, it was not clearly articulated by either the PTO or the Federal Circuit in the Wright case.

Various articles written on Wright include comments which can be related to the significance of the claimed structure for obtaining the *255 expected property. One author, Lastova, [n87] took the extreme position that Wright's invention, to be patentable, should have been incapable of providing increased visibility. In other words, Lastova would have stringently required that the significance of the claimed structure for obtaining the expected property of increased visibility must be zero.

Another author Welsh [n88] suggested that the unspoken critical factor that influenced the court "wasn't whether Wright's level had improved visibility, but rather whether all levels [disclosed in the prior art reference teaching a barrel-shaped vial] having a rod to improve visibility as taught by [[the second prior art reference] would necessarily have the claimed features identified by Wright!" [n89] Welsh contended that certain claim language might have required pitch-measuring markings which were unique to the invention. Eliminating these markings would have permitted non-infringing barrel structures having only the expected properties. If Welsh was correct, it would have suggested that the relative significance of Wright's claimed structure for obtaining the expected property was relatively low.

However, contrary to Welsh's contention, the Patent Office was of the view that it may not have been possible to use a barrel-shaped vial with a corepin, in a level, for the purpose of increased visibility without infringing the claimed structure. Based on the available facts, it is not clear whether the Patent Office or Welsh was correct on this factual issue.

Comments on Wright have also been made which can be related to the significance of the expected property, as compared to structure. One author noted that "From the fact that the Bishop patent was issued in 1904 and the inner-pin structure had apparently not become conventional, one might doubt whether Bishop's technique for increasing visibility revolutionized the art." [n90] Appellant Wright had likewise argued the insignificance of the expected property, stating:

The Commissioner does briefly address the possibility that pitch range enhancement was an unexpected result by challenging its relative significance: "We submit that the reasons for combining the references suggested by the prior art are equally 'significant' as the reason derived from the appellant's solution to the pitch range problem. Appellant has not shown otherwise." (CMR 12.) The fact of Applicant's development and the present application belies any suggestion that pitch range is not a contemporary and significant problem. Against this, is Bishop's early 20th Century teaching of a solution to a bubble visibility problem, which, at the very least, has not *256 been shown to exist in modern vials. In any event, as far as Applicant can ascertain, no one has ever constructed a vial in accordance with the teachings of Bishop notwithstanding that this patent issued over a half century ago. It's hard to find any significance in Bishop's bubble visibility teaching, much less an equality of significance. [n91] [emphasis added]

In other words, Wright argued that if the expected property (bubble visibility) had been significant, then there would have been an incentive (or motivation) for the ordinary artisan to have obtained it since 1904. Similarly, the fact that barrel-shaped vials were conventional since the 1960's also suggests that the introduction of barrel-shaped vials did not make the use of a core pin for the expected property of increased visibility any more significant, since otherwise there would have been motivation or incentive for one of ordinary skill to have obtained it, over the approximately quarter century period that both the barrel-shaped vial and the core pin were available. In contrast, the fact that the claimed structure solved a significant and contemporary problem confronting the inventor suggested the unexpected property was significant.

Although not discussed by the Federal Circuit in the Wright decision, Appellant's brief revealed some interesting facts, which may have influenced the court, regarding the significance of both the expected properties and the claimed structure for obtaining the expected properties. The Appellant Wright explained, in a chronological overview of level vial technology, that the "barrel shaped" inner surface vial (referred to in the art as an "axially-symmetric" vial), when developed in the 1960's, had experienced immediate commercial success. [n92] (Therefore, this "barrel shaped" vial was per se quite a significant structure in the art.) Also in Appellant's brief, however, was an affidavit which presented evidence that "(1) bubble visibility is not a problem in conventional axially-symmetric [barrel-shaped] vials; and (2) the core pin in its vial, made in accordance with the claimed invention, does not improve bubble visibility." [n93] Applicant submitted samples of barrel-shaped vials, both with and without the core pin, to demonstrate the absence of visibility improvement, point (2) above.

In summary, in applying the author's proposed two-part relative significance concept to the facts of Wright, the significance of the unexpected property of increased pitch-measuring capability, as well as the significance of the claimed structure for obtaining the unexpected property, was apparent. The invention solved a significant and contemporary problem. On the other hand, there was substantial doubt as to whether *257 the expected property of increased visibility was a significant property in the claimed structure. Even by Dillon in banc standards, the applicant may have shown the prior art use lacked significance, based on the affidavit evidence. Another critical factor, as discussed above,

may have been that the significance of the claimed structure for obtaining the expected property was relatively low, if non-infringing structures could have been obtained for that purpose, as suggested by Welsh. More broadly speaking, it could also be said that the inventor's contribution (and the need to adequately reward the inventor therefore) clearly outweighed the possibility that one of ordinary skill would have been motivated to obtain the claimed structure for the expected property of increased visibility.

3. Application to *In re Dillon*

In the year following the *Wright* decision, a Federal Circuit panel, in *In re Dillon*, [n94] held patentable a new chemical composition, directed to hydrocarbon fuel compositions containing certain tetra-orthoester compounds for the reduction of soot emissions. Several prior art patent references disclosed tri-orthoesters. One patent ("the Sweeney Patent") was directed to a fuel composition comprising a hydrocarbon, an alcohol, and a tri-orthoester, the latter for preventing phase separation between the fuel and the alcohol. Another patent (the "Eliot patent") disclosed both tetra and tri-orthoesters for water scavenging (dewatering) hydraulic fluids.

The PTO Board had stated that there was a "reasonable expectation" that the tri- and tetra-orthoesters would have similar properties based on "close structural and chemical similarity" and concluded that the claimed compositions would have been *prima facie* obvious. [n95] Consequently, the Board had held that unless *Dillon* showed some unexpected advantage or superiority of the claimed tetra-orthoester compositions, the claimed compositions were unpatentable for obviousness.

The Federal Circuit panel reversed the PTO, holding that the property or use of reducing soot emissions had not been taught or suggested by the prior art and "no objective teaching in the prior art would have led one of ordinary skill to make the claimed compositions in order to solve the problem that was confronting *Dillon*." [n96]

In vacating the panel decision and affirming the Patent Office rejection, the *in banc* Federal Circuit seemed to have been guided by the *258 possibility that the claimed composition was not limited to the new use and hence a patent, if granted, might possibly prevent the skilled artisan from using the composition for what was considered an obvious use. Unfortunately, the court did not address the other side of the balance, the need to provide adequate reward to inventors for their contributions to the progress of the arts. The court did not discuss the part of the balance involving the significance of *Dillon's* invention (the court never said *Dillon's* invention lacked significance) or consider whether alternative method or process claims would have provided adequate reward.

If, based on the facts of *Dillon*, a balance were made, according to the proposed two-part relative significance concept, then it may have made more sense to grant *Dillon* a patent on her invention. First, the significance of *Dillon's* unexpected property (the reduction in the soot emitted when combusting a fuel) had undeniable usefulness. As stated in the appeal brief for *Dillon*, "The environment has become a source of

overwhelming concern. Solving the problems of air pollution is prime among those concerns . . . Indeed, while this case is pending, Congress is considering a new clean air bill . . . " [n97] The Federal Circuit apparently did not find such arguments entitled to much weight.

On the other hand, the significance of the expected property of dewatering fuels, although advocated by Dillon to be the solution of "a nuisance more than anything else," [n98] could be reasonably viewed as also having substantial significance. Merely balancing the significance of the expected and unexpected properties, as advocated by the PTO and the AIPLA in their briefs, would have been an indefinite and difficult matter. However, if the Federal Circuit had taken into account the significance of the claimed structure (or composition) for obtaining the expected property, then Dillon's position would have been stronger and the balance more clearly resolvable. In fact, the claimed structure had relatively little significance for the purpose of obtaining the expected property. Based on all the evidence, the claimed tetra-orthoester was no better than the prior art tri-orthoester which was available for the same purpose. Therefore, even if Dillon were granted a patent for her contribution to the useful arts, the public would be free to use an equivalent, and probably better, prior art orthoester for the alleged expected property. Moreover, the skilled artisan had shown no desire or motivation, in the 15 years since the prior art Sweeney patent had issued, to design around the known tri-orthoester by employing what *259 the Patent Office viewed as an obvious tetra- orthoester. A similar argument was pointed out by Kayton:

Much is to be gained and nothing lost to the public in a holding permitting issuance of Ms. Dillon's novel tetra-orthoester fuel claims which recite the unexpected soot reduction property. Those claims cannot stop anyone from making, using or selling the prior art tri-orthoester fuel which the public owns, and now better appreciates because of Ms. Dillon's discoveries. [n99]

Furthermore, as mentioned in another amicus curiae brief, "If the tetra- orthoester composition is equal to the known composition, the public can continue using the known one. Of course, if tetra-orthoester is markedly superior for scavaging water, it may have been patentable even for that purpose." [n100]

Applying the proposed two-part relative significance balance, Dillon's contribution to the useful arts and the significance of the unexpected property were entitled to substantial weight. By contrast, even if the significance of the expected property had some usefulness, the significance of the claimed structure for obtaining the expected property was, based on all the facts, apparently lacking.

Applying the proposed relative significance concept to the facts of Dillon has the advantage of rationally taking into account the basic principles of the patent system, as explained more fully below. It is much more meaningful and logical than the inflexible mechanistic approach of the PTO, as supported by the in banc Federal Circuit. The PTO had required proof of an actual difference, regarding soot reducing properties, between the prior art tri- orthoester and the claimed tetra-orthoester. Since the property of soot reduction was not expected in the prior art tri-orthoester anyway, it is difficult to see

much logical relevance in the Patent Office requiring the absence of such a soot property in the prior art compound. Such a requirement has no logical relation whatsoever to the PTO's and the Federal Circuit's expressed concern: that a patent would prevent the public from using the claimed compound for the expected property. Even if Dillon had been able to provide the required comparative data (showing the prior art composition did not have the unexpected property), the skilled artisan still might have been prevented from using the composition for its alleged expected properties.

4. The Application of the Relative Significance Concept to Prima Facie Obviousness and Rebuttal Evidence

The proposed two-part concept of relative significance is useful for analyzing prima facie obviousness and rebuttal evidence, particularly *260 in cases of inventions having both unexpected and expected properties. [n101] The role of prima facie obviousness can be of critical significance in many cases, particularly with respect to chemical compounds. It is more than just a procedural device, for it can substantively and dispositively effect the outcome on the merits. In chemical cases, prima facie obviousness is usually based largely on close structural relationship between a prior art compound and a claimed compound, on the theory that it would be strongly expected that structurally similar compounds would have the same or similar properties and use. If prima facie obviousness is established by the PTO, then the burden is shifted to the applicant.

In cases of prima facie obviousness, an applicant's rebuttal evidence commonly consists of applicant showing actual differences in properties, based on comparative data, between the invention and the prior art. Such actual differences may theoretically be of two kinds: (1) the applicant proves that the prior art structure does not have the unexpected property, or (2) the applicant proves that the claimed structure does not possess the expected property. [n102] Such evidence is commonly viewed as rebutting the assumption of similar properties, between the prior art compound and the claimed compound, the rationale for a rejection for obviousness. The more common proof, showing that the prior art structure does not have the unexpected property, may have a double benefit of contradicting the assumption of common properties and proving that the unexpected property actually exists or, in the case of improvements in the same utility, proving the invention is superior (that is, it has an advantage that the prior art does not have). On the other hand, showing the claimed structure does not possess the expected property may have the double benefit of contradicting the assumption of common properties and showing that the invention does not diminish the resources of the skilled artisan.

According to the proposed two-part relative significance concept, proving that a claimed compound does not possess any of the expected properties *261 of the prior art compound would probatively prove that the significance of the claimed structure for obtaining the expected properties is actually zero. If the applicant were to show that the claimed compound possesses less than all, or a lesser degree, of the desirable properties of the cited prior art compound, then the significance of the claimed structure for obtaining the expected properties may be significantly lowered. Persons of ordinary skill

in the art would not be motivated to obtain a structure inferior to other available structures.

In summary, the proposed two-part concept of relative significance may be useful in developing and evaluating a rebuttal to prima facie obviousness. It may suggest to the applicant that the presentation of certain evidence would logically have probative weight in rebutting prima facie obviousness. It may help the decision-maker to evaluate this evidence by helping him/her to more systematically and inclusively consider all the pertinent factors in determining obviousness.

D. The Relation of Relative Significance to the Constitutional Bases of the Patent System

The proposed two-part concept of relative significance, as a consideration (not a requirement) in the determination of obviousness, is consistent with 35 U.S.C. 103 and *Graham v. Deere*, since any differences (and their significances) between the prior art and the invention, both in terms of structure and function (or structure and properties), must always be considered. This section will address the important relation of the concept of relative significance concept to Constitutional principles regarding the patent system.

The primary purpose of the patent system, as explicitly stated in the Constitution, is to promote the progress of the useful arts. [n103] Necessary corollary principles are (1) the need to reward inventors for their contributions to the useful arts, [n104] and (2) the need to not diminish the *262 resources of the skilled artisan. [n105] Such principles were explicitly considered by the CCPA in *In re Ruschig*, [n106] wherein the CCPA balanced the need to provide adequate patent protection for contributions to the useful arts against the possibility of preventing the skilled artisan from using the claimed structures for its expected properties. [n107]

The proposed two-part relative significance concept can be seen as relating to the above mentioned countervailing principles or policies of the Constitution. It takes into account the inventor's contribution to the useful arts, which contribution may relate to the unexpected properties. It also takes into account the possibility and potential significance of preventing one of ordinary skill from using the claimed structure for the expected properties or, in other words, the possibility and potential significance of diminishing the resources of the skilled artisan. It is necessary to consider both the significance of the expected property and the significance of the claimed structure for obtaining the expected property, in order to ascertain the possibility and potential significance of diminishing the resources of the skilled artisan. These factors must be *263 considered relative to the significance of the unexpected property and the significance of the claimed structure for obtaining the unexpected property, in order to balance the inventor's contribution to the progress of the useful arts. The original *Dillon* panel decision could be faulted for not clearly considering one side of the balance; the PTO and the *in banc* decision in *Dillon* could be faulted for not clearly and adequately considering the other side of the balance.

V. Conclusion

This paper has examined one of the perennial problems of patentability, namely the weight to be given unexpected properties of an invention, particularly vis-a-vis expected properties. One major contribution to resolving this problem was Blodgett's original concept of relative significance, described in a published article, and apparently having some influence both within and without the Patent Office. The approach taken by the Federal Circuit, in *Dillon*, with regard to the ultimate issue of obviousness, appears to be a variation of the relative significance concept as described by Blodgett. The Federal Circuit faulted *Dillon* for not carrying the burden of showing the relative importance of the unexpected versus expected properties of her invention.

According to Blodgett's concept of relative significance, in cases of prima facie or structurally obvious compounds, the inventor was required to show that the significance of the unexpected properties was greater than the significance of the expected properties.

This paper reviewed and presented a critique of the original concept of relative significance. Various problems with the original relative significance concept were discussed.

The present author then proposed a revised two-part concept of relative significance for determining obviousness in the case of inventions having both unexpected and expected properties. The author proposed considering both the relative significance, or usefulness, of the unexpected properties versus the expected properties of the invention and the relative significance, or need, of the claimed structure for obtaining the expected properties versus the unexpected properties.

This revised two-part concept of relative significance was proposed, not as a test or general requirement of patentability, but as one analytical guide or tool that may be useful in determining the obviousness of inventions having both unexpected and expected properties. The proposed two-part relative significance concept was shown to be, not only within the expertise of a patent examiner, but to involve common considerations in determining obviousness and in prosecuting a patent application. The proposed two-part relative significance concept *264 was demonstrated to fit quite well with precedent as exemplified by *In re May*, including its facts and holdings, as articulated by the CCPA. It was also shown that the proposed concept could quite rationally be applied to the facts of the two recently controversial cases of *In re Wright* and *In re Dillon*. In contrast, the *Dillon in banc* decision was criticized for not rationally addressing the expressed concern of preventing the skilled artisan from using *Dillon*'s claimed composition for its allegedly expected use.

Finally, the proposed two-part relative significance concept was seen to relate to the countervailing principles of the Constitution regarding the patent system. The proposed relative significance concept is useful for balancing, on the one hand, the need to reward inventors for their contributions to the progress of the useful arts, and on the other hand, the possibility and potential significance of diminishing the resources of the skilled

artisan. In *Dillon*, the Federal Circuit in banc did not appear to make such a balance, focusing only the possible downside of granting *Dillon* a patent. The Federal Circuit did not appear to address, and balance, the fact that *Dillon* may have made a significant and unrewarded contribution to the progress of the useful arts.

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[n1] The statutory basis of the obviousness standard of patentability is § 35 U.S.C. 103, Title 35 (1952) United States Code, Public Law 503, 82d Congress, 2d Session. The relevant part of 35 U.S.C. 103 reads as follows:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The leading Supreme Court decision regarding the interpretation of 35 U.S.C. § 103 is *Graham v. Deere*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966).

The Court stated that obviousness is a legal conclusion involving a preliminary determination of several factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) indicia of nonobviousness, such as commercial success.

[n2] 574 F.2d 1082, 197 USPQ 603 (CCPA 1978).

[n3] 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988).

[n4] Appeal no. 88-1245, slip op. (Fed. Cir. Nov. 9, 1990)(in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n5] Silverberg, "Comment: The Wright Controversy," 71 JPOS 575, 578 (1989).

[n6] Blodgett, "Relative Significance -- A Concept in Chemical Structural Obviousness Cases," 63 JPOS 69 (1981).

[n7] Id. at 116.

[n8] See section IIIB below.

[n9] Id.

[n10] Appeal no. 88-1245, slip op. (Fed. Cir. Nov. 9, 1990) (in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n11] Id. at 12.

[n12] Id. at 12.

[n13] A former Patent Office Board member once stated, regarding the role of unexpected properties in determining obviousness, "Stability in the law is desirable, but there are times when inconsistencies become apparent and then the law must change to the extent necessary to resolve them. There is a tremendous need for even partially crystallized ideas. . . in a field that is now chaotic." Wyman, Chemical Compounds and 35 U.S.C. 103, 50 JPOS 586 (1968).

[n14] Benjamin Cardozo once stated, regarding the development of the law in general, that sometimes "the old maps must be cast aside and the ground charted anew." Hall, SELECTED WRITINGS OF BENJAMIN NATHAN CARDOZA 208-9 (1949).

[n15] See, e.g., Chisum, 2 PATENTS 5-348 and 5-188:

The decisions on invention or nonobviousness focus on two kinds of "differences." The first is the differences between the claims and the prior art purely in terms of structure or methodology. For product claims, how does the claimed product differ in physical structure from the products in the prior art? For process claims, how does the claimed process differ in terms of operative steps from the processes in the prior art? The second is the difference between the claims and the prior art in terms of functions and advantages. . . . What functions, advantages and results does the claimed product or process have that the prior art products or processes do not in fact have? Id. at 5-188.

In a variety of contexts, the courts have ruled that the obviousness of a new product is not to be judged solely by the structural modification or difference from the products in the prior art (or in the case of a process by the changes in the operational steps). [footnote

omitted] A "simple" or "slight" change may be nonobvious if the change achieves a new function. . . . Id. at 5-388.

See also Harris, "Apparent Federal Circuit Standards for Weighing Nonobviousness Argument that Prior Art Reference Teaches Away from Present Invention," 71 JPOS 79, 80-81 (1988):

Nonobviousness advocates invoke numerous kinds of differences between the disclosures of the prior art reference, and the present invention disclosure and claims. . . . These disclosure differences fall into two broad classes: structural disclosure differences and advantage disclosure differences associated with structural disclosure differences. Structural disclosure differences [footnote omitted] may include among other things. . . . geometric differences. . . . values of process parameters (e.g. pressure, temperature), or differences in claim elements (e.g., tensile strength, thermal conductivity, etc.). [footnote:] The term "structural" is not intended to be limited to mechanical claims, but also refers to differences in the details of process steps in any art area, including the sequencing of such steps, molecular structural differences in the chemical arts, and circuit differences in the electrical arts.

See also Rosenberg, PATENT LAW FUNDAMENTALS 9-7 (1988) § 901 ("Expressed in more direct, albeit homelier, terms: It is not the difference, but the difference the difference makes that counts."); Kayton, PATENT PRACTICE 5-3 (2d ed. 1988) ("no structural difference between a claimed invention and the prior art may be ignored. . . ."); *In re Papesh*, 315 F.2d 381, 137 USPQ 43, 52 (CCPA 1963) ("obviousness of the compound. . . is realistically and legally, a composite of both structure and properties").

[n16] Rosenberg, PATENT LAW FUNDAMENTALS § 14.03 at 14-13 (1988) ("Only structural language is determinative of the metes and bounds of patent claims.").

[n17] Id. at 14-3.

[n18] See, e.g., *In re Rushig*, 343 F.2d 965, 145 USPQ 274 (CCPA 1965).

[n19] The term "utility" is generally employed to mean the overall purpose or use of an invention. The distinction between a "utility" and a "property," both functional aspects of an invention, is not always clear. Generally, two inventions with different utilities would usually have basically different principle properties. Two inventions having the same utility usually have basic properties in common, although there may also be significant differences in properties. For example, two drugs may have the same utility as a beta-blocker, but may have different properties with respect to side effects or potency.

[n20] Of course, an expected property would not have been expected, if there had been no motivation in the art to make the invention in the first place. Thus, a more accurate

definition of an expected property is a property that would have been expected to be inherent in the structure of an invention which is prima facie obvious.

[n21] 599 F.2d 618, 195 USPQ 6 (CCPA 1977).

[n22] *Id.* at 620, 195 USPQ at 8.

[n23] The expected properties of an invention are typically based on similarities in structure between the invention and what existed before in the prior art. See, e.g., *In re Hoch*, 428 F.2d 1341, 1344, 166 USPQ 406, 407 (CCPA 1970) ("the prima facie case, at least to a major extent, is based on the expectation that compounds which are very similar in structure will have similar properties."); *In re Payne*, 606 F.2d 303, 313, 203 USPQ 245, 254 (CCPA 1979) ("An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound, in the expectation that compounds similar in structure will have similar properties."); *In re Merck*, 800 F.2d 1091, 1096, 231 USPQ 375, 376 (Fed. Cir. 1986) ("Structural similarity, alone, may be sufficient to give rise to an expectation that compounds similar in structure will have similar properties.").

[n24] Appeal no. 88-1245 (Fed. Cir. Nov. 9, 1990) (in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated): "[R]ebuttal or argument can consist of a comparison of test data. . . or any other argument or presentation of evidence that is pertinent." *Id.* at 8.

[n25] *In re Johnson*, 223 USPQ 1260, 1263 (Fed. Cir. 1984) ("When evidence is submitted in rebuttal, the decision maker must consider all the evidence anew.").

[n26] See Godula, *Retrospections Judge Learned Hand and the Concept of Invention*, 9 IDEA 159, 169-171 (1965). J. Hand, in the second circuit, has been credited with developing the "slight change doctrine," according to which a small structural or physical change may be sufficient to support an invention if a significant new function is uncovered. *Tratel Marble Co. v. Hungerford Brass & Co.*, 18 F.2d 66 (2d Cir. 1927) (J. Hand). ("Very slight structural changes may be enough to support a patent. . . We are to judge such devices, not by the mere innovation in their former material, but by the purpose which dictated them and discovered their function.").

[n27] An invention must be novel (35 U.S.C. § 102), nonobvious (35 U.S.C. § 103) and useful (35 U.S.C. § 101), but advancement in the art is not required. It has been said that even equivalent or inferior inventions enrich the art. See 42 JPOS 75; *Comr. Pats. v. Deutsche Gold-und-Silber Scheideanstalt*, 397 F.2d 656, 157 USPQ 549, 557 n. 8 (CCPA

1968) ("We do not equate the Constitutional standard of advancement with a requirement that the claimed subject matter be 'better' than the prior art."); *Ex parte Parthaborthy*, 174 USPQ 63 (POBA 1971) ("patentability does not depend on a showing of advantages or improvements, but on nonobviousness."). Cf. *Lorenzo, Advance in the Art: The Essential Criterion of Patentability*, 56 JPOS 195 (1974).

[n28] 383 U.S. 39, 15 L.Ed.2d 572, 148 USPQ 479 (1966).

[n29] *Id.* at 484.

[n30] See, e.g., *In re Merck*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367 (Fed. Cir. 1986); *In re Geiger*, 815 F.2d 686, 688 (Fed. Cir. 1987).

[n31] The term "structural obviousness" is a term that is sometimes used synonymously with the term "prima facie obviousness." See *Com'r v. Deutsche Gold-und-Silber Scheideanstalt*, 397 F.2d 656, 663, 157 USPQ 549, 556 (C.A.D.C. 1968) ("[W]e should make it clear that structural obviousness is certainly a large factor to be considered in the determination of obviousness of the subject matter as a whole. Whether it is called an inference of obviousness. . . a prima facie showing of obviousness. . . or a presumption of obviousness. . . is, we believe, immaterial."). See generally *Rosenberg, PATENT LAW FUNDAMENTALS, Structurally Obvious Compounds*, § 9.04[1] at 9-52 (2d ed. 1989). The term "structural obviousness" has been falling into disuse by the courts. This is a positive development, since the term "structural obviousness" is misleading. Evaluation of obviousness must always involve a consideration of both structure and function and is never limited to structure, even in determining prima facie obviousness. See, e.g., *In re Lunsford*, 357 F.2d 380, 382 n. 2, 148 USPQ 716, 718 n. 2 (CCPA 1966) ("apparently [the examiner] envisions a comparison of structure only. . . such an approach is not sanctioned by this court."); *White, CHEMICAL PATENT PRACTICE* 191, 230 (1985) ("Questions of chemical obviousness cannot be decided on the basis of structure alone" and "chemical properties are not secondary to chemical structure in the determination of obviousness."). On the other hand, the term "structural nonobviousness" makes sense, if a claimed structure is not taught by the prior art for obtaining any useful property.

[n32] 574 F.2d 1082, 197 USPQ 601 (CCPA 1978).

[n33] 6 U.S. 242, 66 S.Ct. 81, 67 USPQ 155 (1945).

[n34] 574 F.2d 1082, 197 USPQ 601 (CCPA 1978).

[n35] Id. at 1094, 197 USPQ at 610.

[n36] Id. at 1093, 197 USPQ at 609.

[n37] 553 F.2d 1261, 193 USPQ 641 (CCPA 1977).

[n38] Id. at 1267, 193 USPQ at 645.

[n39] E.g., the expression "tip the scales of patentability" or the like, with regard to obviousness, has been commonly used by the Supreme Court, CCPA, and Federal Circuit. See, e.g., *Graham v. Deere Co.*, 383 U.S. 1, 37, 86 S.Ct. 684, 703, 15 L.Ed.2d 545, 148 USPQ 459, 474 (1966) ("However, these factors do not, in the circumstances of this case, tip the scales of patentability."); *Stratoflex, Inc. v. Aeroquip. Co.*, 713 F.2d 1530, 218 USPQ 871, 878 (Fed. Cir. 1983) ("Those differences do not tilt the scales toward a conclusion of nonobviousness of the invention as a whole in light of all prior teachings."); *In re deMontmollin*, 344 F.2d 976, 978, 145 USPQ 416, 417 (CCPA 1965) (failure to "tip the balance in favor of patentability").

[n40] 315 F.2d 381, 137 USPQ 43 (CCPA 1963).

[n41] 343 F.2d 965, 145 USPQ 274 (CCPA 1965). Perhaps the reason that the weighing of both unexpected and expected properties is so familiar in the chemical arts is (1) the nature of chemical research, which commonly involves making small changes in a known molecule when searching for improved properties, for example increased effectiveness or decreased side effects in a prior drug, and (2) the large number of compounds already made. See, e.g., *In re Lunsford*, 148 USPQ 718 ("When an important medicine is discovered it is customary practice to produce various molecular variants of it seeking the optimum.").

[n42] *Blodgett, Relative Significance -- A Concept in Chemical Structural Obviousness Cases*, 63 JPOS 69 (1981).

[n43] 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988).

[n44] Appeal no. 88-1245, slip op. (Fed. Cir. Nov. 9, 1990)(in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n45] Rollins, PTO Practice: Was Wright Wrong? 71 JPOS 39 (1989); Silverberg, Comment: The Wright Controversy, 71 JPOS 575 (1989).

[n46] Rollins, 71 JPOS at 43-44 (1989).

[n47] In re Dillon, Appeal no. 88-1245, Petition for Rehearing, by the Acting Commissioner of Patents and Trademarks, at 3-4.

[n48] Id. at 10.

[n49] Id. at 14.

[n50] In re Dillon, Appeal no. 88-1245, Brief of Amicus Curiae on behalf of American Intellectual Property Law Association, in support of vacating the decision to be reheard, at 5.

[n51] Id. at 11.

[n52] 574 F.2d 1052, 197 USPQ 601 (CCPA 1978).

[n53] 533 F.2d 1261, 193 USPQ 641 (CCPA 1977).

[n54] 343 F.2d 965, 145 USPQ 274 (CCPA 1965). In *Ruschig*, the unexpected property was lowering blood sugar and the expected property was a textile treatment called sizing. The court stated, "balancing the alternates of providing adequate protection to appellant's limited group of anti-diabetic agents against the possibility that someone might wish to use them for such purposes as making a textile size, we favor the former." Id. at 979, 145 USPQ at 286.

[n55] *Blodgett*, Relative Significance -- A Concept in Chemical Structural Obviousness Cases, 63 JPOS 69, 70 (1981).

[n56] Id. at 116.

[n57] Blodgett did not make a clear distinction between cases where (1) the invention and the prior art have different utilities or uses, and (2) the invention and the prior art have the same utility, but the invention has an additional or superior property (so-called improvement inventions having "properties in common" with the prior art). In the latter case, the properties and uses as a whole would always have greater significance than the expected property, since the properties as a whole would include both the unexpected and expected properties. However, in such a case, May required the balancing of the unexpected properties alone against the expected properties.

[n58] Blodgett, *Relative Significance -- A Concept in Chemical Structural Obviousness Cases*, 63 JPOS 69, 70 (1981).

[n59] Id. at 109. Blodgett further states that, "The solution. . . is to base patentability on the relative significance of the respective uses. . . . When a new compound and its use are far more significant [emphasis in original] than what could have been expected from knowledge of the prior art compound and its use, a patent on the new compound would truly promote the progress of the useful arts." Id. at 73.

An example of the application of the relative significance test is described in Blodgett's article as follows:

Use of relative significance can best be understood by considering a typical situation in which a prior art compound X has a known use U. Applicant discovers a compound X' and a use U' for it. The structural relationship between X and X' is such that one could predict that X' would be useful for use U. These facts give three points of reference for the relative significance analysis: the significance of compound X in use U, the significance of compound X' in U, and the significance of compound X' in use U'.

The initial burden on the PTO would be to show that compound X and its use U were known in the prior art and that the structural similarity between X and X' is such that one of ordinary skill in the art would predict that compound X' would have use U. This is the prima facie case which creates a presumption of obviousness and which shifts the burden of going forward to the applicant.

Assuming that the existence of the presumption of obviousness cannot be defeated, it may nevertheless be rebutted. The concept of relative significance provides one way, and perhaps the only practical way, to do so.

Theoretically, the rebuttal by relative significance would be a three step procedure. First, the applicant must establish the practical significance of the expectations of one of ordinary skill in the art about compound X'. Second, the applicant must establish the practical significance of the discoveries which applicant has made about compound X'. Third, the applicant must establish that the significance of his discoveries is substantially greater than the significance of the prior art expectations about the claimed compound.

In applying the test of relative significance, applicant must remember that the following common sense assumptions will be applied in the absence of evidence to the contrary. Assumption 1: if compound X is recognized to have a practical use U, it has that use to a degree that is significant. Assumption 2: compound X' would be expected to be as significant in use U as compound X. Assumption 3: the significance of use U is equal to the significance of use U'. Id. at 108-9.

[n60] Appeal no. 88-1245, slip op., dissenting opinion at 49 (Fed. Cir. Nov. 9, 1990) (in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n61] Id. at 12.

[n62] Id. at 12. (The court stated that Dillon did not "show that the prior art compositions and use were so lacking in significance that there was no motivation for others making obvious variants").

[n63] 464 F.2d 1051, 175 USPQ 89 (CCPA 1972).

[n64] Blodgett, Relative Significance -- A Concept in Chemical Structural Obviousness Cases, 63 JPOS 69, 92 (1981).

[n65] Id. at 92-93.

[n66] The now defunct "rule of doubt" had been that where the decision-maker, in particular the PTO, was in doubt as to whether applicant's invention was obvious, such doubt was resolved in favor of the applicant. See Becker, The Rule of Doubt -- In re Hofstetter, 49 JPOS 607 (1967). Such a rule of doubt was rejected by the Supreme Court in *Graham v. Deere*, 383 U.S. at 18, 248 USPQ at 467 ("to await litigation is for all practical purposes to debilitate the patent system"). See also *In re Naber*, 503 F.2d 1059, 1059-60, 183 USPQ 245, 246 (CCPA 1974).

[n67] Silverberg, Comment: The Wright Controversy, 71 JPOS 575, 578 (1989).

[n68] 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988).

[n69] Appeal no. 88-1245, slip op. (Fed. Cir. Nov. 9, 1990)(in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n70] In re Dillon, Appeal no. 88-1245, Petition for Rehearing, by the Acting Commissioner of Patents and Trademarks, at 10.

[n71] Blodgett Relative Significance -- A Concept in Chemical Structural Obviousness Cases, 63 JPOS 69 (1981): "If the significance of the contribution is great. . . compared to the significance of what is allegedly taken from the public. . . [then] public policy favors a holding of nonobviousness." Id. at 116.

[n72] 582 F.2d 628, 199 USPQ 129 (CCPA 1978).

[n73] Id. at 135.

[n74] 74 574 F.2d 1082, 197 USPQ 601 (CCPA 1978).

[n75] The CCPA quoted an affidavit:

Moreover, Jacobson states that "[t]he discovery of a nonaddictive analgesic potency comparable to that of morphine would eliminate a major medical problem and would be of inestimable value." Id. at 609.

[n76] Id. at 610.

[n77] Blodgett's concept of relative significance could not focus simply on the "usefulness" of a property, because he had to attribute the entire significance of the invention to the properties. The revised concept, by dividing the significance into two distinct parts, involving structure and properties, respectively, allows a clearer definition of "significance" associated with each part.

[n78] For example, the following general factors may be pertinent to the significance of a claimed structure for obtaining the allegedly expected properties of an invention:

(1) the existence, prior to the invention or claimed structure, of alternate non-claimed prior art structures for obtaining the expected property. At the least, with respect to chemical compounds, such non-claimed structures would, by definition, be found in the prior art cited as the basis of alleged obviousness, namely the closest prior art compound.

(2) the number of equivalents. This may in turn depend on whether the invention is in a crowded art or mature industry, or whether the invention is in a newly developed or emerging technology. Alternatively, in the case of a so-called "selection" invention, a large number of equivalent compounds may be disclosed in a generic or Markush class. Obviously, the existence of a large number of equivalent non-claimed structures may suggest that the significance of the claimed structure is relatively low; on the other hand, if the claimed structure was unique, for the purpose of obtaining the expected property, then the significance of the structure for obtaining the property may be relatively high. The above is not to deny that a claimed structure might have some possible value, even as one of a number of equivalent structures, since it may serve to "enrich" the art.

(3) the actual equivalence, in terms of expected properties, of the claimed structure relative to prior art non-claimed structures for obtaining the expected property. The term "equivalence," as distinguished from superiority or inferiority, means functionally interchangeable or substitutable. If the claimed structure would have been inferior to other non-claimed structures, in terms of obtaining the expected properties, then the significance of the claimed structure for the expected properties may be relatively low (the skilled artisan would not have been motivated to obtain an inferior product).

(4) the availability of the existing equivalent non-claimed structures for obtaining the expected properties. Availability may involve the question of whether the non-claimed structure is freely usable, commercially available, or not covered by other patents. If the equivalent non-claimed structures are covered by patents, then granting a patent on the claimed compound may possibly diminish the ability of the skilled artisan to design around the patented prior art structures.

[n79] 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988).

[n80] Appeal no. 88-1245 (Fed. Cir. Nov. 9, 1990)(in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n81] See, e.g., *In re Neave*, 152 USPQ 275, 279 (CCPA 1967) ("Appellants selected in a crowded art and here claims, a single compound which has been demonstrated to possess advantages over all prior art compounds."). The case law is not clear as to the logical basis for why a crowded art favors the patentability of an invention. As explained in this section, it makes perfect sense according to the proposed two-part relative significance concept.

[n82] The patents in the PTO files are divided by technical subject matter into over 600 classes, which are subdivided into sub-classes. Typically, an examiner may specialize in one or a portion of a single class.

[n83] The Federal Circuit has adopted a "clearly erroneous" standard of review, with respect to factual determinations by the PTO. See *In re Jerabek*, 789 F.2d 886, 229 USPQ 530 (Fed. Cir. 1986) and cases cited therein. However, the standard of review with respect to the ultimate question of obviousness is an inextricably mixed or hybrid question of fact and law. See, e.g., *In re Blauwe*, 222 USPQ 191, 193 (Fed. Cir. 1984) ("At the outset, we caution the [PTO] Solicitor that obviousness is a question of law to be determined from the facts."). See also *In re McCarthy*, 226 USPQ 99 (Fed. Cir. 1985); Sherman, *Obviousness: A Question of Law or of Fact?* 51 JPOS 547 (1988); Rollins, *PTO Practice: Is that a Fact?* JPOS 403 (1988).

[n84] PTO decisions on legal issues of obviousness must be carefully reviewed by the courts, since the statutory standard of obviousness is highly susceptible to errors of interpretation and to perennial pitfalls such as hindsight or not giving proper weight to all the pertinent factors of a case.

[n85] See, e.g., *Smith-Kline Diagnostics, Inc. v. Helena Laboratories*, 859 F.2d 878, 879, 8 USPQ2d 1477, 1478 (Fed. Cir. 1988) (proof of infringement "must show that every limitation of the patent claims asserted to be infringed is found in the accused device, either literally or by equivalent"). See generally Chisum, 4 PATENTS § 18.03[4] *The All Elements Rule*.

[n86] 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988).

[n87] *Lastova*, 70 JPOS 786 (1988).

[n88] *Welsh*, 71 JPOS 568 (1988).

[n89] *Id.* at 571.

[n90] *Rollins*, 71 JPOS 39, 44 (1989).

[n91] Reply Brief for Appellant in *In re Wright*, Appeal No. 87-1464 at 14-15.

[n92] Brief for Appellant in *In re Wright*, Appeal No. 87-1464 at 3-4.

[n93] *Id.* at 16.

[n94] Appeal no. 88-1245, slip op. (Fed. Cir. Nov. 9, 1990) (in banc), 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989) (vacated).

[n95] *Id.* at 1338.

[n96] *Id.* at 1347.

[n97] Brief for Dillon in Opposition to Petition for Rehearing in banc at 8, Appeal no. 88-1245.

[n98] *Id.* at 8. The Appellant Dillon stated that, "In fact, the problem with comparing the two problems is that there is no comparison. One overwhelms the other." *Id.* at 8.

[n99] Brief for Amicus Curiae Professor Irving Kayton in support of Appellant on Rehearing in banc at 5.

[n100] 100 Brief for Amicus Curiae Bar Association of the District of Columbia in support of in banc affirmance of Dillon at 14.

[n101] For a discussion of prima facie obviousness, see *In re Piasecki*, 223 USPQ 785 (Fed. Cir. 1984); *In re Johnson*, 223 USPQ 261 (Fed. Cir. 1984); *In re Rhinehart*, 531 F.2d 1048, 223 USPQ 143 (CCPA 1976).

[n102] In the case of *In re Murch*, 464 F.2d 1051, 175 USPQ 89 (CCPA 1972), the PTO had held the invention prima facie obvious and had required the applicant to provide evidence that the claimed invention did not have the expected property suggested by the prior art. See also *In re Mod*, 408 F.2d 1055, 161 USPQ 281 (CCPA 1969). In contrast, in *In re Hoch*, 428 F.2d 1341, 166 USPQ 406 (CCPA 1970), the PTO had also required the applicant to show the claimed compound did not possess the expected property, but the court, contrary to the PTO position, held that rebuttal evidence of "differences in actual properties" included proving the prior art compound did not have the unexpected property. See also *In re Albrecht*, 514 F.2d 1389, 1396, 185 USPQ 585, 589 (CCPA 1975).

[n103] The Constitution is concise with regard to patents, stating:

The Congress shall have the power. . . to promote. . . the progress of the useful arts, by securing for limited times to. . . inventors the exclusive rights to their discoveries. U.S. Constitution, Article I, Section 8, Clause 8 (1789).

[n104] President Abraham Lincoln aptly stated, the patent system "adds fuel to the fire of genius." Lincoln, Lecture on Discoveries, Inventions, and Improvements (1860). This "fuel" encourages, not only genius, but vast expenditures of effort, time and capital. See, e.g., *In re Lunsford*, 148 USPQ 720 ("inventions of this type here are frequently made only after the expenditures of vast amounts of research time and effort").

[n105] An important contextual intent of the framers of the Constitution was their abhorrence of arbitrary state bestowed monopolies on otherwise freely available goods. The Supreme Court, in *Graham v. Deere*, viewed a patent as a justified and limited exception to the rule against monopolies. Quoting Jefferson, the Court stated:

The difficulty of formulating conditions for patentability was heightened by the generality of the Constitutional grant and the statutes implementing it, together with the underlying policy of the patent system that "the things which are worth to the public the embarrassment of an exclusive patent" as Jefferson put it, must outweigh the restrictive effect of the limited patent monopoly. *Id.* at 464.

The Supreme Court, in *Graham v. Deere*, expressed a Constitutional limit on the granting of patents, by stating, "Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available." *Id.* at 462. See also *Great A & P Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 95 L.Ed. 162, 71 S.Ct. 127, 81 USPQ 303 (1950). The Court stated:

The function of a patent is to add to the sum of useful knowledge. Patents cannot be sustained when, on the contrary, their effect is to subtract from former resources freely available to skilled artisans. *Id.* at 306.

[n106] 343 F.2d 965, 145 USPQ 274 (CCPA 1965).

[n107] The appellants in *Ruschig* had claimed a compound useful for treating diabetes. The Patent Office had rejected the compounds in view of structurally similar prior art compounds having miscellaneous other uses such as sizing textiles. The CCPA stated:

[B]alancing the alternatives of providing adequate protection to appellants' limited group of anti-diabetic agents against the mere possibility that someone might wish to make use of them for some such purpose as making a textile size, we favor the former. *Id.* at 979, 145 USPQ at 286.