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Metaphors of Infringement and Equivalence: The Solution of Our Problems

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METAPHORS OF INFRINGEMENT AND EQUIVALENCE: THE SOLUTION OF OUR PROBLEMS

> An Iranian student, shortly after his arrival in Berkeley, took a seminar on metaphor from one of us. Among the wondrous things that he found in Berkeley was an expression that he heard over and over and understood as a beautifully sane metaphor. The expression was "the solution of my problems" - which he took to be a large volume of liquid, bubbling and smoking, containing all your problems, either dissolved or in the form of precipitates, with catalysts constantly dissolving some problems (for the time being) and precipitating out others. He was terribly disillusioned to find that the residents of Berkeley had no such chemical metaphor in mind. And well he might be . . .[1]

INTRODUCTION: EQUIVALENCE AND INFRINGEMENT

The doctrine of equivalents has been a fixture in patent litigation since well before its putative birth in the 1853 case of *Winans v. Denmead*.[2] Over the past ten years, it has been the subject of continuing debate within the Court of Appeals for the Federal Circuit.[3] The court has vacillated between a desire to preserve the doctrine as part of the courts' equitable powers,[4] and a desire to

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[1] G. LAKOFF & M. JOHNSON, METAPHORS WE LIVE BY, 143-44 (1980).

[2] 56 U.S. (15 How.) 330 (1853).

[3] The United States Court of Appeals for the Federal Circuit was created in 1982 to provide exclusive appellate jurisdiction for patent and certain other cases. *See* Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (1982) (codified as amended in several sections of 28 U.S.C.).

[4] *See, e.g.*, Hughes Aircraft Co. v. United States, 717 F.2d 1351, 219 U.S.P.Q. (BNA) 473 (Fed. Cir. 1983) (holding satellite controlled by on-board computer infringes earlier patent by doctrine of equivalents even though not literally infringing); Texas Instruments, Inc. v. United States Int'l Trade Comm'n, 805 F.2d 1558, 231 U.S.P.Q. (BNA) 833 (Fed. Cir. 1986) (holding later generation calculators do not infringe by virtue of reverse doctrine of equivalents, even though literally infringing).

yield more predictable decisions on infringement by constraining its use.[5] Commentators have discussed extensively this conflict facing the Federal Circuit.[6] Further, the doctrine is presently the subject of an en banc hearing by the court.[7]

Despite appearing to be a limited doctrinal debate, the controversy over the doctrine is representative of an anomaly pervasive in patent law: the inability of language—patent claims—to sufficiently define an invention. The doctrine of equivalents has been viewed perennially as a means of compensating for the inadequacy of words.[8] However, several judges in the Federal Circuit are of the opinion that current doctrine on equivalents and claim interpretation[9] is too open-ended, which undermines the predictability of the

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[5] *See, e.g.*, Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931, 4 U.S.P.Q.2d (BNA) 1737 (Fed. Cir. 1987) (holding computerized sorter does not infringe by doctrine of equivalents because lacking elements equivalent to patented machine).

[6] *See, e.g.*, Ronald E. Larson, *Balancing the Competing Policies Underlying the Doctrine of Equivalents in Patent Law*, 21 AIPLA Q.J. 1 (1993) (attempting to harmonize decisions under doctrine of equivalents using functional cooperation analysis); Paul C. Craane, *At the Boundaries of Law and Equity: The Court of Appeals for the Federal Circuit and the Doctrine of Equivalents*, 13 N. ILL. U.L. REV. 105 (1992) (arguing for limiting doctrine of equivalents to cases of piracy); Maxim H. Waldbaum, Pennwalt *Redux—Judicial Uncertainty vs. Procrustean Bed*, 19 AIPLA Q.J. 237 (1991) (arguing recent Federal Circuit decisions undermine flexibility of doctrine of equivalents); Martin J. Adelman et al., *The Doctrine of Equivalents in Patent Law: Questions That* Pennwalt *Did Not Answer*, 137 U. PA. L. REV. 673 (1989) (arguing that doctrine of equivalents represents judicial undermining of statutory design).

[7] In *Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, No. 93-1088, the court has certified the following questions for review:

1. Does a finding of patent infringement under the doctrine of equivalents require anything in addition to proof of the facts that there are the same or substantially the same (a) function, (b) way, and (c) result, the so-called triple identity test of *Graver Tank v. Linde Air Products Co.*, 339 U.S. 605 (1950), and cases relied on therein? If yes, what?
2. Is application of the doctrine of equivalents by the trial court to find infringement of the patentee's right to exclude, when there is no literal infringement of a claim, discretionary in accordance with the circumstances of the case?
3. Is the issue of infringement under the doctrine of equivalents an equitable remedy to be decided by the court, or is it, like literal infringement, an issue of fact to be submitted to the jury in a jury case?

[8] *See* Autogiro Co. of America v. United States, 384 F.2d 391, 396-400 (Ct. Cl. 1967).

[9] In addition to consideration of the doctrine of equivalents, the court has certified two more cases for en banc hearing, each dealing with claim interpretation. Pall Corp. v. Micron Separations, Inc., 792 F. Supp. 1298 (D. Mass. 1992), *appeal filed*, Nos. 91-1391, 91-1394, and 91-1409 (Fed. Cir. Jan. 7, 1994); Markman v. Westview Instruments, Inc., 772 F. Supp. 1535

patent grant, and, hinders technological innovation.[10] This rekindles a controversy which has preceded the *Winans* decision.

Although there seems to be a consensus in favor of designing the patent system to support innovation and maximize aggregate economic benefit, there are widely disparate theories on how to achieve these goals. The theories tend to fall into two groups. One group disfavors the uncertainty generated by the doctrine of equivalents and argues that it undermines adequate notice to innovators working at the margins of existing patents.[11] The other group stresses the need to preserve the doctrine under the courts' general equitable powers in order to do justice in individual cases, and thus, maintain the integrity of patent rights and the incentives they provide.[12]

(E.D. Pa. 1991), *appeal filed*, No. 92-1049 (Fed. Cir. Jan. 7, 1994).

[10] *See, e.g.*, London v. Carson Pirie Scott & Co., 946 F.2d 1534, 20 U.S.P.Q.2d (BNA) 1456 (Fed. Cir. 1991) (asserting that doctrine of equivalents threatens to render patent claims uncertain); *An Interview with Circuit Judge S. Jay Plager*, J. PROPRIETARY RTS., Dec. 1993, at 2.

[11] A typical argument for "order" is found in Martin J. Adelman & Gary L. Francione, *The Doctrine of Equivalents: Questions That* Pennwalt *Did Not Answer*, 137 U. PA. L. REV. 673 (1989). According to Adelman and Francione:

> "[t]he doctrine of equivalents is the primary . . . cause of the current uncertainty surrounding the scope of patent claims . . . uncertainty about the scope of patent protection hinders both patent holders and potential defendants from assessing the possible outcome of litigation or from making other business decisions . . . . due process concerns are potentially raised to the extent that pervasive and systemic uncertainty generated by the doctrine of equivalents destroys the ability of patent claims to provide fair notice, so that they effectively provide no notice.

Id. at 682-83.

[12] A typical "equity" argument is found in Maxim H. Waldbaum, Pennwalt *Redux—Judicial Uncertainty vs. Procrustean Bed*, 19 AIPLA Q.J. 237 (1991). Criticizing the Federal Circuit's adoption of an "all-elements" restriction on the doctrine of equivalents, Waldbaum states:

> [t]he problem with [the all elements rule] is its lack of flexibility. Patent lawyers do not always draft claims with crystal clarity, nor do they always discern perfectly what is and what is not a material claim limitation in a claim. In some cases, to require one-to-one correspondence between identical or substantially similar elements in two devices to prove infringement is an unattainable or unfair requirement. In such cases, the court must have the ability to go beyond the rigid rules . . . and to do equity.

Id. at 253.

Both positions offer important insights, but tend toward myopia. Arguments for order collapse everything into an economics problem, as if one could bound patent scope to achieve an optimal economic effect. Aggregate economic theories are pitifully under-equipped to deal with such incommensurable factors. Although the presence of indeterminacy certainly supports equity arguments, discussion of equity does not determine whose sense of equity will prevail. Without this sense, equity offers a rather unhelpful—and ultimately inequitable—subjectivity.

This Note aims at a modest paradigm shift between the two views on the doctrine of equivalents. Part I presents a history of infringement doctrine, one focusing on its dissonance. In particular, it focuses on the genesis of the conceptual split between the notions of "literal" infringement and the doctrine of equivalents. Part II traces the split between literal infringement and the doctrine of equivalents to a fundamental dissonance in the ways we *talk* about inventions, using tools borrowed from cognitive linguistics. Specifically, these tools identify two possible metaphors arising from the polysemy of the word "invention." These two metaphors are INVENTIONS ARE DISCOVERIES and INVENTIONS ARE OBJECTS. Part II argues that the interaction of these metaphors is peaceful when an invention can be clearly characterized by one metaphor or the other. However, crisis occurs in cases where these metaphors come into competition.

Finally, Part III addresses the status of the doctrine of equivalents from this cognitive perspective. It focuses on the "copying" model, which some members of the Federal Circuit have proposed to solve a perceived problem with the doctrine of equivalents. In cognitive terms, this proposed solution represents the triumph of the INVENTIONS ARE OBJECTS metaphor. Although it may be tempting to adopt this metaphor in the name of certainty, such a move is questionable in light of the wording of the patent laws and their historical application. More importantly, the ascendancy of this single metaphor of invention threatens to submerge the diversity-ensuring INVENTIONS ARE DISCOVERIES metaphor. It is this metaphor which animates the doctrine of equivalents, and much of the incentive the patent laws establish.

I. EQUIVALENCE OR INFRINGEMENT?

> It is impossible to set any theoretic limits to such a doctrine, which indeed its origin forbids, since it is in misericordiam to relieve those who have failed to express their complete meaning. Somewhat the same process is indeed inherent in the interpretation of any verbal expression, and perhaps the best that can be said is that in the case of patent claims much greater liberties are taken than would be allowed elsewhere. Each case is inevitably a matter of degree, as so often happens, and other decisions have little or no value. *The usual ritual, which is so often repeated and which has so little meaning, that the same result must follow by substantially the same means, does not help much in application; it is no more than a way of stating the problem.*[13]

Under modern doctrine, the determination of patent infringement has evolved into two distinct tests. First, there is the inquiry into "literal" infringement. This is a two-step analysis, involving (1) "interpretation" of the patent claim in the light of all useful documents, including the specification, the drawings and the "file wrapper,"[14] and (2) construction of the claim by "reading it on" the accused device; comparing the claim with the accused device to determine whether the accused device contains all of the elements found in the interpreted claim.[15]

Second, there is an inquiry into whether the accused device infringes the patentee's rights by virtue of the doctrine of equivalents. The doctrine holds that even though an accused device does not literally infringe the patent, it nonetheless may infringe the patentee's rights because the accused device utilizes the same *principle* or "performs substantially the same overall function or

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[13] Claude Neon Lights, Inc. v. E. Machlett & Son, 36 F.2d 574, 576 (2d Cir. 1929) (Hand, J.).

[14] The "file wrapper" is the record of transactions between the applicant and the Patent and Trademark Office.

[15] Autogiro Co. of America v. United States, 384 F.2d 391, 399-400, 155 U.S.P.Q. (BNA) 697 (Ct. Cl. 1967).

work, in substantially the same way, to obtain substantially the same overall result as the claimed invention."[16] Conversely, the doctrine allows an alleged infringer to escape liability even though her device literally infringes the patent, if her device fails to perform substantially the same function, in substantially the same way, to achieve substantially the same result as the patented invention.[17]

One might ask whether the distinction between literal infringement and infringement by equivalence is a distinction without a difference, since the purpose of both is to determine whether an accused infringer "makes, uses or sells" the patented invention.[18] Notwithstanding this common purpose, the case law suggests that the two doctrines are fundamentally different inquiries.[19] To understand these two doctrines, it is important to look at the history of patent infringement.

A. THE DOCTRINE OF EQUIVALENTS AS A PART OF CLAIM CONSTRUCTION

The history of infringement doctrine in United States patent law is largely a history of the construction of claims. Starting with simple descriptions, a body of technically complex claiming practice has evolved over many years. Several factors have influenced this evolution, including the increasing number and complexity of inventions, the increasing complexity of economic relationships in an industrialized society, and the increasing administrative demands on the patent system. Intertwined with the evolution of claiming practice, infringement doctrine has evolved from a simple concept of "substantial similarity" to an increasingly complex analytical procedure.

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[16] Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931, 934 (Fed. Cir. 1987).

[17] This is often referred to as the "reverse" doctrine of equivalents. *See* Texas Instruments v. United States Int'l Trade Comm'n, 805 F.2d 1558 (Fed. Cir. 1986) (holding that pioneer patent for hand-held calculator was not infringed by later-generation devices having same literal elements but implemented in superior next generation technologies).

[18] 35 U.S.C. § 271 (1988).

[19] *See, e.g.*, Valmont Indus., Inc. v. Reinke Mfg. Co., 983 F.2d 1039, 1043, 25 U.S.P.Q.2d (BNA) 1451 (Fed. Cir. 1993) (distinguishing between equivalence under § 112 and doctrine of equivalents).

Early patent cases exhibited little of the complexity that characterizes many patent cases today. The Patent Act of 1793 required only a "written description of . . . [the] invention . . . in such full, clear and exact terms, as to distinguish the same from all the others."[20] There was no explicit requirement for discrete claims set apart from the specification, and specifications from this period were typically written in broad terms. Infringement analysis was a somewhat *gestalt* process, with infringement found if the accused device was "substantially, in [its] principles and mode of operation, like" the patented invention,[21] if it was not "an improvement on the principle, or the form, or proportions" of the patented invention,[22] or if it was "substantially the same, and operate[d] in the same manner, to produce the same result."[23]

Trials included testimony by persons "acquainted with the particular art . . . for the purpose of pointing out and explaining to the jury the points of resemblance, or of difference" between the accused device and the patented invention.[24] After this testimony, a jury was left to decide whether there was infringement.[25] There was little detailed instruction on infringement; in fact, the first Supreme Court patent case fails to mention the issue altogether.[26]

Courts gave patentees a great deal of flexibility when determining the scope of their patent rights. Besides forgiving less than adequate disclosure when not accompanied by an intent to deceive, courts also liberally construed the language of the specification.[27] Asserting that patents should not be treated as monopolies "odious to the law," Justice Story noted that the object of interpretation is:

> to ascertain, what, from the fair sense of the words of the specification, is the nature and extent of the invention claimed by the party; and when the nature

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[20] Patent Act of 1793, ch. 11, § 3, 1 Stat. 318, 321-22 (1793).

[21] Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

[22] Reutgen v. Kanowrs, 20 F. Cas. 555, 556 (C.C.D. Pa. 1804) (No. 11,710).

[23] Gray v. James, 10 F. Cas. 1015, 1016 (C.C.D. Pa. 1817) (No. 5,718).

[24] Dixon v. Moyer, 7 F. Cas. 758, 759 (C.C.D. Pa. 1821) (No. 3,931).

[25] *Id.* at 759.

[26] Evans v. Eaton, 16 U.S. (3 Wheat.) 454 (1818).

[27] *See* Gray v. James, 10 F. Cas. 1015, 1018 (C.C.D. Pa. 1817) (No. 5,718); Whitney v. Emmett, 29 F. Cas. 1074, 1082 (C.C.D. Pa. 1831) (No. 17,585).

> and extent of that claim are apparent, not to fritter away his rights upon formal or subtile objections of a purely technical character . . . [W]e are not to single out particular phrases standing alone, but to take the whole in connexion.[28]

"Mere colorable differences, or slight improvements" would not save an accused device from a finding of infringement;[29] neither would "formal differences"[30] or "variance in some small matter for the purpose of evasion, or as a colour for a patent."[31]

In these early cases, a critical issue was the validity of the patent. Under this inquiry, an important subissue was whether the patent specification was sufficient to allow a person skilled in the art to produce the invention.[32] Courts also focused on whether a specification was full, clear and explicit enough to distinguish it from all other inventions of the same type.[33] Although concern about notice to potential infringers appeared in the 1820's,[34] the courts generally were not concerned with the problem of innocent infringement at the margins of patents. As with infringement, the adequacy of the specification was generally a jury issue.[35]

Although early courts were content to draw the substance of the invention from the specification as a whole, an increasing emphasis on distinguishing patented inventions from their predecessors led

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[28] Ames v. Howard, 1 F. Cas. 755, 756 (C.C.D. Mass. 1833) (No. 326).

[29] Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

[30] *Gray*, 10 F. Cas. at 1016.

[31] *Whitney*, 29 F. Cas. at 1078.

[32] If the specification was not enabling, the next issue was whether this defect was the product of an intent to deceive the public. *See* Reutgen v. Kanowrs, 20 F. Cas. 555, 556 (C.C.D. Pa. 1804) (No. 11,710); Gray v. James, 10 F. Cas. 1015, 1018 (C.C.D. Pa. 1817) (No. 5,718).

[33] *See, e.g.*, Whitney v. Emmett, 29 F. Cas. 1074, 1082 (C.C.E.D. Pa. 1831) (No. 17,585) ("the true inquiry is whether . . . the plaintiffs have made such a description of the thing patented as to distinguish it from all others before known.").

[34] *See* Dixon v. Meyer, 7 F. Cas. 758, 760 (C.C.D. Pa. 1,821) (No. 3,931) ("[post-hoc determination of the nature of an improvement] would afford no advantage to third persons, and least of all to the defendant, who, if he has offended at all, did it innocently").

[35] *See, e.g.*, Davis v. Palmer, 7 F. Cas. 154, 158 (C.C.D. Va. 1827) (No. 3,645) ("it is within province of jury to decide, whether skilful workman can carry into execution plan of inventor"); Reutgen v. Knowrs, 20 F. Cas. 555, 556 (C.C.D. Pa. 1804) (No. 11,710) (holding adequacy of specification is jury question). *But see* Dixon v. Moyer, 7 F. Cas. 758, 760 (C.C.D. Pa. 1821) (No. 3,931) (holding adequacy of specification not jury issue).

patentees to include in their applications broadly worded "claims" set apart from the rest of the specification. Early cases made no mention of claims.[36] However, rudimentary claims began to appear in later cases.[37] These embryonic claims would evolve into the stylized form of modern practice.

The evolution of claiming began in earnest with the rewriting of the Patent Act in 1836. The new Act replaced the old registration system with a requirement that each application be examined. Also, in order to implement this new requirement, the Act created the administrative bureaucracy of the Patent Office.[38] Concomitant with the creation of an examination system, the idea of "claiming" emerged in the statutory requirements.[39] The creation of the examination system and the increased emphasis on claiming were probably a result of the increase in patent filing and the courts' previous experience in determining patent validity.

Despite the appearance of claims, the infringement tests applied in the courts basically remained unchanged. Courts continued liberal construction techniques, and exhibited few references to the need for a "literal" approach. Typical district court opinions from the period after the enactment of the 1836 Act refer to standards like "substantial difference in the principle"[40] as the measure of noninfringement. The efficacy of such a malleable standard soon became a point of conflict.

This conflict emerged in *Winans v. Denmead*,[41] the Supreme Court case often cited as the source of the doctrine of equivalents.

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[36] Neither the patent in *Reutgen*, issued in 1796, nor the patent in *Odiorne*, issued in 1799, made any mention of claims.

[37] The *Whitney* patent issued in 1826 and its specification concluded:

> [o]ur invention consists in this, a new combination of the various parts of the mould, with the use of the pin and machinery before described, in such a manner as without any blowing to produce a finished knob with a hole perforated through it, and a neck or enlargement, so that it will not come out of the mould without opening it, at one operation, by compression merely.

Whitney, 29 F. Cas. at 1075.

[38] Patent Act of 1836, ch. 357, 5 Stat. 117 (1836).

[39] The Act required that the applicant "particularly point out the part, improvement, or combination, which he *claims* as his own invention." Patent Act of 1836, ch. 357, 5 Stat. 117, 119 (1836) (emphasis added).

[40] Smith v. Pearce, 22 F. Cas. 619, 620 (C.C.D. Ohio 1840).

[41] 56 U.S. (15 How.) 330 (1853).

In *Winans*, the defendant was accused of infringing a patent for coal car designs which specified a conical coal compartment. The Court held that a jury could find that an accused device which utilized an octagonal shape approximating a cone infringed the patented design, even though its shape was not strictly conical.[42]

The majority and dissenting opinions reflected two poles of thought. Writing for the majority, Justice Curtis cautioned against constraining claims to a "literal" meaning because: (1) the inventor, having a right to the whole invention, intended to claim that whole, and (2) the constitutional mandate of promoting the useful arts called for securing for the inventor all she has created.[43] He emphasized that "to copy the principle or mode of operation described, is an infringement, although such copy should be totally unlike the original in form or proportions."[44]

Dissenting, Justice Campbell argued that the patentee should be held to "his precise and definite specification and claim," relying on the Patent Act's requirement of specificity in claims.[45] Making an argument that would echo across the next 140 years, he warned that "[n]othing . . . will be more mischievous, more productive of oppressive and costly litigation, of exorbitant and unjust pretensions and vexatious demands, more injurious to labor, than a relaxation of these wise and salutary requisitions of the act of Congress."[46]

Although many trace the birth of the doctrine of equivalents to *Winans*, the doctrine prevailing in that case was clearly the same gestalt infringement test of earlier cases.[47] Soon after *Winans*, the connection between doctrine of equivalents and the "function-way-result" tests of earlier cases became more apparent:

> If the invention of the patentee be a machine, it will be infringed by a machine which incorporates in its

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[42] *Id.* at 344.

[43] *Id.* at 341-42.

[44] *Id.*

[45] *Id.* at 345.

[46] Winans v. Denmead, 56 U.S. (15 How.) 330, 347 (1853).

[47] In fact, the phrase "doctrine of equivalents" was not even used in *Winans*. "Doctrine of equivalents" actually did not appear until *McCormick v. Talcott*, 61 U.S. (20 How.) 402 (1857).

> structure and operation the substance of the invention; that is, by an arrangement of mechanism which performs the same service or produces the same effect in the same way, or substantially the same way.[48]

In view of this similarity, it seems clear that the doctrine, as expressed in *Winans*, was a restatement of the old test of patent infringement.[49] Rather than being a separate test or cause of action, the doctrine of equivalents was an integral part of claim construction.[50]

The Supreme Court of the late nineteenth century appears to have retained this view. In *Seymour v. Osborne*,[51] the Court stated that "[p]atentees . . . are entitled *in all cases* to invoke *to some extent* the doctrine of equivalents."[52] Similarly, in *Imhaeuser v. Buerk*,[53] the Court held that "[e]quivalents may be claimed by a patentee of an invention consisting of a combination of old elements or ingredients, as well as of any other patented improvement, provided the arrangement of the parts composing the invention is new, and will produce a new and useful result."[54] Further, *Miller v. Eagle Manufacturing Co.*[55] referred to a "range of equivalents" to which every patentee is entitled, based on the nature of the invention.[56] The same understanding of the doctrine

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[48] Burr v. Duryee, 68 U.S. (1 Wall.) 531, 573 (1863); *see also* Gray v. James, 10 F. Cas. 1015, 1016 (C.C.D. Pa. 1817) (No. 5,718) ("[W]e think it may safely be laid down as a general rule, that where the machines are substantially the same, and operate in the same manner, to produce the same result, they must be in principle the same"). *See also* Whitney v. Carter, 29 F. Cas. 1070, 1078 (C.C.D. Ga. 1810) (No. 17,583) (using similar language).

[49] The foregoing analysis somewhat follows that found in Harold C. Wegner, *Equitable Equivalents: Weighing the Equities to Determine Patent Infringement in Biotechnology and Other Emerging Technologies*, 18 RUTGERS COMPUTER & TECH. L.J. 1 (1992).

[50] A similar conclusion is reached in *Hilton Davis Chemical Co. v. Warner-Jenkinson Co., Inc., Appeal No. 93-1088, Brief for Amicus Curiae American Bar Association*, 3 FED. CIR. B.J. 375, 382 (Winter 1993) ("the doctrine of equivalents is not . . . an equitable 'remedy.' Nor is it a separate cause of action . . . The cause of action is patent infringement . . .").

[51] 78 U.S. (1 Wall.) 516 (1870).

[52] *Id.* at 556 (emphasis added).

[53] 101 U.S. 647 (1879).

[54] *Id.* at 655-56.

[55] 151 U.S. 186 (1894).

[56] *Id.* at 207.

was widespread in the lower courts during the same era.[57]

A consistent theme throughout this era was that while the doctrine of equivalents was always available to patentees, the breadth of equivalents should depend on whether an invention was a pioneer or a mere improvement. A pioneer invention was entitled to a liberal application of the doctrine, while a mere improvement was entitled to only a narrow range of equivalents.[58] This approach somewhat represented a restatement of the thinking of some of the early cases; to avoid infringing a new machine, an accused infringer must show that she had essentially achieved a new invention—or at least a very substantial improvement.[59] Short of this, she risked a charge of equivalence.

B. THE CONCEPT OF LITERAL INFRINGEMENT

The view that the doctrine of equivalents was an integral part of claim construction survived the turn of the century.[60] However,

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[57] *See, e.g.*, McCormick Harvesting Mach. Co. v. C. Aultman & Co., 69 F. 371, 393-94 (6th Cir. 1895) (holding pioneer patent entitled to wide range of equivalents, limited only by positive intention to limit scope); Erie Rubber Co. v. American Dunlop Tire Co., 70 F. 58, 64-65 (3rd Cir. 1895) (holding that broad, primary inventions entitled to correspondingly broad range of equivalents).

[58] For example, in *McCormick v. Talcott*, the Court held that:

> [i]f [the plaintiff] be the original inventor of the device or machine called the divider, he will have a right to treat as infringers all who make dividers operating on the same principle, and performing the same functions by analogous means or equivalent combinations, even though the infringing machine may be an improvement of the original, and patentable as such. But if the invention claimed be itself an improvement on a known machine by a mere change of form or combination of parts, the patentee cannot treat another as an infringer who has improved the original machine by use of a different form or combination performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress as other improvements which are not mere colorable invasions of the first.

McCormick v. Talcott, 61 U.S. (20 How.) 402, 405 (1857). *See also* Imhaeuser v. Buerk, 101 U.S. 647, 656 (1879) (calling for broad application of doctrine of equivalents in case of a "new device or an entirely new machine"); *Miller*, 151 U.S. at 207 (calling for broad application of doctrine of equivalents when invention is "broad or primary in its character").

[59] *See supra* notes 29-31 and accompanying text.

[60] *See* Continental Paper Bag Co. v. Eastern Paper Bag Co., 210 U.S. 405 (1908) (holding that range of equivalents is based on degree of invention); Brill v. Washington Ry. & Elec. Co., 215 U.S. 527 (1910) (holding narrow claim has little room for doctrine of equivalents); Brothers v. United States, 250 U.S. 88 (1919) (finding no infringement of pioneer patent).

there were growing signs of dissatisfaction with the indeterminacy of this approach. For example, in *Keystone Bridge Co. v. Phoenix Iron Co.*,[61] the Court emphasized that specific claims were statutorily required, and that "courts have no right to enlarge a patent beyond the scope of its claim."[62] Nonetheless, courts made little reference to a separate test of literal infringement, distinct from equivalence.

When did the modern test of literal infringement arise? Ironically, the concept of literal infringement can be attributed to the Supreme Court's decision in *Graver Tank & Manufacturing v. Linde Air Products*,[63] the case more often known as the wellspring for the modern doctrine of equivalents. In that case, Justice Jackson first raised the possibility of separate *legal* and *equitable* tests for infringement.

In determining infringement, he declared, a court must first determine whether the accused device "falls clearly within the claim."[64] If it does, "infringement is made out and that is the end of it."[65] In contrast, the doctrine of equivalents[66] should be available "when proper circumstances for its application arise," namely to prevent a "fraud on the patent" by an "unscrupulous copyist" who seeks to steal the invention.[67]

These passages from *Graver Tank* suggest that there is a unique "literal" meaning which can be gleaned from the words of the claim, *sans* equivalents. The legal test of infringement lies in determining whether an accused device falls within that meaning. The doctrine of equivalents is an equitable safety valve, available when the

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During this era, many courts perceived equivalents to fall *within* the scope of claims. *See, e.g.*, Noma Elec. Corp. v. M. Goldman & Co., 60 F.2d 579 (D.C. Conn. 1932) ("[t]his device is the equivalent of [the patented invention] . . . as it performs substantially the same function in substantially the same way to obtain substantially the same result. *Consequently defendant's structure . . . comes within the terms of claim 1 . . .*") (emphasis added).

[61] 95 U.S. 274 (1877).

[62] *Id.* at 278.

[63] 339 U.S. 605, 85 U.S.P.Q. (BNA) 328 (1950).

[64] *Id.* at 607.

[65] *Id.*

[66] The Court invoked the function-way-result test of *Winans* and earlier cases. *Id.* at 608 ("a patentee may invoke [the doctrine of equivalents] against the producer of a device 'if it performs substantially the same function in substantially the same way to obtain the same result' ") (quoting Sanitary Refrigerator Co. v. Winters, 280 U.S. 30, 42 (1929)).

[67] *Id.* at 607-08.

"proper circumstances," such as copying with insubstantial changes, warrant its application.

Looking at the opinion as a whole undermines this interpretation, however. After his remarks on "fraud on the patent," Justice Jackson implied that the use of the doctrine of equivalents is not limited to cases of piracy. Citing *Westinghouse v. Boyden Power Brake Co.*,[68] he noted that the doctrine may also work against the patentee by preventing a finding of infringement when "a device is so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way," even though it falls within a literal construction of the claims.[69] This undermined his earlier statement that infringement begins and ends with literal infringement.[70] Thus, there is always a lingering question of equivalence.

This latter nuance did not survive as well as Jackson's opening remarks on fraud and copying. While courts did not immediately grasp the introduction of a literal/equivalents distinction in the *Graver Tank* opinion, it was inevitable that they would do so in the future. Some seventeen years after *Graver Tank*, in *Autogiro Co. of America v. United States*,[71] the Court of Claims would clearly demarcate separate inquiries into literal infringement and infringement by equivalents, deepening the conceptual separation introduced by *Graver Tank*. Although the court was careful to include equivalents analysis as a necessary step in determining infringement,[72] a new cognitive categorization was taking shape.

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[68] 170 U.S. 537 (1898).

[69] Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 608-09 (1950).

[70] One district court immediately recognized the apparent inconsistency of Jackson's statement that literal infringement is "the end of it" and his remarks on *Westinghouse v. Boyden Power Brake*. Texas Co. v. Globe Oil & Refining Co., 112 F. Supp. 455, 466, 98 U.S.P.Q. (BNA) 312 (N.D. Ill. 1953) ("It seems to me that this statement, taken in its context, does not have this broad meaning, as is plainly indicated by the reference to *Westinghouse v. Boyden Power Brake Co.*").

[71] 384 F.2d 391 (Ct. Cl. 1967).

[72] *Id.* at 400 ("If the claims do not read literally on the accused structures, infringement is not necessarily ruled out. The doctrine of equivalents casts around a claim a penumbra which also must be avoided if there is to be no infringement").

C. INSTITUTIONALIZATION IN THE FEDERAL CIRCUIT

The advent of the Court of Appeals for the Federal Circuit has institutionalized the literal/equivalents schism.[73] In contrast to the early courts, the Federal Circuit has stated that the doctrine of equivalents is not a matter of claim interpretation because it does not act to expand claims.[74] The doctrine of equivalents increasingly has been characterized as an equitable appendage[75] to a more mainstream analysis; centered around literal infringement. This characterization has led ultimately to its marginalization.[76] Until the last few years, however, the court has begrudgingly acknowledged the need for equivalents analysis to accompany a literal infringement analysis, as outlined in *Autogiro*. As a consequence, it has retained the seeming inconsistency between the doctrines of literal infringement and equivalence.

This inconsistency has left the court uneasy. Aided by the doctrine's marginalized status, the court has moved to constrain the doctrine in the name of predictability. Starting with an attempt to limit the doctrine's application to an "all-elements" approach,[77] the

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[73] As a measure of the institutionalization of literal infringement, consider a survey of patent infringement cases conducted on the electronic databases Westlaw and Lexis. Searching cases before 1945 yields 3 "hits" on the phrase "literal infringement," with no cases referring to any two-part literal/equivalents inquiry. After 1945, there are over 500 hits, with nearly 300 coming from the district courts after 1982, the year of the formation of the Federal Circuit.

[74] Wilson Sporting Goods Co. v. David Geoffrey & Assos., 904 F.2d 677, 684, 14 U.S.P.Q.2d (BNA) 1942 (Fed. Cir. 1990) ("To say that the doctrine of equivalents extends or enlarges *the claims* is a contradiction in terms .... The doctrine of equivalents, by definition, involves going beyond any permissible interpretation of the claim language, i.e. it involves determining whether the accused product is "equivalent" to what is described by the claim language").

[75] *See* Autogiro Co. of America v. United States, 384 F.2d 391, 400 (Ct. Cl. 1967) (using doctrine as penumbra around bounds of claim).

[76] *See, e.g.*, London v. Carson Pirie Scott Co., 946 F.2d 1534, 1538 (Fed. Cir. 1991) ("the doctrine of equivalents is the exception, ... not the rule"); Charles Greiner & Co., Inc. v. Mari-Med Mfg., Inc., 962 F.2d 1031, 1031, 22 U.S.P.Q.2d (BNA) 1526 (Fed. Cir. 1992) ("the doctrine retained its traditional equitable limits").

[77] In *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931 (Fed. Cir. 1987), the court attempted to limit equivalents analysis to the finding of equivalents of "elements" in the patent claims, as opposed to a more flexible "invention-as-a-whole" approach. While the court has maintained the viability of the all-elements rule after *Pennwalt*, it has been effectively compromised in subsequent cases, which have loosened the all-elements constraint by enlarging the definition of an element. *See, e.g.*, Corning Glass Works v. Sumitomo Elect.

court's efforts can be characterized as an attempt to channel infringement analysis primarily into a test for literal infringement, with very well-constrained forays into equivalents analysis available only under specific and limited "equitable" threshold conditions.

1. Particularized testimony and linking argument. Faced with retreat on an all-elements rule,[78] the quest to constrain the doctrine of equivalents shifted ground to the question of whether other requirements should be met before the doctrine could even be invoked. The possibility of additional procedural and evidentiary requirements was first raised by Judge Lourie in dictum in *London v. Carson Pirie Scott & Co.*[79] Plaintiff London had accused defendant Samsonite of infringing its patent on a garment bag hanger clamp. In reviewing the district court's grant of summary judgment in favor of Samsonite, Judge Lourie commented:

> [a]pplication of the doctrine of equivalents is the exception, . . . not the rule, for if the public comes to believe (or fear) that the language of patent claims can never be relied on, and that the doctrine of equivalents is simply the second prong of every infringement charge, regularly available to extend protection beyond the scope of the claims, then claims will cease to serve their intended purpose . . . The present case is one in which the claims mean what they say.[80]

Applying *Pennwalt*, the court held that London had failed to raise a genuine issue of material fact by not specifically showing that the

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U.S.A., Inc., 868 F.2d 1251, 1259, 9 U.S.P.Q.2d (BNA) 1962 (Fed. Cir. 1989) (holding that "element" in all-element rule may mean series of limitations which, taken together, make up component of claimed invention); Sun Studs, Inc. v. ATA Equip. Leasing, Inc., 872 F.2d 978, 989, 10 U.S.P.Q.2d (BNA) 1338 (Fed. Cir. 1989) (holding that elements do not correspond to discrete components, and that claimed and accused devices must be examined as a whole). *See also* William E. Eshelman, *The Doctrine of Equivalents in Patent Law: Post* Pennwalt *Developments*, 65 TUL. L. REV. 883 (1991) (arguing that Federal Circuit has failed to adhere strictly to all-elements rule in cases subsequent to *Pennwalt*).

[78] *See supra* note 77.

[79] 946 F.2d 1534 (Fed. Cir. 1991).

[80] *Id.* at 1538.

accused device contained equivalents of what the court viewed as "significant" limitations in his claims.[81]

A few months later, the idea of a threshold showing as a prerequisite to the invocation of the doctrine emerged in detail. In *Malta v. Schulmerich Carillons, Inc.*,[82] plaintiff Malta had invented an improvement to musical handbells, allowing the loudness of the bells to be modulated during performance. This was achieved by turning the clapper of the bell into one of several indexed positions, causing the bell to contact surfaces of varying hardness on the clapper. Defendant Schulmerich fabricated and sold bells with similar features, differing only in that Schulmerich utilized felt pieces attached to the clapper instead of the "striking buttons" claimed in Malta's patent. Malta argued that these felt pieces were the equivalent of the striking buttons.[83]

While failing to find literal infringement, the jury found infringement by the doctrine of equivalents. The trial judge granted a judgment notwithstanding the verdict for Schulmerich. He cited the Federal Circuit's holding in *Lear Seigler, Inc. v. Sealy Mattress Co.*[84] that a plaintiff charging infringement under the doctrine of equivalents is required to present the "function/way/result" elements of *Graver Tank* in the form of "particularized testimony and linking argument."[85] The Federal Circuit upheld the district court's ruling because Malta failed to present sufficiently particularized evidence of equivalence between the felt surfaces and the striking buttons.[86] Although Malta testified that the felt surfaces were equivalent to the buttons, his claim of infringement failed because he did not distinctly explain why the surfaces and buttons were equivalent.

In her dissent, Judge Newman argued that the majority's action amounted to an improper de novo review of the evidence, and that its requirement of particularized testimony and linking argument strained credulity.[87] She argued that Malta had extensively

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[81] *Id.* at 1534.
[82] 952 F.2d 1320, 21 U.S.P.Q.2d (BNA) 1161 (Fed. Cir. 1991).
[83] *Id.* at 1338-39.
[84] 873 F.2d 1422, 10 U.S.P.Q.2d (BNA) 1767 (Fed. Cir. 1989).
[85] Malta v. Schumerich Carillons, Inc., 13 U.S.P.Q.2d 1900, 1901 (E.D. Pa. 1989).
[86] Malta v. Schumerich Carillons, Inc., 952 F.2d 1320, 1327 (Fed. Cir. 1991).
[87] *Id.* at 1331-1334.

shown how the striking buttons and the felt pieces were equivalent;[88] considering the evidence presented and the simplicity of the invention involved, the jury clearly had an adequate basis for determining equivalence.[89] Sensing an attempt to constrain *Graver Tank*'s flexible view of equivalents, she reiterated its statement that "proof of equivalence can be made in any form,"[90] and accused the majority of a paternalistic attitude toward juries which "diverts patent jury trials from the mainstream of the law."[91]

2. Fraud or copying as a threshold requirement. Notwithstanding Judge Newman's criticism, the attempt to block access to the doctrine of equivalents has moved forward. Clearly, the court is now looking at some kind of fraud threshold, in line with some of Justice Jackson's statements in *Graver Tank*.[92] The latest questions which the court has posed involve defining further equitable requirements for pleading the doctrine, and if such requirements are met, who will make the final determination of equivalence.[93]

The source of the court's questions lies in *Charles Greiner & Co. v. Mari-Med Mfg.*[94] In *Greiner*, the court reviewed a district court's finding of non-infringement under the doctrine of equivalents. The patent involved a cervical collar comprising front and back portions of a soft material, with rigid support members at the "bight" of each half of the collar. The accused device was quite similar to the patented device, to the point of being marketed by some distributors as a "generic" form of the patented collar.[95] It differed only in the construction of its rigid support members which, while also located at the bight of the collar, extended appreciably past either side of the bight.[96] The district court found that this extension took the accused device out of the range of the equivalents covered by the Greiner collar, based on examina-

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[88] *Id.* at 1336.
[89] *Id.* at 1342.
[90] *Id.* at 1343.
[91] Malta v. Schumerich Carillons, Inc., 952 F.2d 1320, 1344 (Fed. Cir. 1991).
[92] *See supra* notes 64-67 and accompanying text.
[93] *See supra* note 7.
[94] 962 F.2d 1031 (Fed. Cir. 1992).
[95] *Id.* at 1037.
[96] *Id.* at 1035.

tion of drawings in the specification and an estoppel arising from Greiner's admission that the rigid support members of his invention were located "only at the bight."[97]

The Federal Circuit affirmed the district court's ruling, and used the opportunity to expound on the limits of the doctrine of equivalents. Judge Rader proclaimed that, "[t]his court has repeatedly stated that the doctrine must not clash with the legal significance of claims . . ." and, citing Judge Lourie's comments in *London*, cautioned that the doctrine be confined to its "proper equitable role" to provide "certainty and clarity in the scope of patent rights."[98] He reiterated that the doctrine of equivalents is designed solely to prevent a "fraud on a patent," suggesting that a showing of copying might be a threshold requirement for invoking the doctrine.

Subsequent cases have amplified this theme. In *American Home Products Corp. v. Johnson & Johnson*,[99] Judge Plager stated that the doctrine is available only "when necessary to protect the rights of the patentee from fraud or other inequitable abuse," arguing that:

> the doctrine of equivalents is not an automatic second prong to every infringement charge. . . . [The patentee] must put forth proof of the equities and the trial court must provide sufficient explication of its reasoning to support any finding under the doctrine of equivalents.[100]

Further, in *Valmont Indus. v. Reinke Mfg. Co.*,[101] the court repeated the "fraud on the patent" language from *Graver Tank*, subtly adding an additional element:

> [t]he doctrine of equivalents prevents a copyist from evading patent claims with insubstantial changes. In

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[97] *Id.* at 1036. This is referred to as the doctrine of "prosecution history estoppel", under which the patentee is estopped from claiming equivalents which she gave up during prosecution of the patent application.

[98] *Greiner*, 962 F.2d at 1031 (emphasis added).

[99] 25 U.S.P.Q.2d (BNA) 1954 (Fed. Cir. 1992).

[100] *Id.* at 1956.

[101] 983 F.2d 1039 (Fed. Cir. 1993).

> applying the doctrine, the Supreme Court refused to allow an 'unscrupulous copyist to make unimportant and unsubstantial changes and substitutions in the patent.' This statement elucidates both the purpose of the doctrine *and the type of conduct which triggers its application*.[102]

Not only is the doctrine of equivalents appropriate when there is evidence of copying; such evidence may be a something extra needed to invoke the doctrine.

In *International Visual Corp. v. Crown Metal Mfg. Co.*,[103] the court hinted at the form this something extra might take. In that case, the district court granted summary judgment in favor of the alleged infringer, finding no literal infringement or infringement by the doctrine of equivalents.[104] The district court found a limitation in the patent claims that was not present in the accused device, thus precluding a finding of literal infringement.[105] Conducting a "hypothetical claim" analysis under the doctrine of equivalents, it found the accused device to be an equivalent of the patented invention, but that infringement was precluded because the same claim would have been obvious in the light of the prior art.[106]

The reviewing panel held that the district court had improperly granted summary judgment on literal infringement because it erroneously read the limitation into the claim.[107] Although the panel upheld the district court's hypothetical claim approach, it also concluded that the court's equivalents analysis was tainted by its erroneous reading of the claims.[108] The panel remanded the case for reconsideration of literal infringement, stating that if literal infringement were found, application of the doctrine of equivalents

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[102] *Id.* at 1043 (emphasis added).

[103] 991 F.2d 768, 26 U.S.P.Q.2d (BNA) 1588 (Fed. Cir. 1993).

[104] International Visual Corp. v. Crown Metal Mfg. Co., 22 U.S.P.Q.2d (BNA) 1778 (N.D. Ill. 1992).

[105] *Id.* at 1780.

[106] *Id.* at 1782.

[107] International Visual Corp. v. Crown Metal Mfg. Co., 991 F.2d 768, 771 (Fed. Cir. 1993).

[108] *Id.* at 772.

would be unnecessary.[109]

In a lengthy concurrence, Judge Lourie argued that the panel should have gone further in instructing the district court on the doctrine of equivalents. Emphasizing the "fraud on the patent" concept, he lamented that "the tripartite [*Graver Tank*] test has become a mechanical formula which can often be applied to accused infringers who are not unscrupulous copyists and who have made more than insubstantial changes, under circumstances in which it may not be equitable to do so."[110]

In an interesting twist, Judge Lourie read the *Graver Tank* statement that "equivalence is not a prisoner of formula" to mean that in order to invoke the doctrine of equivalents, other "equitable" factors are *required* beyond the "function-way-result" test. In fact, he suggested yet another two-part test: (1) a determination of whether the accused device meets the tripartite test, the hypothetical claims test and prosecution history estoppel, and, if it does, (2) a separate equitable determination, including a determination of the place of the accused device on a "copying-independent development spectrum," and the substantiality of changes between the accused device and the patented invention.[111]

D. SUMMARY: DIVISION AND DIFFERENTIATION IN DOCTRINE

This history leads to the issues presented in the *Hilton Davis* case.[112] Starting from a single idea of infringement, the courts created a new test. The doctrine of equivalents is clearly the same test of patent infringement found in the early cases. In contrast, the doctrine of literal infringement arose mainly to deal with the notice problems which exist in an ever more crowded system of property rights. The result of this differentiation are two distinct concepts of what constitutes a violation of those rights: infringement and equivalence.

The structure of the Patent Act supports these dual concepts. Under the modern Act, the idea of literal infringement involves

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[109] International Visual Corp. v. Crown Metal Mfg. Co. Inc., 991 F.2d 768, 772 (Fed. Cir. 1993).

[110] *Id.* at 774.

[111] *Id.*

[112] *See supra* note 7.

reading the section of the Act defining infringement,[113] in the light of the section requiring that the specification "point out and distinctly claim the subject matter of the invention."[114] The *Autogiro* court engaged in this reading.[115] In the absence of such a reading, however, "making, using or selling the patented invention" can also support the historically more open-ended analysis of equivalence under the doctrine of equivalents. It is this latter interpretation of the statute which has fallen into disfavor with the Federal Circuit.

In developing the copying model for the doctrine of equivalents, a distinction from the early cases has metamorphosized. Cases that preceded *Graver Tank* almost invariably distinguished pioneer inventions from improvements. These cases usually involved an inventor of an improvement seeking a judgment against a subsequent inventor who claimed a similar improvement to the same machine.[116] Although it is tempting to equate copying with equivalence under such facts, early courts generally avoided conflating infringement with imitative activity; in fact, they expressly carved out a distinction between conduct and result.[117] This distinction has gradually become blurred, particularly in the Federal Circuit.

A potential problem with basing equivalence on a concept of copying is that it is not clearly supported by the statute. Copying consists of two elements: (1) the accused infringer makes, uses or sells the invention, with (2) an intent to deceive the public and misappropriate the original invention. The statute, however, is

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[113] 35 U.S.C. § 271 (1988).

[114] 35 U.S.C. § 112 (1988).

[115] Autogiro Co. v. United States, 384 F.2d 391, 395-96 (Ct. Cl. 1967).

[116] *See, e.g.*, McCormick v. Talcott, 61 U.S. 402 (1857) (distinguishing improvements to divider, component of reaping machine).

[117] *See, e.g., McCormick*, 61 U.S. at 402 (finding that patentee for improvement by combining mechanical devices could not hold alleged infringer liable for using only part of combination). In Burr v. Duryee, 68 U.S. 531 (1863), the Court distinguished between "invasions" of a patentee's rights and "evasions" of those rights:

> it has been argued, that though not a colorable invasion of the patentee's claim, it is an evasion of his patent, which is equally injurious. If so, it is "damnum absque injuria." Every man has a right to make an improvement in a machine, and evade a previous patent, provided he does not invade the rights of the patentee.

Id. at 573-74.

only concerned with whether the accused infringer "makes, uses or sells" the invention.[118] Prevention of copying is only incidental; as originally formulated, the doctrine was not designed just for that purpose. A copying-based test limits the causal aspect of the original pioneer invention/improver distinction to a particular species of scienter. This is not the only type of causation the doctrine originally encompassed.

The appeal of the fraud on the patent doctrine arises from real experience—equivalents of inventions are often obtained by copying. Cognitively, we are likely to perceive that an object is the equivalent of another object if we perceive spatial proximity, temporal proximity and an intent to imitate. In other words, an imitation serves as a prototype equivalent. However, there are other possible prototypes.

The possibility of these other prototypes is buried in Justice Grier's maxim: a person may not invade an invention, but they are free to evade it.[119] Apart from invasion or evasion, there is the issue of the nature and extent of the invention. The attempt to decouple the doctrine of equivalents from the task of claim construction dodges this issue. Despite assertions that claims do not embrace equivalents of inventions, they do signify them. Claims point out equivalents, too; in this sense, are not equivalents the same as the invention?

Part II deals with inventions, equivalence and infringement starting from this cognitive question. Borrowing from theories of cognitive linguistics, it explains the interaction between infringement and equivalence as an interaction of metaphors of inventions. These metaphors often produce consistent results; when they do, courts have little difficulty in determining the proper scope of a patent. When they do not, a conceptual crisis ensues.

II. INFRINGEMENT AS A COGNITIVE ISSUE

> In *Winans v. Denmead* . . . the Supreme Court, apparently for the first time, laid down the doctrine over a strong dissent, and based it upon the theory

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[118] 35 U.S.C. § 271 (1988).

[119] *See supra* note 117.

> that the claim was not intended to be verbally definitive, but to cover the "invention" which should, to some extent anyway, be gathered from the disclosure at large . . . It is plain that such latitude violates in theory the underlying and necessary principle that the disclosure is open to the public save as the claim forbids, and that it is the claim and that alone which measures the monopoly . . . On the one hand, therefore, the claim is not to be taken at its face - however freely construed - but its element may be treated as example of a class which may be extended more [or] less broadly as the disclosure warrants, the prior art permits, and originality of the discovery makes desirable. On the other, it is not to be ignored as a guide in ascertaining those elements of the disclosure which constitute the "invention" and without which there would be no patent at all.[120]

As Judge Hand points out, the courts' handling of patent claims is arguably inconsistent. On one hand, the doctrine of literal infringement embodies a perspective that claims define the periphery of a fixed object, the boundary of the patent property. On the other hand, the doctrine of equivalents implies that claims also point to a discovery which transcends these literal boundaries, but which is also the claimed invention.

The usual response to this clash is in terms of balancing between two interests. The first interest is that claims "point out and distinctly claim the subject matter"[121] of the invention, which provides order and predictability. This interest is weighed against the interest in fully preserving a patentee's rights against another who "makes, uses or sells the invention,"[122] which preserves the incentives underlying the patent system. While this balancing metaphor has a certain appeal, its fairly difficult in practice. Exactly what does one balance? The proposed equation seems as

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[120] Claude Neon Lights, Inc. v. E. Matchlett & Son, 36 F.2d 574, 575-76 (2d Cir. 1929).
[121] 35 U.S.C. § 112 (1988).
[122] 35 U.S.C. § 271 (1988).

intractable as Judge Hand's "B < PL" formulation for tort liability.[123] In spite of protests about balance, one suspects that in a contest between competing interests, a court simply chooses one over the other.

This decision occurs because the determination of patent infringement is a task of categorization. Courts trying patent cases struggle to see how linguistic entities - claims - look like physical objects and motions.[124] An important aspect of this activity is that it is motivated. Theories like literal infringement and the doctrine of equivalents are metaphorical tools which allow the court to categorize perceptual data as it decides whether to bring the coercive power granted it under the patent laws. This section looks at these tools in greater depth.

A. A THEORY OF METAPHOR

The working hypothesis of cognitive linguistics, in its "experientialist" form, is that all human cognition, including language, is pervasively metaphorical.[125] Far from being found only in poetry, metaphors are our everyday tools of analogical reasoning.[126]

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[123] United States v. Carroll Towing Co., 159 F.2d 169 (2d Cir. 1947). Of course, Judge Hand recognized the impossibility of applying a quantitative test to such incommensurable factors. Moisan v. Loftus, 178 F.2d 148 (2d Cir. 1949).

[124] In fact, Justice Holmes once referred to the "felt meaning" of a claim. United States v. Johnson, 221 U.S. 488, 496 (1911).

[125] "Experientialism" is a term attributable to the linguist-philosophers George Lakoff and Mark Johnson. GEORGE LAKOFF & MARK JOHNSON, METAPHORS WE LIVE BY (1980); G. LAKOFF, WOMEN, FIRE, AND DANGEROUS THINGS (1987) . Experientialism starts with the hypothesis that human thought and action is fundamentally shaped by the linguistic function. Specifically, it posits that thought and action are pervasively influenced by metaphor, the cognitive mapping between various domains of human experience. MARK JOHNSON, PHILOSOPHICAL PERSPECTIVES ON METAPHOR 3-47 (Mark Johnson, ed. 1981).

The role of metaphor in legal discourse has been analyzed in the domain of constitutional law. *See, e.g.*, Steven L. Winter, *Transcendental Nonsense, Metaphoric Reasoning, and the Cognitive Stakes for Law*, 137 U. PA. L. REV. 1105 (1988); Steven L. Winter, *Indeterminacy and Incommensurability in Constitutional Law*, 78 CAL. L. REV. 1441 (1990). Winter's work picks up on that of Felix Cohen and Robert Cover, and the earlier work of legal realists such as Llewellyn, Corbin, and Frank.

[126] Lakoff and Johnson point out:

> Metaphor is for most people a device of the poetic imagination . . . a matter of extraordinary rather than ordinary language. Moreover, metaphor is typically viewed as characteristic of language alone, a matter of words rather than thought or action. For this reason, most

Metaphor is the means by which we create categories, which are indispensable to our everyday interaction with the world.[127] As we daily encounter new domains of experience, we act in this new domain through metaphorical projection of certain gestalts we have already constructed through our experience as physical and cultural beings.[128] As the predictive power of the metaphor is reinforced by experience in the new domain, the imaginative quality of a given metaphor is gradually submerged. It ceases to appear metaphorical and becomes a part of ordinary language. We begin to act as we talk.[129]

Metaphorical projection generates entailments, in which related structural metaphors from a source domain are carried into a target domain. This projection is partial, however, because only those parts of the source experiential gestalt that seem to be of use

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> people think they can get along perfectly well without metaphor. We have found, on the contrary, that metaphor is pervasive in everyday life, not just in language but in thought and action.

LAKOFF & JOHNSON, *supra* note 125, at 3.

[127] For example, consider waking up in the morning: you get up out of a bed (category things to sleep on), go through the bedroom door (category things to pass through) and into the kitchen (category places to eat in).

[128] This is the *motivated* aspect of metaphor:

> Because so many of the concepts that important to us are either abstract or not clearly delineated in our experience (the emotions, time, etc.), we need to get a grasp on them by means of other concepts that we understand in clearer terms (spatial orientations, objects, etc.). This need leads to metaphorical definition in our conceptual system.

LAKOFF & JOHNSON, *supra* note 125, at 115.

[129] Lakoff and Johnson offer the metaphor ARGUMENT AS WAR as an example:

> It is important to see that we don't just talk about arguments in terms of war. We can actually win or lose arguments. We see the person we are arguing with as an opponent. We attack his positions and defend our own. We gain and lose ground. We plan and use strategies. If we find a position indefensible, we can abandon it an take a new line of attack. Many of the things we do in arguing are partially structured by the concept of war .... The essence of metaphor is understanding and experiencing one kind of thing in terms of another. It is not that arguments are a subspecies of war. Arguments and wars are different kinds of things, ... and the actions performed are different kinds of actions. But ARGUMENT is partially structured, understood, performed and talked about in terms of WAR. . . . this is the ordinary way of having an argument and talking about one.

LAKOFF AND JOHNSON, *supra* note 125, at 4-5. *See also* JOHNSON, *supra* note 125, at 15-16 ("the 'fixed truths' of our culture are nothing but metaphorical understandings that have been conventionalized to the point where their metaphoricity is forgotten").

in the target domain are projected. Entailments from the source domain which do not work in the target domain are perceived as figurative, and considered outside the ordinary language employed in the target domain.[130]

Hence, metaphors are incapable of exhaustively describing the phenomena we experience. Under a classical objectivist theory of meaning, categories are defined by inherent properties. Under an experientialist theory of meaning, however, the metaphor-created categories have interactional properties; meanings are provisional according to the environment in which the imperfect metaphors are used.[131] This undermines the proposition that any categorization is capable of converging upon a single objective formulation. In place of a God's eye view, we have a plethora of models, each revealing certain truths about experience while concealing others.

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[130] Lakoff and Johnson give the example of the metaphor THEORIES ARE BUILDINGS:

> The parts of the concept BUILDING that are used to structure the concept THEORY are the foundation and the outer shell. The roof, staircases, and hallways are parts of a buildings which are not used as part of the concept THEORY. Thus the metaphor THEORIES ARE BUILDINGS has a "used" part (foundation and outer shell) and an "unused" part (rooms, staircases, etc.). Expressions such as *construct* and *foundation* are instances of the used part of such a metaphorical concept and are part of our ordinary literal language about theories.

LAKOFF AND JOHNSON, *supra* note 125, at 52-53.

[131] As an example, consider the metaphors LIGHT IS WAVES and LIGHT IS PARTICLES which are employed in physics. Neither particles nor waves appear to have an objective correlation to some object "light" in the world. The two metaphors are obviously inconsistent, yet both are accepted by physicists and engineers because they both are useful in explaining, and more importantly, predicting certain experiences. LIGHT IS WAVES is useful for determining the makeup of a star or for designing a telescope to view one. Similarly, LIGHT IS PARTICLES is useful in designing a television camera to record the image. *See* LAKOFF & JOHNSON, *supra* note 125, at 165.

Lakoff gives a concrete example of this "motivated situatedness" through case studies of the language of the Australian aboriginal Dyirbal tribe. In this language, the world is divided up into four basic categories which would seem strange to non-aborigines; for instance, one category includes women, fire, bandicoots, and poisonous species of snakes. Lakoff hypothesizes that these categories roughly correspond to a Dyirbal tribesman's basic experiential gestalts; for example, the category recited roughly (but not quite) corresponds to "dangerous things." Part of the evidence supporting Lakoff's hypothesis is that the Dyirbal system of classification appears to be breaking down over successive generations as the tribe has been exposed to Western culture. *See* LAKOFF, *supra* note 125, at 92-102.

B. METAPHOR IN INFRINGEMENT DOCTRINE

The history of infringement doctrine reveals a problem of categorization. Our inability to formulate a set of necessary and sufficient conditions to define inventions is reflected in the fact that two of our major metaphors of invention, INVENTIONS ARE OBJECTS and INVENTIONS ARE DISCOVERIES, are essentially incomplete and inconsistent. This section's working hypothesis is that INVENTIONS ARE OBJECTS is the main source of concepts like claims measure the invention and literal infringement, while the metaphor INVENTIONS ARE DISCOVERIES is the main source of concepts like pioneer inventions and the doctrine of equivalents. The inconsistencies between these metaphors partially explain the dissonance in doctrine, while the ascendancy of certain entailments of each helps explain decisions in particular cases or particular eras.

1. Inventions are objects. The metaphor INVENTIONS ARE OBJECTS is largely spatial, motivated by a need to administer relationships between people. A convenient way of administering these relationships is to divide the world into discrete objects, and give individuals possession of these objects. Such division allows people to trade these objects between themselves to acquire the various objects they desire. In manipulating these objects, it is useful to define them in terms of boundaries which enclose spaces. A person's rights in an object are violated when another touches or penetrates those boundaries. Entailments for INVENTIONS ARE OBJECTS might include: (1) INVENTIONS CAN BE POSSESSED; (2) INVENTIONS CAN BE TRANSFERRED; (3) INVENTIONS HAVE BOUNDARIES, INSIDES AND OUTSIDES, MEASURABLE EXTENT, AND ELEMENTS; (4) INVENTIONS CAN BE PENETRATED; AND (5) INVENTIONS CAN BE COPIED.

These entailments are found in the Constitution, the patent statute and case law. The Constitution seeks to secure for the inventor the "exclusive Right."[132] The patent statute allows for ownership and assignment of an invention;[133] it also requires an

[132] U.S. CONST. art. I, § 8, cl. 8.
[133] 35 U.S.C. § 261 (1988).

invention to be pointed out and distinctly claimed.[134] Many cases speak of scope, breadth and coverage, and of expanding and limiting claims.[135] The concept that inventions have elements is also widespread.[136]

Finally, there is the concept of infringement itself. One definition for "infringe" is "to break in or encroach on or upon."[137] Its use in the context of patents suggests that claims define a space, and that violation of that space occurs when someone encroaches on boundaries defined by claims. Starting with the early cases, which speak of the *invasion of the patent right*,[138] cases in the mid-nineteenth century begin to speak interchangeably of the *invasion of the patent*.[139] In ordinary discourse, the patent becomes a bounded object subject to touches or penetrations by infringers.

The INVENTIONS ARE OBJECTS metaphor is critical to the idea of infringement. In a culture which places great importance on the possession and exchange of objects, a model which places innovation in discrete packages is very useful. It enables inventions to be possessed, and it creates markets. Through concepts like scope, elements and infringement, INVENTIONS ARE OBJECTS provides a powerful analytical tool for courts deciding the extent of these packages and how people interact with them.

2. Inventions are discoveries. The metaphor INVENTIONS ARE DISCOVERIES is both spatial and temporal. A discoverer is

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[134] 35 U.S.C. § 112 (1988).

[135] *See, e.g.*, Battin v. Taggert, 58 U.S. 74, 84 (1854) ("scope of the patentee's invention"); The Driven-Well Cases, 122 U.S. 40, 59 (1887) ("enlarge the scope of the claim so as to cover"); Yale Lock v. Greenleaf, 117 U.S. 554, 558-59 (1886) ("The scope of letters patent must be limited to the invention covered by the claim").

[136] *See, e.g.*, Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931, 935 (1987) (holding there was no infringement); Lemelson v. United States, 752 F.2d 1538, 1551 224 U.S.P.Q. (BNA) 526 (1985) (holding that plaintiff failed to prove infringement).

[137] THE SHORTER OXFORD ENGLISH DICTIONARY 1070 (3d ed. 1973).

[138] *See, e.g.*, Evans v. Eaton, 16 U.S. (3 Wheat) 454, 496 (1818) (holding that patent conveyed only an exclusive right to improvement); Barrett v. Hall, 2 F. Cas. 914, 922 (C.C.D. Mass. 1818) (No. 1,047).

[139] *See, e.g.*, McCormick v. Talcott, 61 U.S. 402, 405 (1857); Cawood Patent, 94 U.S. 695, 710 (1876); Tilghman v. Proctor, 125 U.S. 136, 147 (1888). Then there is Justice Jackson's statement in *Graver Tank* that "[i]f accused matter falls clearly *within* the claim, infringement is made out . . . ." Graver Tank & Mfg. Co. v. Linde Air Products Co., 339 U.S. 605, 607 (1950) (holding that finding of infringement by defendant's device under doctrine of equivalents was not clearly erroneous).

someone who finds some previously unknown place. As later explorers define its contours, this place often turns out to be more extensive than the discoverer's initial contemplation. The discoverer is entitled to a share of this reward because the temporal concept of causation tells us that without the initial discovery, there would be no later explorers. Entailments for INVENTIONS ARE DISCOVERIES might include: (1) INVENTORS FIND UNKNOWN PRINCIPLES; (2) INVENTORS ARE PIONEERS; (3) PIONEER INVENTIONS HAVE ILL-DEFINED BOUNDARIES; AND (4) INVENTORS OWN WHAT THEY FIND AND OWNERSHIP OF INVENTIONS CAUSES FURTHER INVENTION.

INVENTIONS ARE DISCOVERIES is found in the Constitution:

> The Congress shall have Power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and *Discoveries*.[140]

Also here are the entailments that securing ownership in discoveries provides an incentive to further discovery, thus furthering the public good.

These entailments are also at work in the cases, particularly in the concept of a pioneer invention. In *Reutgen v. Kanowrs*, the inventor of a machine for making iron bolts sued a former employee who had invented a putative improvement to the original machine.[141] The original inventor created his machine by modifying yet another machine, a common tilt.[142] The defendant's machine was similar, except it also included "swedges." An intriguing aspect of the case is the way Judge Washington characterized the patented invention and the accused device. He referred to the plaintiff's machine as the "discovery" or the "original invention," while referring to the defendant's machine as an "improve-

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[140] U.S. CONST. art. I, § 8, cl. 8.

[141] Ruetgen v. Kanowrs, 20 F. Cas. 555, 556 (C.C.D. Pa. 1804) (No. 11,710).

[142] A common tilt is a heavy powered hammer/anvil combination used in forging. The invention consisted of providing the hammer and anvil with concave surfaces, moved by a cogwheel powered by water or the like. *Id.* at 555-56.

ment."[143] The inventor of the original machine is entitled to the "principal" of the machine. The accused escapes liability for infringement only if his machine represents an improvement on the plaintiff's principle, as opposed to an improvement on the principal of the tilt.[144] Clearly, this characterization is essential to the interpretation of the patentee's claims.

In *Odiorne v. Winkley*, Justice Story invokes this same distinction:

> suppose a watch was first invented by a person so as to mark the hours only, and another person added the work to mark the minutes, and a third the seconds; each of them using the same combinations and mode of operations, to mark the hours, as the first. In such a case, the inventor of the second-hand could not have entitled himself to a patent embracing the inventions of the other parties.[145]

The inventor of the original watch would have rights enforceable against the others because he got "there" first. Even though he has invented an arguably worthless invention—a watch with no minute or second hands—the others cannot produce their watches without his permission, as long as we perceive that his watch was the original invention.

Finally, in *Gray v. James*, Judge Washington responds to a defendant's arguments that a patentee's machine was not useful or, more specifically, was not an invention, by pointing out that:

> [I]f the machine be useless, it may fairly be asked, why do they use it? If they give the answer . . . this it was used with improvements which make it valuable, may it not be replied, that this proves that the original invention was useful? For, if that had not been made by some person, it is obvious that the improvements could have not been made. *If [the*

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[143] *Id.* at 556.
[144] *Id.* at 556.
[145] Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

> *plaintiff] . . . had not made the discovery which he did, can any person doubt that the present improved and valuable [machinery] would be unknown in the world?*[146]

At work here is a concept that certain inventors are entitled to a quantum of ownership simply because they get to a certain place first; "[t]he inventor of the original machine . . . may lawfully enjoy the *full* benefit of that discovery, *notwithstanding the improvement made upon it by a subsequent discoverer.*"[147] In the domain of discoveries such a place might be a continent, while in the domain of inventions, it is the principle or substance. This is an entailment of INVENTIONS ARE DISCOVERIES; inventions are analogous to particular objects or locations which have particular temporal/causal relationships.

The later doctrine of equivalents cases reiterate this theme. For instance, in *McCormick v. Talcott* a key issue was whether the patentee discovered the underlying principle of the divider:

> If [the plaintiff] be the original inventor of the device or machine called the divider, he will have a right to treat as infringers all who make dividers operating on the same principle, and performing the same functions by analogous means or equivalent combinations, even though the infringing machine may be an improvement of the original, and patentable as such. But if the invention claimed be itself an improvement on a known machine by a mere change of form or combination of parts, the patentee cannot treat another as an infringer who has improved the original machine by use of a different form or combination performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress other improvements which are not mere colorable invasions of the first.[148]

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[146] Gray v. James, 10 F. Cas. 1015, 1018 (C.C.D. Pa. 1817) (No. 5,718) (emphasis added).
[147] Evans v. Hettick, 8 F. Cas. 861, 867 (E.D. Pa. 1818) (No. 4,562) (emphasis added).
[148] McCormick v. Talcott, 61 U.S. 402, 405 (1857).

In the domain of discovery, this is analogous to a comparison of Columbus's discovery of America to DeSoto's discovery of the Mississippi River and Balboa's discovery of the Pacific. De Soto and Balboa both owe a debt to Columbus because without him, both would still be in Spain. However, Balboa and de Soto owe nothing to each other. For our inventors, if McCormick is the discoverer of the place identified as the divider, Talcott owes him a debt even if he is exploring hitherto unexplored frontiers of that place. If McCormick is himself just an explorer of the divider, however, Talcott would not be an infringer unless his device is essentially identical to McCormick's.

Exploring the metaphor, although Columbus discovers America, the only concrete terms in which he can describe it refer to the much narrower domain of Hispaniola. He writes to Isabella and Ferdinand, describing the natives, the palm trees and the coconuts, and asks to be named governor. De Soto comes along, explores North America from Georgia to the Mississippi. Yet, because of the perceived spatial and temporal/causal relationship between the two, we somehow feel comfortable with the notion of giving a right in all of America to Columbus and not to de Soto; Columbus's discovery is somehow worth more than de Soto's. If we did not recognize this greater worth, the incentive for people to act like Columbus would be diminished. We read Columbus' claim to cover de Soto's, even though he did not literally discover Georgia or the Mississippi River.

Under the doctrine of equivalents, we similarly are comfortable reading McCormick's claims to include Talcott's divider, if we can think of McCormick as the original or pioneer inventor. This is because experience tells us that when one first discovers a principle, one cannot imagine its possible extent. The fact that the boundaries of a pioneer invention cannot be clearly defined should not preclude the pioneer inventor from having a right even in that part of the place which he was unable to claim. His invention is worth more because he found it first, which allowed others to follow. The incentive to discover new principles would be diminished if we acted otherwise. This is an effect of the spatial and temporal entailments of the metaphor INVENTIONS ARE DISCOVERIES. We define the extent of an invention in terms of a temporal relationship between inventors.

The INVENTIONS ARE DISCOVERIES metaphor is useful in explaining experiences about which the INVENTIONS ARE OBJECTS metaphor is silent. It embraces the commonly held perception that someone who finds something first owns it as against subsequent explorers because the initial discovery paves the way for them. This notion is manifest in the idea that a pioneer inventor finds an abstract place, a general principle which transcends the literal limits of claims.

C. INTERACTION BETWEEN THE METAPHORS

At times, INVENTIONS ARE DISCOVERIES is consistent with INVENTIONS ARE OBJECTS, while at other times the metaphors collide. For instance, INVENTIONS ARE DISCOVERIES relies on the object aspect of INVENTIONS ARE OBJECTS; an inventor finds a thing, a *principle*. In contrast, collision occurs because INVENTIONS ARE DISCOVERIES entailments such as PIONEERS ARE SUPERIOR TO IMPROVERS AND INVENTIONS DON'T HAVE WELL-DEFINED BOUNDARIES do not mesh well with the spatial entailments of INVENTIONS ARE OBJECTS.

Alone, the recognition of this effect is no great revelation—it is the familiar tension between order and equity noted by many commentators.[149] The interesting thing to note is that although this tension is often recognized, decisions rest on the ascendancy of one or the other metaphor. Why is this? Though many commentators discuss balancing interests in the process of "defining the scope" of the patent grant, courts really do not do that. They simply decide whether or not an accused device infringes.

In cases where the court clearly perceives the patented invention as a pioneer, the INVENTIONS ARE DISCOVERIES metaphor dominates. For example, in *Hughes Aircraft v. United States*,[150] the court focused on how the patentee of a new type of satellite altitude control system solved a technical problem which huge government expenditures had been unable to solve.[151] While not quite of the stature as the first spin-stabilized satellite, the court

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[149] *See supra* note 6.
[150] 717 F.2d 1351 (Fed. Cir. 1983).
[151] *Id.* at 1351.

considered the patented invention to be a sort of pioneer. Thus, he was entitled to a range of equivalents broader than "that very narrow range of equivalents applicable to improvement patents in a crowded art."[152]

However, the court did not describe exactly the range nor how far inside the range the accused device penetrated - it would be difficult if not impossible to do so. MEASURING DISTANCE FROM A BOUNDARY is an entailment of the INVENTIONS ARE OBJECTS metaphor which is not useful within the experience of invention. What dominates is the temporal relationship between the patent and the accused devices. The OBJECTS entailments of boundaries and elements are barely mentioned. The court applied an "invention as a whole" approach to the "function-way-result" test and the patentee won, even though the accused satellites were arguably different from the patented invention.

In contrast, INVENTIONS ARE OBJECTS dominates in cases where the court is convinced that an invention is not a pioneer. For example, the majority opinion in *Pennwalt Corp. v. Durand-Wayland, Inc.* denied pioneer status for the plaintiff's patent.[153] This rejection revealed the underlying weakness of the INVENTIONS ARE DISCOVERIES metaphor in the case, leaving the field open to INVENTIONS ARE OBJECTS. Declaring that claims strictly define the measure of a patent, the court turned an obligatory doctrine of equivalents inquiry into a redundant literal infringement test by adopting the "all elements" rule.[154]

However, the court could not define the boundaries of the claims any better than it could in *Hughes Aircraft*; that entailment of the INVENTIONS ARE OBJECTS is still too metaphorical. The court found a literal detail in the patent which it could not find in the accused device,[155] and the patentee lost. INVENTIONS ARE DISCOVERIES is still powerful in the dissent because the dissent envisioned the case as being more like *Hughes Aircraft*.[156]

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[152] *Id.* at 1361.

[153] 833 F.2d 981, 937 (Fed. Cir. 1987).

[154] *Id.* at 938.

[155] Note that in dissent, Judge Bennett quite easily finds an equivalent of the limitation on which the majority hangs its decision. *Id.* at 944.

[156] *Id.* at 941-42.

Even an enigmatic case like *Texas Instruments v. United States International Trade Commission*[157] can be explained in terms of these metaphors. The court considered a possible infringement of the first patent on the electronic hand-held calculator by several imported calculators which employed state of the art technology.[158] The claims of the patent were written in very broad "means-plus-function" terms,[159] which made it difficult to avoid a finding of literal infringement. In such a situation, INVENTIONS ARE OBJECTS should carry the day and produce a finding of infringement.

But INVENTIONS ARE DISCOVERIES also had great force because the invention was clearly pioneering. Texas Instruments discovered the calculator, but allowing the literal scope of Texas Instruments' claims to prevail would be the cognitive equivalent to saying Columbus discovered Alaska because Alaska is now part of America. The temporal relationship was too remote to allow INVENTIONS ARE OBJECTS to dominate. Thus, the court applied the reverse doctrine of equivalents.[160] INVENTIONS ARE DISCOVERIES prevails, and the court barely mentioned boundaries and notice.

Thus, a court usually reads a claim as pointing to or describing different inventions, depending on whether it perceives the invention as more like an OBJECT or more like a DISCOVERY. Generally, if the invention looks like a discovery, then the claims refer to the principle of the invention—the place—and the court ignores boundaries and notice. If the invention looks more like an OBJECT, the court dissects the claims, makes statements like "claims measure the grant," and emphasizes that failure to keep to

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[157] 805 F.2d 1558 (Fed. Cir. 1986).

[158] *Id.* at 1561-62.

[159] The claim included an "input means," "electronic means for performing arithmetic computations," "memory means," and "display means." *Id.* at 1561. However, the patent came early in the first generation of such devices, and the specification described preferred embodiments using first-generation technology such as bipolar junction transistors and thermal printers. *Id.* at 1566-67.

[160] The reverse doctrine of equivalents holds that accused devices do not infringe a patent because of the stretch of time and intervening events between the issuance of the patent and the alleged infringement. *Id.* at 1558.

the literal meaning of the claims has implications for due process and the integrity of the patent system.[161]

D. OTHER POSSIBLE METAPHORS

The INVENTIONS ARE DISCOVERIES and INVENTIONS ARE OBJECTS are only two of many possible metaphoric projections capable of producing the phenomena observed in patent cases. If one accepts the theory of metaphor, there is conceivably an infinite variety of metaphorical projections which may be at work in a given culture, with different metaphors predominating in particular contexts. Talking about a few simply opens up the possibility of finding others. At best, it provides yet another handle on the amorphous problem that Judge Hand referred to in *Claude Neon Lights*.[162]

One important thing to keep in mind—assuming one accepts the explanatory power of experientialism—is that these metaphors may not continue to be as dominant as they have been in the past. Dominant metaphors in patent law will change as the technological, economic and legal environment changes. Some of these changes will be the result of experiences which are more physical in character, while others will be of a more cultural nature.[163] All will be subject to a certain inertia.[164] As for the current trend of

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[161] Cases like *Texas Instruments v. United States Int'l Trade Comm'n* reinforce this hypothesis. There, the claim was overly broad, possibly due to unconscious assumptions about the pace of technological development in the field. Even though the claim was too broad, the court could not declare it invalid based on a lack of novelty or obviousness; thus, it was stuck with a finding of literal infringement unless it could find a way to modify the literal meaning of the claims, which is did through the doctrine of equivalents. Texas Instruments v. United States Int'l Trade Comm'n, 805 F.2d 1558, 1568 (Fed. Cir. 1986).

[162] *See supra* note 13 and accompanying text.

[163] In experientialist terms, "physical" does not mean more basic or real. An example of an experiential input which is more physical in nature is the perceived effect on our bodies of what we call gravity - it pushes us down. In the context of patent law, physical experience might change through developments in the basic sciences such as genetics or particle physics, *i.e.*, through fundamental changes in our abilities to interact with a physical environment. Changes in experience which are more "cultural" might include changes in economic or political organization. It is important to realize, however, that these experiences are often interrelated. LAKOFF & JOHNSON, *supra* note 125.

[164] Steven Winter discusses the phenomenon of inertia or "sedimentation" in the context of the emergence of "new" constitutional rights, such as privacy. *See* Steven Winter, *Indeterminacy and Incommensurability in Constitutional Law*, 78 CAL. L. REV. 1441 (1990).

the Federal Circuit, it can be explained in terms of the ascendancy of the INVENTIONS ARE OBJECTS metaphor, which appears to be at work in the copying limitation on the use of the doctrine of equivalents.

One suspects that the dominance of this metaphor may be linked to a controlling perception that technological development is increasingly a battle between intense competitors fighting at the margins of modestly inventive, but extremely valuable inventions in a crowded art.[165] In such an environment, inventions are complex and close together. The ELEMENTS and BOUNDARIES entailments of INVENTIONS ARE OBJECTS are useful tools in dealing with this complexity. A COPYING entailment is similarly useful because it limits a broad inquiry into temporal/causal relationships between a patented invention and an accused device to an ostensibly simpler inquiry into the conduct of the accused infringer. However, these tools face some of the same serious obstacles in the INVENTIONS ARE DISCOVERIES metaphor and the patent statute itself.[166]

The conclusion of this Note discusses the implications of the ascendancy of the INVENTIONS ARE OBJECTS metaphor, specifically in the context of the issues the Federal Circuit has raised about the doctrine of equivalents. It also suggests some ways in which an analysis of the cognitive bases of infringement doctrine might support some alternative paths the court appears to be taking. These alternatives are linked to the competing metaphor INVENTIONS ARE DISCOVERIES, which captures the diversity-building incentives underlying intellectual property laws.

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[165] For instance, when an electronics firm develops a new microprocessor, the development takes many years and several millions of dollars. However, it is not perceived as a spectacular breakthrough in comparison to the initial discovery of the transistor or the integrated circuit, even though probably as much or more time and effort is expended developing the microprocessor as was spent on the initial research on the transistor. One factor in our perception of the inventiveness of a particular invention is the perceived frequency of similar inventions. For instance, with the development of computer design, simulation and test, electronics inventions have become almost commonplace. *See, e.g.*, Mark J. Rozman, Recent Development, Intel v. ULSI System Technology, Inc., 1 J. INTELL. PROP. L. 373, 390-93 (1994) (discussing background of microprocessor industry).

[166] *See supra* note 118 and accompanying text.

III. CONCLUSION

> [T]he chemical metaphor is both beautiful and insightful. It gives us a view of problems as things that never disappear utterly and that cannot be solved once and for all. All of your problems are always present, only they may be dissolved and in solution, or they may be in solid form. The best you can hope for is to find a catalyst that will make one problem dissolve without making another one precipitate out. And since you do not have complete control over what goes into solution, you are constantly finding old and new problems precipitating out and present problems dissolving, partly because of your efforts and partly despite anything you do.[167]

A. THE NEED FOR DIVERSE METAPHORS

The crisis presented by the doctrine of equivalents is not all that unusual. It is an example of what Thomas Kuhn refers to as a "crisis of normal science," the inevitable failure of models to completely describe a given set of phenomena.[168] For patent law, the infringement/equivalence controversy is a similar anomaly, one for which there will not be a complete solution.

However, the idea that a particular model or set of rules will solve the problem is seductive. Models—metaphors—provide a means to predict, giving a basis for expectation and action. But, as Lakoff and Johnson point out:

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[167] GEORGE LAKOFF & MARK JOHNSON, METAPHORS WE LIVE BY 143-144 (1980).

[168] THOMAS KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS 66-76 (2d ed. 1970). In theoretical physics, for example, such a crisis developed around the Bohr model of atomic interaction. A miniature solar system held together by deterministic forces was a powerful model, but eventually it just did not cohere with certain experimental observations. De Broglie's introduction of electron wave theory helped explain some of these phenomena, but neither wave theory nor particle theory give a complete account of all phenomena. P. TIPLER, PHYSICS 968 (1976).

> it is one thing to impose a single objectivist model in some restricted situations and to function in terms of that model - perhaps successfully; it is another to conclude that the model is an accurate reflection of reality. There is a good reason why our conceptual systems have inconsistent metaphors for a single concept. The reason is that there is no one metaphor that will do.[169]

If the Federal Circuit thinks it can eliminate uncertainty in infringement cases by confining courts to the literal interpretation of claims, with a limited exception for copying, it is likely to be as unsuccessful in this effort as it was in keeping to the "all-elements" rule of *Pennwalt*.[170] As the chemical metaphor suggests, new problems will precipitate out.

Departing from the chemical metaphor, the fate of doctrine of the equivalents raises ecological issues. The effects of the Federal Circuit's decisions will be distributed throughout the technological community, in ways which are at best only dimly perceived. In keeping with the ecology metaphor, the question may be whether the court's doctrinal moves reach an ecological dead end.

By emphasizing the INVENTIONS ARE OBJECTS metaphor for the sake of uniformity, the court risks ignoring other metaphors which offer equally useful insights into the development of technology. For example, INVENTIONS ARE OBJECTS has little to say about incentives for pioneering achievements, or about the collaborative aspects of innovation which have been of critical importance in the development of many new technologies. Uniformity at the cost of these values may not be worth the cost.

As an alternative to arguments for uniformity, we might look at these issues using the metaphor DIVERSITY IS A SURVIVAL VALUE, an entailment of our ecology metaphor that shares much with INVENTIONS ARE DISCOVERIES. Our experience of ecosystems is that once the diversity of a stable ecosystem is reduced, that ecosystem's robustness may be diminished, rendering the remaining species vulnerable to destruction from environmental

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[169] LAKOFF & JOHNSON, *supra* note 125, at 220-21.

[170] *See supra* note 77.

changes. Examining the incentives embodied in the INVENTIONS ARE DISCOVERIES metaphor, we can see that patents help encourage efforts in unconventional directions, protecting them from the crush of the status quo and ensuring technological diversity.[171] This is one aspect of the patent system which we risk losing with the ascendancy of the INVENTIONS ARE OBJECTS metaphor.

B. ANSWERING THE COURT'S QUESTIONS

Judge Lourie's comment that application of the doctrine of equivalents is becoming habitual and mechanical may be correct;[172] the "function-way-result" standard seems very malleable. A question which the court has avoided, however, is whether this truly is a problem. If it is, there is good reason to suspect that it is overblown, as technological development in the United States has managed to proceed quite well under traditional practices.

The myth is that courts do not already engage in a well-constrained inquiry into infringement. Under the current two-part test, a literal reading of claims should normally prevail as long as our system of invention disclosure remains cognitively adequate. If the system is adequate, the doctrine of equivalents should receive cursory treatment in most cases. Claiming practice is highly conventionalized, and most fact finders will be persuaded by a given literal interpretation of a claim. In addition, factors such as the prosecution history estoppel and the hypothetical claims analysis tend to diminish the probability of juries and judges running amok.

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[171] This incentive even works toward the recognition of serendipitous accidents requiring very little investment. The point is that patents help create the consciousness that *any* new interpretation of experience may be potentially useful. This value in diversity should be distinguished from the idea of aggregate economic efficiency, with which it does not exactly coincide. Patent laws do not exist to provide fixed expectancies for investors; to the contrary, they exist in part to encourage people to pursue activities which often make little economic sense, at least in a prospective sense. *See* Robert P. Merges, *Uncertainty and the Standard of Patentability*, 7 HIGH TECH. L.J. 1, (1992) (arguing that purpose of nonobviousness standard, including protection for both methodical and serendipitous invention, is to encourage research which is highly uncertain).

[172] *See supra* note 80 and accompanying text.

Given this, worrying that the doctrine of equivalents might become the rule instead of the exception misses the point. The doctrine of equivalents serves as a monitor of the health of our system of invention disclosure. If we have a predominance of findings of infringement by equivalents, we should worry more about the viability of this system. An explosion of findings of infringement by equivalents would tend to indicate that our methods of disclosure are inadequate for making new technologies patentable, and that we may be losing the ability to talk to each other about inventions.[173] A more sensible response to this problem may be to seek improvement of the mode of disclosure, instead of doing away with a doctrine which compensates for its inadequacies.

These inadequacies can cut both ways. A patentee can claim either too little or too much.[174] Generally, interpreting claims involves the difficult but unavoidable task of assigning a substantive value to inventions. Merges and Nelson point out that the doctrine of equivalents and its reverse provide a means for courts to adjust patent scope, based on an *ex post facto* analysis of the patent in the context of its economic and technological environment.[175] This is an effect of the temporal/causal entailments of the INVENTIONS ARE DISCOVERIES metaphor discussed herein. It guarantees that the scope of patents will always in some sense be uncertain.

The proposed copying approach attempts to avoid this uncertainty by adopting a limited contract view of the patent process, a view consistent with the dominance of the INVENTIONS ARE OBJECTS metaphor. Under this metaphor, temporal/causal relationships are limited to those normally associated with objects; someone touches your object or copies it. The copying paradigm

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[173] As media for expression become more varied, one wonders if written specifications and claims are anachronistic. The way claims are written now renders them almost useless; Judge Plager of the Federal Circuit seems to think they are. *See An Interview with Circuit Judge S. Jay Plager*, J. PROPRIETARY RTS., Dec. 1993, at 2 ("I no longer think the claims I read are going to tell me what I need to know—even aside from having to look at the specification and file history").

[174] *See supra* notes 150, 157 and accompanying text.

[175] *See* Robert P. Merges and Richard P. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 908-16 (1990) (discussing economics of patent scope as affected by courts' discretion in patent law).

views these as the only types of events which justify modifying the contract. Given the intrinsically uncertain scope of patents, it is a dubious enterprise to view patent prosecution in terms of a contract model because both parties are negotiating without any basis for expectation. But even contract theory recognizes other events which serve to undermine the original intent of the parties, such as mistake and changed circumstances.[176]

The requirement that an argument for infringement by equivalents be accompanied by particularized testimony and linking argument might help broaden a fact finder's cognitive experience, but one suspects that it is much like the "function-way-result" test, a mere statement of the problem. It is difficult to say what the standard means, and in many cases its assertion is pointless, if not harmful. It is difficult to imagine how anyone could convince a fact finder that an accused device is an infringing equivalent without offering some kind of evidence and argument as to how it is equivalent, especially when an opposing party is arguing vehemently that it is not. When considering more complex rules of pleading and production, perhaps the Federal Circuit should temper its sense of mission with the realization that the adversary system and the common sense of judges and juries can adequately resolve many cases.

Admittedly, this becomes problematic in technically complex cases. While the division of labor in our modern society makes possible many of our complex technological achievements, it also makes it difficult to empanel a jury or judge with sufficient experience to be sensitive to many of the nuances of specialized technical issues. In such cases it is tempting to argue for special-

[176] The same goes for advice given by patent attorneys. One of the chief complaints about the doctrine of equivalents is that is makes it difficult for patent attorneys to advise their clients. *See supra* note 12.

Presumably, a competent attorney relies on more than a literal interpretation of a patent document when giving advice. In addition to being familiar with the documents, he also is knowledgeable enough about the technology to have at least an educated "feel" for what might be argued to be an equivalent, and how to respond to such arguments. While no one would quarrel with eliminating as much arbitrariness from the law as is possible—that is what due process is all about—the patent laws do not exist to make life easier for patent attorneys.

ized tribunals with ever more complex rules of procedure.[177] However, we expose ourselves to danger if we abdicate the determination of such issues to those whose experience is limited to parochial, conventionalized notions of law and technology. Moreover, technically complex cases are not all that the patent laws must accommodate; technically complex procedures presuppose technically complex cases. We should keep in mind that a patent system which accommodates diversity may be more robust.

Judge Lourie's equitable threshold idea may be even more dangerous. Many current cases fit the situation which gives rise to Judge Lourie's copying test. However, conventionalizing this into new burdens of proof and persuasion is ill-advised because the inertia of these new rules unnecessarily constrains courts in future cases. No one can offer any prediction as to what degree of economy or certainty will be gained by raising a barrier to the application of the doctrine.[178] Its practical effect may be to shift the uncertainty and inefficiency attributed to the doctrine of equivalents to the issue of whether the equitable threshold has been met.[179]

The search for an alternative to the function-way-result test of *Graver Tank* is ironic because it is only a label for the amorphous cluster of meaning we call equivalence or infringement.[180] Equiv-

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[177] *See* Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 1-2 (1989) (reciting arguments for specialized "science courts" to adjudicate technical issues).

[178] Judge Plager claims that the doctrine of equivalents has contributed to the practice of drafting claims that are abstract and overly general, and that reigning in the doctrine of equivalents might encourage patent lawyers to right more straightforward claims. *See An Interview with Circuit Judge S. Jay Plager*, J. PROPRIETARY RTS., Dec. 1993, at 2 (1993) ("As a basic proposition, you ought to get nothing more than what your claims give you because, among other things, that will, with all due respect, for the patent prosecution bar to draft claims that make sense"). However, it seems possible that the source of today's baroque claiming techniques is the opposite—the abstruseness of claims seems to track the increasing literalism on the part of the Patent Office, patent lawyers and the courts. Quite possibly, the effect of diminishing the availability of the doctrine of equivalents could be that patent lawyers will attempt even more abstract language in an effort to stretch available "literal" interpretations.

[179] It seems inevitable that once a copying test is announced, litigants will routinely claim copying. Since the accused infringer will theoretically *always* have access to the patent—unlike a case of copyright infringement, for example—it will often be difficult to differentiate between an intent to design around a patent and an intent to copy.

[180] *See supra* note 13 and accompanying text.

alence is likely to include aspects of function, behavior, history and whatever else that might be involved in deciding whether an accused infringer makes, uses or sells a patented invention. In contrast, literal infringement is a judicially-created doctrine arising from a limited, conventionalized reading of the patent statute.[181]

This reading does not represent the triumph of a better, more objective idea of inventions. It simply is the triumph of a particular metaphor for inventions—a metaphor in which inventions are objects with clearly definable boundaries, insides, outsides, and elements. Under this metaphor, patent laws exist merely to regulate the trade in these boxes, through a literalist approach to claim interpretation. However, the patent laws embrace more than one metaphor for invention. Conventionalizing the INVENTIONS ARE OBJECTS metaphor submerges other concepts embodied in the patent system, including the diversity-building incentives found in the metaphor INVENTIONS ARE DISCOVERIES. Instead of limiting discourse to achieve an illusory goal of certainty, it may be wiser to look for even more metaphors.

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[181] *See supra* notes 113-115 and accompanying text.