

The Economics of Improvement in Intellectual Property Law¹

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I have a colleague in practice who claims that as a trade secrets lawyer, his job is to "prosecute thieves and defend entrepreneurs." For a lawyer in private practice, determining which is which may not be that difficult on a case-by-case basis: the answer may depend largely on who is paying the bills. Courts hearing intellectual property cases are not so fortunate, however. They must find a way to distinguish between *improvement* -- which is thought to be a noble task, a necessary part of innovation, and generally to be encouraged -- and *imitation*, which is generally considered both illegal and even immoral.³ This distinction is not easy to make, but it is critical to achieving the proper balance of intellectual property rights. Allow too much imitation, and you will stifle the incentives for development and commercialization of new products. Discourage improvements too strongly, and you will freeze development at the first generation of products.

This problem is not new. Even before the United States adopted its patent and copyright laws, Lord Mansfield said the following in an English case involving a copyright claim against improved navigational charts: "The rule of decision in this case is a matter of great consequence to the country. In deciding it we must take care to guard against two extremes equally prejudicial; the one, that men of ability, who have employed their time for the service of the community, may not be deprived of their just merits, and the reward of their ingenuity and labor;

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³ See generally Jeremy Waldron, *From Authors to Copiers: Individual Rights and Social Values in Intellectual Property*, 68 **Chi.-Kent L. Rev.** 841, 842 (1993) (treating the morality of copying); Laurie Stearns, Comment, *Copy Wrong: Plagiarism, Process, Property and the Law*, 80 **Cal. L. Rev.** 513 (1992) (distinguishing plagiarism from copyright infringement, and arguing that the former is immoral).

the other, that the world may not be deprived of improvements, nor the progress of the arts be retarded."⁴ Unfortunately, there has not been much improvement in the law of improvements since 1785.

A number of doctrines in modern copyright and patent law attempt to strike some balance between the rights of original developers and the rights of subsequent improvers. Both patents and copyrights are limited in duration and in scope. Each of these limitations provides some freedom of action to subsequent improvers. Improvers are free to use material that is in the public domain because the copyright or patent has expired. They are free to skirt the edges of existing intellectual property rights, for example by taking the ideas but not the expression from a copyrighted work⁵ or "designing around" the claims of a patent. However, improvers cannot always avoid the intellectual property rights of the basic work on which they wish to improve. Some improvements fall within the scope of the preexisting intellectual property right, either because of an expansive definition of that right⁶ or because economic or technical necessity requires that the improver hew closely to the work of the original creator in some basic respect.⁷ Here, the improver is at the mercy of the original intellectual property owner, unless there is some separate right that expressly allows copying for the sake of improvement.

Patent and copyright law differ in how they treat improvements that fall within the scope of the original intellectual property right. Patent doctrines such as the rule of blocking patents

⁴ *Sayre v. Moore*, 1 East 361 n.1, 102 Eng. Rep. 139 (1785) (Lord Mansfield, C.J.). Lord Mansfield instructed the jury to distinguish between a new chart which corrected the errors in the plaintiff's work, and a "mere servile imitation" of the plaintiff's chart. Only the latter work was actionable under copyright. The jury found for the defendant.

⁵ *See* 17 U.S.C. § 102(b); *Baker v. Selden*, 101 U.S. 99 (1879).

⁶ *See infra* notes ___-___ and accompanying text (discussing how improvements can still fall within the literal scope of a patent claim).

⁷ *See infra* notes ___-___ and accompanying text (discussing market factors that may require exact duplication of an original work, particularly in the computer software or parody contexts).

and the reverse doctrine of equivalents offer some protection to the developers of significant or radical improvements.⁸ Improvers are therefore in a position to bargain with original patent owners to allocate the gains from their respective invention, and in some circumstances may even be free to use that invention without payment.⁹ By contrast, copyright doctrine currently offers little or no protection to improvers. Rather, the exclusive rights granted to the copyright owner in section 106 extend to cover any "copy" or adaptation or alteration of the original that is nonetheless "substantially similar" to the original work. So improvers -- even radical improvers -- have no power to bargain with copyright owners to divide the value of the improved work. If the work is substantially similar to the underlying copyrighted work, the original copyright owner has the right to exclude it from the market entirely. Further, because the rule is that improvers cannot even copyright their original contributions to what is on balance an infringing work, there is no way for the improver to capture even part of the value of her contribution. To be sure, improvers may be protected under copyright's "fair use" doctrine.¹⁰ But application of that doctrine is fraught with uncertainty,¹¹ and historically has focussed primarily on market harm to the original copyright owner. The result is a rule which in some respects gives broader protection to copyright owners than that given to patentees, and arguably provides insufficient incentive to improve upon copyrighted works.

In this paper, I argue that copyright rules regarding improvement should look more like analogous patent doctrines. I suggest that there should be a rule of "blocking copyrights" analogous to the blocking patents doctrine that already exists, and that the "transformative use" doctrine gaining currency among the courts may, if properly applied, protect radical improvers

⁸ For a discussion of the meaning of these terms, see *infra* notes ____ and accompanying text.

⁹ See *infra* notes ____ and accompanying text.

¹⁰ 17 U.S.C. § 107.

¹¹ See, e.g., Pierre N. Leval, *Toward a Fair Use Standard*, 103 **Harv. L. Rev.** 1105 (1990).

from liability to original copyright owners even where the improvement hurts the market for the original work. Part I sets out the economic background of intellectual property and the general problem of improvements. Part II examines the treatment of improvement under patent law, with particular attention to the doctrines of blocking patents and the reverse doctrine of equivalents. Part III examines the treatment of similar improvements under copyright law, considering both the rules governing derivative works and the fair use doctrine as it has historically been applied. In Part IV, I consider whether the different treatment of improvement under the patent and copyright laws is justifiable. For a variety of reasons, I conclude that it is not. Part V then models the optimal treatment of improvement in intellectual property law, concluding that the patent rules regarding improvements make more sense than the analogous copyright rules, largely because they reflect more realistic assumptions about the economics of intellectual property licensing. Part VI offers a way to interpret the fair use doctrine in copyright to reach a result analogous to that in the patent cases, and provides examples of how certain cases might be decided under that interpretation.

I. The Economics of Invention and Improvement

Intellectual property is fundamentally about incentives to invent and create. While there are a number of noneconomic theories offered to explain both copyright¹² and patent law,¹³ both

¹² Noneconomic theories of copyright tend to center around a natural law or moral rights approach, suggesting that authors have some sort of preexisting entitlement to control their works. For discussions of these approaches, see, e.g., Wendy J. Gordon, *A Property Right in Self-Expression: Equality and Individualism in the Natural Law of Intellectual Property*, 102 **Yale L.J.** 1533 (1993); Alfred Yen, *Restoring the Natural Law: Copyright as Labor and Possession*, 51 **Ohio St. L.J.** 517 (1990); cf. Steven Chermansky, Comment, *A Penny for Their Thoughts: Employee-Inventors, Preinvention Assignment Agreements, Property, and Personhood*, 81 **Cal. L. Rev.** 595, 641 (1993) (applying Peggy Radin's theory of personal investments of self in property to intellectual property). For what might be termed a "utilitarian but noneconomic" view of copyright as designed to further the development of a democratic civil society, see Neil Weinstock Netanel, *Copyright and a Democratic Civil Society*, 106 **Yale L.J.** — (forthcoming 1996).

¹³ For a discussion of reward-based and even natural law theories of scientific invention, see, e.g., A. Samuel Oddi, *Un-Unified Economic Theories of Patents -- the Not-Quite-Holy Grail*, 71 **Notre Dame L. Rev.** 267, 274-77 (1996); Kevin Rhodes, Comment, *The Federal Circuit's Patent Nonobviousness Standards: Theoretical*

the United States Constitution and judicial decisions seem to acknowledge the primacy of incentive theory in justifying intellectual property. The Constitution expressly conditions the grant of power in the patent and copyright clause on a particular end, namely "to Promote the Progress of Science and useful Arts."¹⁴ As the Supreme Court explained in the landmark case of *Mazer v. Stein*,¹⁵ "[t]he copyright law, like the patent statutes, makes reward to the owner a secondary consideration. . . . The economic philosophy behind the clause empowering patents and copyrights is the conviction that it is the best way to advance public welfare through the talents of authors and inventors in Science and useful Arts."¹⁶

To understand why the Framers thought exclusive rights in inventions and creations would promote the public welfare, consider what would happen absent any sort of intellectual property protection. Invention and creation require the investment of resources -- the time of an author or inventors, and often expenditures on facilities, prototypes, supplies, etc. In a private market economy, individuals will not invest in invention or creation unless the expected return from doing so exceeds the cost of doing so -- that is, unless they can reasonably expect to make a profit from the endeavor. To profit from a new idea or a work of authorship, the creator must be

Perspectives on Recent Doctrinal Changes, 85 **Nw. U.L. Rev.** 1051 (1991); cf. Lawrence C. Becker, *Deserving to Own Intellectual Property*, 68 **Chi.-Kent L. Rev.** 609 (1993) (arguing that desert-based arguments for patent law are intuitively appealing, but do not necessarily justify the scope of current patent doctrine). An alternative to classical incentive theory is the prospect theory of patents, advanced by Edmund Kitch in an important article twenty years ago. See Edmund Kitch, *The Nature and Function of the Patent System*, 30 **J.L. & Econ.** 265 (1977). Kitch offers a property-based vision of patents as entitlements to innovate within a particular field, granted to those who have already started such innovation. For a refinement of Kitch's approach which takes account of rent-seeking, see Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 **Va. L. Rev.** 305 (1992).

¹⁴ U.S. Const., art. I, cl. 8.

¹⁵ 347 U.S. 201 (1954).

¹⁶ *Id.* at 219.

able either to sell it to others for a price, or to put it to some use which provides her with a comparative advantage in a market.¹⁷

But ideas (and writings, for that matter) are notoriously hard to control. Even if the idea is one that the creator can use herself, for example to boost productivity in her business, she will reap a reward from that idea only to the extent that her competitors don't find out about it. A creator who depends on secrecy for value therefore lives in constant peril of discovery and disclosure. Competitors may steal the idea, or learn of it from an ex-employee. They may be able to figure it out by watching the creator's production process, or by examining the products she sells. Finally, they may come upon the idea on their own, or discover it in the published literature. In all of these cases, the secrecy value of the idea will be irretrievably lost.¹⁸

The creator who wants to sell her idea is in an even more difficult position. Selling information requires disclosing it to others. Once the information has been disclosed outside a small group, however, it is extremely difficult to control. Information has the characteristics of what economists call a "public good" -- it may be "consumed" by many people without depletion, and it is difficult to identify those who will not pay and prevent them from using the information.¹⁹ To adapt an old parable, if I give you a fish, I no longer have it, but if I teach you to fish, you or I can teach 100 others the same skill without appreciably reducing its value.²⁰ If

¹⁷ The latter may occur, for example, where an idea for a more efficient machine is used to reduce the cost of producing goods, allowing the owner of the idea to compete more effectively in selling those goods.

¹⁸ It is possible to address this problem by adopting rules preventing the misappropriation of trade secrets, in effect adding legal support to a creator's efforts to keep a secret. Trade secrets laws fall within the general category of intellectual property, so they do not disprove the rule stated in the text. Further, there are problems with relying solely on secrecy in many cases, as noted below.

¹⁹ See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in **The Rate and Direction of Inventive Activity: Economic and Social Factors** 609, 614-16 (NBER 1962).

²⁰ To some extent this oversimplifies the problem by ignoring possible second-order distorting effects. In practice, if I taught several hundred million people to fish, the result might be depletion of a physical resource (fish) that would otherwise not have occurred. Similarly, wide dissemination of information may have particular effects on secondary markets, depending on what the information is. Nonetheless, the general point remains accurate.

we assume that it is nearly costless to distribute information to others -- an assumption that was once unrealistic but has become much more reasonable with the development of the Internet -- it will prove virtually impossible to charge for information over the medium run. If the author of a book charges more than the cost of distribution, hoping to recover some of her expenditures in writing the work, competitors will quickly jump in to offer the book at a lower price. Competition will drive the price of the book towards its marginal cost -- in this case the cost of producing and distributing one additional copy. In this competitive market, the author will be unable to recoup the fixed cost of writing the book. More to the point, if this holds generally true authors may be expected to leave the profession in droves, since they cannot make any money at it. The result, according to economic theory, is an underproduction of books and other works of invention and creation with similar public goods characteristics.²¹

Information is not the only example of a public good. Economists generally offer lighthouses and national defense as examples of public goods, since it is virtually impossible to provide the benefits of either one only to paying clients. And indeed it would be inefficient to do so, since consumption of these goods is "nonrivalrous" (meaning that everyone can benefit from them once they are produced). In the case of national defense (and most lighthouses),²² we avoid the underproduction that would result from leaving it to the market by having the government step in and pay for the public good. For a variety of good reasons, we have not gone that route with information.²³ Instead, government has created intellectual property rights in an

²¹ See, e.g., **F.M. Scherer, *Industrial Market Structure and Economic Performance*** 444 (2d ed 1980) ("If pure and perfect competition in the strictest sense prevailed continuously . . . incentives for invention and innovation would be fatally defective without a patent system or some equivalent substitute."). Scherer goes on to note, however, that natural market imperfections may give advantages to first movers, reducing the need for intellectual property protection. *Id.* at 444-45.

²² But see Ronald H. Coase, *The Lighthouse in Economics*, in **The Firm, The Market, and the Law** (1988) (casting doubt on the assumption that lighthouses must always be publicly provided).

²³ For example, government provision of all books or all ideas is probably inefficient, if there is a way to encourage competition between authors or inventors. Competition is a better spur to new ideas than government mandate. Further, government control over new publications is fundamentally inconsistent with the diversity of

effort to give authors and inventors control over the use and distribution of their ideas, and therefore encourage them to invest efficiently in the production of new ideas and works of authorship.

Unfortunately, this approach comes at a cost. Granting authors and inventors the right to exclude others from using their ideas necessarily limits the diffusion of those ideas, and so prevents people from benefiting from them.²⁴ In economic terms, intellectual property rights prevent competition in the sale of the particular work or invention covered by the intellectual property right, and therefore allow the intellectual property owner to raise the price of that work above the marginal cost of reproducing it. Indeed, intellectual property rights must permit prices to rise above marginal cost in some cases if they are to have their intended effect of providing an incentive to create.²⁵ This means that in many cases fewer people will buy the work than if it

viewpoints and freedom of speech inherent in a democratic society. *See, e.g.,* Vincent Blasi, *The Checking Value in First Amendment Theory*, 1977 **Am. B. Found. Res. J.** 521.

²⁴ Glynn Lunney offers a second set of costs, which are not normally considered in economic analyses of intellectual property. He suggests that incentives for creation distort allocative efficiency by encouraging the inefficient shifting of resources from other sectors of the market into the production of works of intellectual property. *See* Glynn S. Lunney, Jr., *Reexamining Copyright's Incentives-Access Paradigm*, 49 **Vand. L. Rev.** 483 (1996). While Lunney's critique of the copyright system, if valid, is fundamental, a detailed analysis of his paper is beyond the scope of this article.

²⁵ This does *not* mean that intellectual property rights automatically confer market power or create "monopolies" in an economic or antitrust sense, as some courts have erroneously presumed. *See* *Jefferson Parish Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2 (1984); *United States v. Loew's, Inc.*, 371 U.S. 38 (1962); *Digidyne Corp. v. Data General Corp.*, 734 F.2d 1336 (9th Cir. 1984). While some intellectual property rights may in fact give their owner power in an economically relevant product market, most do not. They merely prevent others from competing to sell copies of a particular product, not from selling different products that compete with the original. *See, e.g.,* Philip Areeda & Louis Kaplow, **Antitrust Analysis** 441 (1987); Herbert Hovenkamp, **Economics and Federal Antitrust Law** § 8.3, at 219 (1985); Mark A. Lemley, Comment, *The Economic Irrationality of the Patent Misuse Doctrine*, 78 **Cal. L. Rev.** 1599, 1626-28 (1990); Russell Lombardy, Comment, *The Myth of Market Power: Why Market Power Should Not Be Presumed When Applying Antitrust Principles to the Analysis of Tying Agreements Involving Intellectual Property*, 8 **St. John's L. Rev.** 449 (1996); William Montgomery, Note, *The Presumption of Economic Power for Patented and Copyrighted Products in Tying Arrangements*, 85 **Colum. L. Rev.** 1140, 1156 (1985).

Whether the intellectual property owner can take advantage of his right to exclude to raise prices on his product depends largely on two factors: whether perfect competition prevails in the industry, and whether his invention gives him a cost advantage over competitors. *See* Scherer, *supra* note ___, at 444.

were distributed on a competitive basis, and they will pay more for the privilege.²⁶ Because intellectual property rights impose costs on the public, the intellectual property laws can be justified by the public goods argument only to the extent that they do on balance encourage enough creation and dissemination of new works to offset those costs. One of the reasons that intellectual property rights are limited in scope, in duration, and in effect²⁷ is precisely in order to balance these costs and benefits.²⁸

The situation becomes more complex when we consider not just the market for a particular work, but the market for new works in general. Creation does not occur in a vacuum. Rather, knowledge is cumulative -- authors and inventors must necessarily build on what came before them.²⁹ Indeed, if they did not do so, the societal costs in terms of reinvention would be enormous.³⁰ Try to imagine building something as complex as a car, without using any ideas from anyone who came before you (including such ideas as the wheel, nuts and bolts, screws, glass, and the combustion engine). As countless economists have demonstrated, efficient creation of new works requires access to and use of old works.³¹ And since "improvements"

²⁶ See Scherer, *supra* note ___, at 450-51 (documenting patent holders pricing in excess of cost).

²⁷ See *supra* notes ___-___ and accompanying text (briefly describing a few of the ways in which intellectual property rights are limited).

²⁸ For efforts to strike the optimal balance between these costs and benefits, see, e.g., **William Nordhaus, *Invention, Growth and Welfare: A Theoretical Treatment of Technological Change*** (1969). On the indeterminacy of the whole endeavor, see Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 **Harv. L. Rev.** 1813 (1984).

²⁹ The most famous formulation of this phenomenon is credited to Sir Isaac Newton, who reportedly said "If I have seen further than other men, it is by standing on the shoulders of giants." This is occasionally referred to in computer law as the OTSOG ("On The Shoulders of Giants") principle.

³⁰ Cf. Mark A. Lemley & David O'Brien, *Encouraging Software Reuse*, 49 **Stan. L. Rev.** __ (forthcoming Jan. 1997) (documenting costs of partial reinvention in the software industry).

³¹ See, e.g., **M. Kamien & N. Schwartz, *Market Structure and Innovation*** (1982); **Richard Nelson & Steven Winter, *An Evolutionary Theory of Economic Change*** (1982); Paul David, *New Technology, Diffusion, Public Policy, and Industrial Competitiveness* 20 (Center for Econ. Policy Res., Pub. No. 46, April 1985); Robert Merges & Richard Nelson, *On the Complex Economics of Patent Scope*, 90 **Colum. L. Rev.** 839 (1990); Nathan Rosenberg,

may in many cases dwarf the original work in terms of their practical significance,³² dynamic market efficiency over different generations demands such access as well.

But intellectual property limits the public's ability to access and use old works. The creators of old works can, if they choose, refuse to distribute them to anyone at all, at any price, during the duration of intellectual property protection.³³ While most creators will not prevent access altogether, they can and do exercise control over who can use their creation, the purposes for which they can use it, and the price they must pay. Intellectual property owners may use these rights not only to obtain a return on their investment in research and development, but also to exercise content control over subsequent uses of their works or to prevent the development of a competitive market for their products.³⁴ Even if the intellectual property owner is willing to license his rights on reasonable terms, or even if the work turns out to be in the public domain, someone who wants to use the work must expend time and resources identifying intellectual property owners and negotiating with them. Improvers also bear the risk of failing to identify every intellectual property owner, and unknowingly infringing on a prior intellectual property right. In each of these circumstances, the existence of preexisting intellectual property rights imposes a positive cost on improvers that they would not otherwise face.³⁵ It is not enough to

Factors Affecting the Diffusion of Technology, 10 **Explorations Econ. Hist.** 3 (1972); Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 **J. Econ. Persp.** 29 (1991).

³² For examples, see, e.g., Enos, *A Measure of the Rate of Technological Progress in the Petroleum Refining Industry*, 6 **J. Indus. Econ.** 180, 189 (1958); Mak & Walton, *Steamboats and the Great Productivity Surge in River Transportation*, 32 **J. Econ. Hist.** 619, 625 (1972).

³³ cite Salinger case, and a patent refusal to license case. In some cases, such as trademarks and trade secrets, the duration of intellectual property right may be indefinite. See *Warner-Lambert Pharm. Co. v. Reynolds*, 178 F. Supp. 655 (S.D.N.Y. 1959).

³⁴ The circumstances in which an intellectual property owner might refuse to license his idea are explored in detail in Part V, *infra*.

³⁵ See Brian R. Landy, Comment, *The Two Strands of the Fair Use Web: A Theory for Resolving the Dilemma of Music Parody*, 54 **Ohio St. L.J.** 227, 227 (1993); Merges & Nelson, *supra* note ___, at 868-870; Scotchmer, *supra* note ___, at 38; Stewart E. Sterk, *Rhetoric and Reality in Copyright Law*, 94 **Mich. L. Rev.** 1197, 1207-08 (1996).

say that intellectual property law favors "creators" -- for here we have creators on both sides of the equation, and the law must choose between them.³⁶

Because original developers and improvers will not always find each other and agree to license the original work *ex ante*, the intellectual property rules governing improvements are important in understanding the extent to which protection for first-generation innovation will impede improvement in subsequent generations. The more absolute the property right given to original authors and inventors, the more critical efficient licensing is to subsequent innovation, and the more sensitive the industry is to market failures in licensing.

Sometimes improvers benefit from the limits placed on the scope or duration of intellectual property rights. Patents, for example, last from the time they are approved until twenty years from the date the patent application was filed.³⁷ After that time, the material claimed in the patent enters the "public domain," and is free for anyone to use.³⁸ Copyrights last longer, anywhere from 50 to about 120 years depending on who wrote the original work, whether they were paid to do so, whether they published it, and how long they live.³⁹ Nonetheless, copyrights too expire eventually, and the contents of such public domain works may be freely copied.⁴⁰ The limited duration of patents and copyrights promotes improvement

³⁶ For a discussion of the parameters of this choice, see Glynn S. Lunney Jr., *Lotus v. Borland: Copyright and Computer Programs*, 70 **Tulane L. Rev.** 2397, 2418 (1996). Paul Goldstein describes this as a paradox: "that every infringer of a derivative right is, by definition, itself the potential copyright owner of a derivative work, with an equal claim on copyright's system of investment incentives." Paul Goldstein, *Derivative Rights and Derivative Works in Copyright*, 30 **J. Copyright Off. Soc'y** 209, 211 (1983). He is certainly correct that this fact "seriously complicates" the task of establishing optimal infringement rules. *Id.*

³⁷ 35 U.S.C. § 154(a).

³⁸ *Brulotte v. Thys*, 379 U.S. 29 (1964).

³⁹ See generally 17 U.S.C. §§ 301-304 (setting out rules governing duration of copyrights). A proposal pending in Congress would lengthen copyright term by an additional twenty years, for both individual copyrights and works created "for hire." [cite bill].

⁴⁰ Indeed, many important works of literature, such as the Bible and the writings of Shakespeare, are free for all to copy. On the importance of a vibrant public domain in copyright law, see David Lange, *Recognizing the Public Domain*, 44 **L. & Contemp. Probs.** 147 (1981); Jessica Litman, *The Public Domain*, 39 **Emory L.J.** 965 (1990).

in writings and inventions, by allowing subsequent authors and inventors to build upon what came before them.⁴¹

Even during the term of a patent or copyright, the strength of the owner's exclusive right is further limited by rules that delineate the scope of that right. Thus, a copyright prevents copying, adaptation, distribution, and performance, but does not prevent private use of a work.⁴² Further, the restriction on copying extends only to appropriation that is "substantial."⁴³ Similarly, patent law grants the patentee the right to make, use, and sell the claimed invention, but limits the scope of that right to what is set forth in the patent claims and equivalents thereof.⁴⁴ Improvers can avoid the reach of patents and copyrights still in force by skirting the edges of these exclusive rights -- for example, by taking only ideas and not expression from a copyrighted work,⁴⁵ or by "designing around" the claims of a patent.⁴⁶

Rob Merges and Richard Nelson have modeled the scope of patent rights in detailed economic terms.⁴⁷ In this paper, I deal with a subset of the broader question of proper scope for intellectual property rights -- what happens in those cases in which an improvement falls

⁴¹ See Sterk, *supra* note ___, at 1223-24.

⁴² See 17 U.S.C. § 106.

⁴³ See Amy Cohen, *Masking Copyright Decisionmaking: The Meaninglessness of Substantial Similarity*, 20 U.C. Davis L. Rev. 719 (1987).

⁴⁴ See *Graver Tank Mfg. Co. v. Linde Air Prods.*, 339 U.S. 605 (1950).

⁴⁵ *Baker v. Selden*, 101 U.S. 99 (1879), 17 U.S.C. § 102(b). See also Justin Hughes, *The Philosophy of Intellectual Property*, 77 Geo. L.J. 287, 319-20 (1988) (improvers benefit from copyright's refusal to protect ideas).

⁴⁶ Designing around a patent refers to using the written claims of a patent as a guide for deciding what to avoid in producing a competing product. Recent Federal Circuit decisions have given more lenient treatment to accused infringers who designed around the patent in an effort to avoid infringement. See *Roton Barrier, Inc. v. Stanley Works*, No. 95-1217, 51 BNA PTCJ 577 (Fed. Cir. Mar. 4, 1996); *Hilton-Davis Chemical Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (en banc).

⁴⁷ Merges & Nelson, *supra* note __.

squarely within the scope of an intellectual property right still in force. In those cases, the improver is at the mercy of the original intellectual property owner, unless the intellectual property laws offer improvers relief from infringement actions in certain circumstances. It is to that latter issue that I turn in Parts II and III.

II. Treatment of Improvements in Patent Law

A. The Scope of Patent Claims

Patents in the United States are granted exclusively by the Patent and Trademark Office (PTO). Inventors must apply to the PTO for patent protection, and obtain rights over the invention only when the PTO issues a patent.⁴⁸ To obtain a patent, the inventor must prove to the PTO that his idea is novel, is not obvious, is useful, and is sufficiently described in the application to allow others to use and benefit from it.⁴⁹ The patent describes what the inventor has designed or built,⁵⁰ and it concludes with "claims" setting forth the legal boundaries of the invention.⁵¹

The key to understanding the treatment of improvements in patent law is recognizing that patents are legally defined by the language of the patent's "claims", not by what the patent owner has actually invented or built.⁵² The claims establish the boundaries of the invention, and it is

⁴⁸ By contrast, every other form of intellectual property vests at least partial rights in the owner upon creation of the work or satisfaction of the requirements of protection.

⁴⁹ See generally 35 U.S.C. §§ 101-03, 112.

⁵⁰ An inventor can obtain a patent on a device without having ever built that device, so long as it is described sufficiently that one skilled in the art could build it. See *Hazeltine Corp. v. United States*, 820 F.2d 1190 (Fed. Cir. 1987).

⁵¹ 35 U.S.C. § 112 ¶ 2 ("[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.").

⁵² See *Datascope Corp. v. SMEC, Inc.*, 879 F.2d 820 (Fed. Cir. 1989) ("it is *claims*, not commercial embodiments, that are infringed.").

the claims that are used in deciding whether a defendant's product infringes the patent. If an accused product falls within the bounds of a valid claim (in patent parlance, if it "literally infringes" the claim), it generally does not matter that the accused product is different from the inventor's product, or even that the inventor could not possibly have built the accused product. The defendant must avoid any infringement on the territory covered by the claim.

For this reason, a patent owner can expand the reach of his patent by drafting claims as broadly as possible. For example, the inventor of a pencil will be better off claiming an "instrument for writing" than a "hexagonal cylinder constructed of wood, the center of which is hollow and filled with graphite, and which is capable of being sharpened for use in marking on paper." The former claim will capture more ground for the patent owner. Not only will octagonal or round pencils fall within the scope of the first claim, but so too might pens, mechanical pencils, and signature machines.

There are two basic limits on the ability of inventors to draft broad claims. First, because novelty and nonobviousness are tested with respect to the language of the claims,⁵³ a claim must not cover something already invented, or which is merely an obvious extension of prior work. Thus, the scope of a patentee's claims are limited by the "prior art" in the field. The effect of the novelty rule is clear -- you are not entitled to a patent on something that someone else has already invented or described. If your "invention" duplicates another's, then in theory you have not added any social value to justify obtaining an exclusive right.⁵⁴ The nonobviousness rule requires still more from the patentee than an invention no one else has come up with. What is

⁵³ *RCA Corp. v. Applied Digital Data Sys.*, 730 F.2d 1440 (Fed. Cir. 1984).

⁵⁴ Reality is not that simple. An inventor may add value in the way he describes the invention, or in making it known to a greater segment of the public, or in taking the steps necessary to commercialize it. But these aspects of innovation are not normally protected by patent law if the invention itself is already in the public domain. For a proposal to protect commercialization efforts directly, and criticism thereof, see **W. Kingston, Direct Protection of Innovation** (1987).

required is an "inventive leap"⁵⁵ -- some quantum of improvement over what has come before. In effect, the nonobviousness requirement sets a minimum threshold social value the invention must contribute in order to make it worth the trouble of issuing and enforcing a patent. It also prevents patentees from overclaiming their invention. For example, the inventor of the pencil cannot get away with claiming an "instrument for writing" if there are already other writing instruments in the prior art.

Second, the patentee must be able to point to language in the patent specification that enables those skilled in the art to make the claimed invention. Certainly, the patentee must describe what he has actually built or designed. If he is to claim an entire class of products, though, he must give some indication of how to produce other products in that class. Thus, in a celebrated case, Thomas Edison defeated a prior patent on incandescent light bulbs on the grounds that the patent owners had not enabled the full scope of their claims.⁵⁶ Sawyer and Man had built an incandescent bulb which didn't work very well, largely because the particular fiber they had chosen as the filament (carbonized paper) was not durable. In their patent, Sawyer and Man claimed the use of any vegetable fiber as a filament. When Edison discovered that a particular species of bamboo worked much better than any other type of fiber, Sawyer and Man sued him for patent infringement, since Edison's bamboo was after all vegetable fiber, and therefore within the scope of the claim. The Court held their claim invalid on the grounds that they had not done sufficient work to justify treating all vegetable fibers as interchangeable. In the words of the Court:

Is the complainant entitled to a monopoly of all fibrous and textile materials for incandescent conductors? If the patentees had discovered in fibrous and textile substances a quality common to them all, or to them generally, as distinguishing them from other materials, such as minerals, etc., and such quality or

⁵⁵ *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

⁵⁶ *The Incandescent Lamp Patent*, 159 U.S. 465 (1895).

characteristic adapted them peculiarly to incandescent conductors, such claim might not be too broad. If, for instance, minerals or porcelains had always been used for a particular purpose, and a person should take out a patent for a similar article of wood, and woods generally were adapted to that purpose, the claim might not be too broad, though defendant used wood of a different kind from that of the patentee. But if woods generally were not adapted to the purpose, and yet the patentee had discovered a wood possessing certain qualities, which gave it a peculiar fitness for such purpose, it would not constitute an infringement for another to discover and use a different kind of wood, which was found to contain similar or superior qualities. The present case is an apt illustration of this principle. Sawyer and Man supposed they had discovered in carbonized paper the best material for an incandescent conductor. Instead of confining themselves to carbonized paper, as they might properly have done, and in fact did in their third claim, they made a broad claim for every fibrous or textile material, when in fact an examination of over six thousand vegetable growths showed that none of them possessed the peculiar qualities that fitted them for that purpose. Was everybody then precluded by this broad claim from making further investigation? We think not.

The injustice of so holding is manifest in view of the experiments made, and continued for several months, by Mr. Edison and his assistants, among the different species of vegetable growth, for the purpose of ascertaining the one best adapted to an incandescent conductor. * * * The question really is whether the imperfectly successful experiments of Sawyer and Man, with carbonized paper and wood carbon, conceding all that is claimed for them, authorize them to put under tribute the results of the brilliant discoveries made by others.⁵⁷

This does not mean, however, that patent owners are limited only to what they have in fact discovered. Claims may reach beyond what the patentee has in fact invented in three circumstances. First, where a number of materials or devices are substitutable because they have similar characteristics, the patentee may claim the generic class of materials, so long as he describes the general class and its characteristics with sufficient precision that others can identify and use them without "undue experimentation."⁵⁸ Thus, in *Atlas Powder Co. v. duPont*,⁵⁹ the

⁵⁷ *Id.* at ____.

⁵⁸ *E.g.* *Utter v. Hiraga*, 845 F.2d 993, 998 (Fed. Cir. 1988); *In re Angstadt*, 537 F.2d 498, 502 (C.C.P.A. 1976). On what constitutes undue experimentation, see *In re Wands*, 858 F.2d 731 (Fed. Cir. 1988).

⁵⁹ 750 F.2d 1569 (Fed. Cir. 1984).

court allowed a patent on explosive compounds made from various salts, fuels and emulsifiers, where the patentee had listed the ingredients that might be used but had not given any indication of which combinations would work. Even though duPont had not tried all of the possible combinations (there were thousands), and in practice 40% of the combinations tried were inert, the court held that duPont was entitled to claim the generic group of explosives.⁶⁰ Thus, the enablement requirement places some limits on broad claiming, but it certainly does not limit claims to the precise embodiments tested by the patent owner.

Second, the doctrine of equivalents provides a means for broadening the scope of a patent beyond the literal language of the claims (and hence beyond the invention originally made by the patent owner). The doctrine of equivalents was originally intended to provide equitable relief to patent owners against imitators who would avoid literal infringement of a narrowly-written claim by changing one insubstantial feature of the invention.⁶¹ It has since been expanded by the courts into an integral part of the infringement analysis of every patent,⁶² though the scope and application of the doctrine remain a matter of some dispute at this writing.⁶³ As presently conceived, the doctrine of equivalents provides that accused products or processes which do not fall within the literal scope of the patent claims nonetheless infringe the patent if they are only "insubstantially different" from the patent claims.⁶⁴ The effect is to create a "penumbra" around

⁶⁰ *Id.* at 1576-77.

⁶¹ See *Graver Tank Mfg. Co. v. Linde Air Prods.*, 339 U.S. 605 (1950); *Boyden Power-Brake Co. v. Westinghouse*, 170 U.S. 537, 569 (1898).

⁶² See *Hilton-Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (en banc) (doctrine of equivalents must be applied in each case; judge has no discretion not to do so).

⁶³ The Supreme Court has granted certiorari in *Hilton-Davis*. 116 S. Ct. __ (1996).

⁶⁴ *Hilton-Davis*, 62 F.3d at __. The court in *Hilton-Davis* provided significant guidance as to what factors should be used in determining the substantiality of a difference.

the literal scope of the claims, and therefore to expand the protection given to patent owners.

Figure 1 diagrams the scope of patent protection in simple terms.

[insert Figure 1 here]

Finally, patent claims may reach new and unanticipated inventions made after the patent issues, but which fall within the literal language of the claims.⁶⁵ An example is *Hughes Aircraft Co. v. United States*.⁶⁶ In that case, Hughes held a patent on technology developed in the 1970s for controlling the orientation of a communications satellite by sending control signals from a ground control computer to the satellite. When advances in computer technology allowed the necessary processing power to be installed on the satellite itself, the government began to control its satellites using on-board computers. In Hughes' patent suit against the government, the Federal Circuit held that the government's method of on-board computer control infringed the Hughes patent, even though that patent was based on old technology that required communications from the ground.⁶⁷ In the *Hughes* case, it is clear that the government's technology represented a significant advance over the technology conceived by the patentee. Nonetheless, the patentee was entitled to capture the benefits of these subsequent technological improvements.

B. Evaluating Infringement by Improvers

Changes in products and processes occur all the time. Trying something new in the hope of improving on an existing product or process is an integral part of the competitive process. Sometimes these changes will actually improve the existing product or make its production more

⁶⁵ Cf. *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 435 (1911) (patentee need not understand why or how his invention works, so long as it does); accord *Eames v. Andrews*, 122 U.S. 40, 55-56 (1887).

⁶⁶ 717 F.2d 1351 (Fed. Cir. 1983).

⁶⁷ *Id.* at 1365. *Accord Laser Alignment, Inc. v. Woodruff & Sons*, 491 F.2d 866 (7th Cir. 1974) (use of laser to align pipe segments infringed patent for using ordinary beams of light to align pipe).

efficient, and therefore contribute to social value. Other changes may be value-neutral (that is, the new product may be just as good or as efficient as the existing product), or they may actually be inefficient (producing less useful products, or products that cost more than the existing ones).

Where the existing product is patented, improvers must avoid the literal scope of the patent claims and equivalents thereof in order to sell a competing product. Not every change from the actual product invented by the patent owner will avoid infringement, since some will fall within the literal scope of the patent claims. In Figure 1, these changes will fall within the C-D range, although they are not within the actual scope of what the inventor created (range A-B). Still other changes will fall outside the literal scope of the patent claims, but within the somewhat amorphous range of protection afforded the invention under the doctrine of equivalents. In Figure 1, these changes are within the E-F range, but are outside the C-D range.

This determination is largely a factual one, and will depend on the nature of the accused products as well as the scope of the claims. The Federal Circuit has offered a number of ways to test infringement under the doctrine of equivalents, for example.⁶⁸ Efforts to "design around" a known patent may be evidence of noninfringement, on the theory that most such efforts by competent scientists will produce a substantially different product.⁶⁹ Equivalence will normally be tested on an element-by-element basis,⁷⁰ inquiring whether there are substantial differences in

⁶⁸ See Keith A. Robb, *Hilton Davis and the Doctrine of Equivalents -- An Insubstantial Difference*, 4 **Tex. Intell. Prop. L.J.** 275 (1996).

⁶⁹ See *Hilton-Davis*, 62 F.3d at ___. For criticism of the use of intent to determine infringement, see Joseph F. Haag, Comment, *Hilton-Davis Chemical Co. v. Warner-Jenkinson Co.: An Equitable Solution to the Uncertainty Behind the Doctrine of Equivalents*, 80 **Minn. L. Rev.** 1511, 1537-39 (1996).

⁷⁰ See *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931 (Fed. Cir. 1987) (en banc) (to be an equivalent, accused device must contain each element of the patent claim or an equivalent thereof). *But see, e.g.*, *Corning Glass Works v. Sumitomo Elec. U.S.A.*, 868 F.2d 1251 (Fed. Cir. 1989); *Sun Studs, Inc. v. ATA Equip. Leasing*, 872 F.2d 978, 989 (Fed. Cir. 1989) (both implicitly rejecting element-by-element approach). See also Martin Adelman & Gary Francione, *The Doctrine of Equivalents in Patent Law: Questions That Pennwalt Did Not Answer*, 137 **U. Pa. L. Rev.** 673 (1989).

the function each element performs, or in the way it performs,⁷¹ or alternatively whether the claimed device and the accused device are "reasonably interchangeable."⁷²

It should be obvious from the foregoing discussion that one cannot avoid patent infringement merely by building something different than what the patentee has built (or even what he has described). Subsequent developers of products must be careful to avoid treading on the literal language of the patent claims, whether or not the patentee envisioned the particular device at issue. Further, subsequent developers must attempt to guarantee that a jury will not find their product to be insubstantially different from the patent claim language. Even subsequently developed products that unquestionably improve on the work of the original inventor may infringe the inventor's patent.⁷³

What may be less obvious is that this infringement determination does not take into account the value of the improvement made by the accused infringer. Dramatic improvements may still fall within either the literal scope of the claims or the range of equivalents afforded the original invention. Consider the improvement at issue in *Hughes Aircraft*, above,⁷⁴ which was held to infringe an old patent even though subsequent events had revolutionized satellite technology. Similar results have occurred when electrical patents based on analog technology have been asserted against new (and in most cases dramatically improved) digital implementations.⁷⁵ At the other end of the spectrum, changes with little or no social value may

⁷¹ See *Graver Tank*, 339 U.S. at 605 (adopting the "function-way-result" test for infringement under the doctrine of equivalents). But see *Hilton-Davis*, 62 F.3d at 1512 (function-way-result test is not the only way of determining equivalence).

⁷² See *Graver Tank*, 339 U.S. at 605; *Hilton-Davis*, 62 F.3d at 1512.

⁷³ See *Marsh-McBirney, Inc. v. Montedoro-Whitney Corp.*, 882 F.2d 498, 504 (Fed. Cir. 1989); *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1240 (Fed. Cir. 1989); *Water Technologies Corp. v. Calco*, 850 F.2d 660, 669 (Fed. Cir. 1988); *Atlas Powder Co. v. E.I. duPont de Nemours & Co.*, 750 F.2d 1569, 1580 (Fed. Cir. 1984); *Bendix Corp. v. United States*, 199 U.S.P.Q. 203 (Ct. Cl. 1978), *aff'd* 600 F.2d 1364 (1979).

⁷⁴ *Hughes*, 717 F.2d at ____.

⁷⁵ See *id.* at ____.

be sufficient to avoid infringement of a patent, especially if the claims are narrowly drafted. For example, the narrow claim for a pencil described above might not be infringed by a seven-sided cylinder, or a cylinder made of plastic, even though changing the shape or composition of the pencil has no impact on its performance. Indeed, in some cases competitors may be encouraged to adopt inefficient solutions in order to avoid infringement. The only clear way to avoid infringing on a patent is to use a product that was in the prior art⁷⁶ -- an approach which does not capture any of the value of the patented invention.

C. Mechanisms for Protecting Improvers

Patent law does, however, provide two doctrines which encourage improvements, even when those improvements infringe on the underlying patent. It is useful to distinguish three general cases, which I will call here the minor improver, the significant improver, and the radical improver.

Minor Improvers. As noted above, inventors are entitled to a patent on their invention only if they show some "inventive leap" over the prior art. Generally speaking, this translates into a minimum social contribution necessary to obtain a patent.⁷⁷ For the sake of argument, let

⁷⁶ See *Wilson Sporting Goods Co. v. David Geoffrey & Assoc.*, 904 F.2d 677 (Fed. Cir. 1990) ("since prior art always limits what an inventor could have claimed, it limits the range of permissible equivalents of a claim."). This rule seems an obvious and necessary extension of the general principle that patent claims which cover even in part material that was in the prior art are invalid. See, e.g., *Malta v. Schulmerich Carillions, Inc.*, 952 F.2d 1320, 1342 (Fed. Cir. 1991); *Intel Corp. v. United States Int'l Trade Comm.*, 946 F.2d 821, 842 (Fed. Cir. 1991); accord Paul Janicke, *Heat of Passion: What Really Happened in Graver Tank*, 23 *AIPLA Q.J.* __ n. 330 (forthcoming 1997) (citing over 30 cases and commentators in agreement). Even this seemingly obvious rule has been called into question, however. See *Baxter Healthcare Corp. v. Spectramed, Inc.*, __ F.2d __ (Fed. Cir. Mar. 17, 1995) (accused device may infringe patent even though accused device is obvious in view of the prior art). The approach taken in *Baxter* seems both incorrect as a matter of policy and flatly inconsistent with *Wilson Sporting Goods*.

⁷⁷ This need not necessarily be the case. Because the requirement that a patented invention be "useful" is only laxly enforced, see *Tol-O-Matic, Inc. v. Proma Product-und-Marketing Gesellschaft*, 945 F.2d 1546 (Fed. Cir. 1991); *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261 (Fed. Cir. 1986); cf. *United States Steel Corp. v. Phillips Petroleum*, 865 F.2d 1247 (Fed. Cir. 1989) (finding of infringement compels finding of utility), it is theoretically possible to obtain a patent on a nonobvious but inefficient (relative to the prior art) way of doing

us set this minimum value the patent owner has contributed to society at \$200. Subsequent developers may make changes to the patented technology in an effort to avoid infringement. As noted above, those changes may result in real improvements to the original patented process, but they need not do so. Let us define all such changes with an *additional* social value of less than \$200 as "minor improvements." This includes those whose changes are inefficient, as well as those whose changes add some value, but less than the minimum additional value required for an improvement patent (that is, those developers whose improvements are obvious in view of the original patent or the prior art).

The law offers no protection to such minor improvers, beyond the possibility of avoiding infringement as described above. In other words, minor improvers must take their chances with infringement. Further, because their contribution does not rise to the minimum value necessary for patent protection, minor improvers cannot prevent either the original patent owner or other competitors from copying their improvement and using it in competing products. While in some cases the minor improver may be able to appropriate some of the value of her improvement through trade secrecy or first mover advantages,⁷⁸ there is no guarantee that she will be able to do so. And if the minor improvement does turn out to be infringing, only the original patent owner can use it during the term of his patent. Thus, the patent owner captures the value of the improvement in this situation.

Significant Improvers. Subsequent developers whose improvements exceed the minimum social value threshold for patentability fare slightly better under patent doctrine. Let

things. Nonetheless, this hypothetical case need not detain us, since infringement of such a patent would presumably be rare.

⁷⁸ On the value of first mover advantages, see Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 3 **Brookings Papers on Econ. Activity** 783, 816 (1987). On the limitations of such advantages, particularly in industries where copying is easy, see William Baldwin & Gerald Childs, *The Fast Second and Rivalry in Research and Development*, 36 **Southern Econ. J.** 18, 21 (1969); Janusz A. Ordover, *Economic Foundations and Considerations in Protecting Industrial and Intellectual Property*, 53 **Antitrust L.J.** 503, 507 (1985).

us define a "significant improver" as a developer whose improvement has an additional value of society of more than \$200, but less than some higher number. For now, we will set that higher number at \$1000.⁷⁹ Developers whose improvement on a patented technology adds between \$200 and \$1000 of social value still risk infringement of the underlying patent, either literally or under the doctrine of equivalents. But these significant improvers have another weapon in their arsenal -- they can patent their improvements.⁸⁰

It may seem odd at first that an improvement which is nonobvious in view of the prior art can still infringe on a patent which is part of that prior art. Such a situation can arise in at least three different ways. First, adding to an infringing machine does not relieve a defendant of liability for infringement. Thus, if the improvement consists of additions to the basic structure claimed in the original patent, that improvement will not avoid infringement even though it would not have been obvious to the original patentee. A clear example of this case is *Marconi Wireless Tel. Co. v. DeForest Radio Tel. & Tel. Co.*,⁸¹ where the court held that a triode (a container having three electrodes) infringed a prior patent on a diode (a container having two electrodes), since the triode necessarily contained two electrodes in a container. The second reason such a situation might arise is that enablement is tested only as of the time the original inventor files for a patent. If the original inventor has *at that time* enabled the use of an entire class of products, a claim covering that entire class is warranted. But if the class *subsequently* expands to include other species not conceived at the time of the first patent, the generic claim language will allow the first inventor to capture those new species within the scope of his

⁷⁹ I discuss factors relevant to setting the proper upper value for "significant" improvements in Part VI.

⁸⁰ By hypothesis, the improvement is nonobvious -- it has contributed more than the minimum social value required for patentability. Naturally, the minimum social value test is highly stylized. Improvers must meet other requirements, such as enablement and utility, in order to qualify for a patent on their improvement. Still, these factors should not concern us unduly. Enablement is generally within the control of a patent applicant, and an improvement to an existing patent with significant social value will normally clear the utility hurdle with ease.

⁸¹ 236 F. 942 (S.D.N.Y. 1916), *aff'd* 243 F. 560 (2d Cir. 1917).

claim.⁸² Finally, a patent on a new product will extend to new and unanticipated *uses* of that product. For example, in *B.G. Corp. v. Walter Kidde & Co.*,⁸³ the court held that the inventor of the spark plug was entitled to control the use of spark plugs in airplanes, even though he never foresaw that use at the time of his invention.

Patenting an improvement does not prevent it from infringing on the original patent, and so it does not directly protect the significant improver from suit.⁸⁴ But an improvement patent will affect what value the original patent owner can capture in such a suit. The original patent owner is entitled to damages for past infringement, and an injunction against future use of the infringing improvement. But in contrast to the case of the minor improver, the original patent owner cannot capture the value of the significant improvement, because that improvement is itself protected by a patent. Should the original patent owner try to use the patented improvement, the significant improver can sue *him* for damages and an injunction.⁸⁵ This situation is known as the case of "blocking patents."⁸⁶ The original patent owner can prevent the

⁸² On this problem, see Robert P. Merges, *Rent Control in the Patent District: Observations on the Grady-Alexander Thesis*, 78 **Va. L. Rev.** 359, 379 n.73 (1992).

⁸³ 79 F.2d 20, 22 (2d Cir. 1935).

⁸⁴ See *supra* note __ (citing cases).

⁸⁵ See generally 35 U.S.C. § 154 (patent laws provide only the right to exclude others from working the invention, rather than an affirmative right to practice the invention). Cases involving blocking patents include *Cantrell v. Wallick*, 117 U.S. 689, 694 (1886); *Cochrane v. Deener*, 94 U.S. 780, 787 (1877); *Atlas Powder Co. v. duPont*, 750 F.2d 1569, 1576 (Fed. Cir. 1984); *Ziegler v. Phillips Petroleum*, 483 F.2d 858, 871-72 (5th Cir. 1973); *Bryan v. Sid W. Richardson, Inc.*, 254 F.2d 191 (5th Cir. 1958), as well as those cited above.

⁸⁶ For general treatments of blocking patents in the literature, see, e.g., Robert P. Merges & Richard Nelson, *On the Complex Economics of Patent Scope*, 90 **Colum. L. Rev.** 839, 860-62 (1990); Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 **Tenn. L. Rev.** 75 (1994). For our purposes, patents on complementary goods owned by different parties might also be thought to be "blocking" in a limited sense. If I own the patent on a hammer and you own the patent on an anvil, each of us is free to make our own products, so the patents are not strictly "blocking." However, absent a license agreement neither of us may be able to exploit our patents to maximum advantage, because of the synergy between the two. See Michael A. Sanzo, *Antitrust Law and Patent Misconduct in the Proprietary Drug Industry*, 39 **Villanova L. Rev.** 1209, 1245-46 (1994); David S. Taylor, Note, *The Sinking of the United States Electronics Industry Within Japanese Patent Pools*, 26 **Geo. Wash. J. Int'l L. & Econ.** 181, 201 (1992).

improver from using his patented technology, but the improver can also prevent the original patent owner from using the improvement. Unless the parties bargain, no one gets the benefit of the improvement.⁸⁷

Radical Improvers. In some sense, any invention, no matter how pioneering, can be thought of as an improvement on prior work.⁸⁸ One might conceive of the automobile as an improvement on the horse and buggy, for example, or of computers as an improvement on calculators.⁸⁹ Clearly, not all improvements escape infringement -- even significant improvements do not do so.⁹⁰ But at some point -- \$1000 in our stylized example -- the patent law treats an improvement as sufficiently radical to constitute a departure from all that came before it, even though the improvement may fall within the literal claims of the original patent. These radical improvements are protected under the "reverse doctrine of equivalents."⁹¹

Despite its name and its origin,⁹² the reverse doctrine of equivalents is not merely the "flip side" of the doctrine of equivalents used in infringement analysis.⁹³ The reverse doctrine

⁸⁷ On the efficiency of this approach and the likelihood of bargaining between the parties, see *infra* Part V.

⁸⁸ See *supra* note __ (most innovation is cumulative in nature).

⁸⁹ This last example is not exactly hypothetical. Texas Instruments, for example, has asserted its basic calculator patent against a variety of modern products containing integrated circuits. Cf. *Texas Instruments, Inc. v. United States Int'l Trade Comm.*, 805 F.2d 1558 (Fed. Cir. 1986) (suit by TI against importers of modern calculators).

⁹⁰ See *Phillips Petroleum v. U.S. Steel Corp.*, 673 F. Supp. 1278 (D. Del. 1987), *aff'd* 865 F.2d 1247 (Fed. Cir. 1989) ("the mere fact that the accused products are superior does not, in and of itself, permit Defendants to escape liability under the reverse doctrine of equivalents.").

⁹¹ On the reverse doctrine of equivalents generally, see, e.g., *SRI Int'l v. Matsushita Elec. Ind. Corp.*, 775 F.2d 1107 (Fed. Cir. 1985); Jonathan Geld, *Back Up! -- Using the Reverse Doctrine of Equivalents to Halt the Advance of Functionally Claimed Software* (working paper 1996); Michael S. Greenfield, Note, *Recombinant DNA Technology: A Science Struggling with the Patent Law*, 44 *Stan. L. Rev.* 1051, 1078-79 (1992); Laura A. Handley, *Refining the Graver Tank Analysis With Hypothetical Claims: A Biotechnology Exemplar*, 5 *Harv. J.L. & Tech.* 31, 34 (1991); C.F. Pigott, *Equivalents in Reverse*, 48 *J. Pat. & Trademk. Ofc. Soc'y* 291 (1966).

⁹² *Boyden Power-Brake Co. v. Westinghouse*, 170 U.S. 537 (1898) is generally cited as the first case establishing the reverse doctrine of equivalents. In *Graver Tank*, the Supreme Court referred to the doctrine of equivalents as a unified phenomenon that included within its scope the reverse doctrine of equivalents. 339 U.S. at 608-09. Nonetheless, the development of the doctrines have not been entirely parallel.

protects from infringement a product "so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way, but nevertheless falls within the literal words of the claim."⁹⁴ Unlike the doctrine of equivalents, which can apply both to technology known at the time of the patent application and to subsequently developed technology,⁹⁵ the only application of the reverse doctrine is to protect subsequent improvements from infringement if they are sufficiently radical.⁹⁶ An example of the reverse doctrine at work is *Scripps Clinic Research Foundation v. Genentech*.⁹⁷ In that case, Scripps had a patent for a blood clotting product, human Factor VIII:C, which it purified from human blood. Genentech produced identical Factor VIII:C from laboratory bacteria using recombinant DNA processes. Genentech argued that its recombinant Factor VIII:C was "changed in principle" from Scripps' purified Factor VIII:C.⁹⁸ The Federal Circuit held that material issues of fact precluded summary judgment on this issue, and reversed a district court finding of infringement.⁹⁹

⁹³ See Mark D. Janis, *Unmasking Structural Equivalency: The Intersection of § 112, ¶ 6 Equivalents and the Doctrine of Equivalents*, 4 **Alb. L.J. Sci. & Tech.** 205, 213-15 (1994) (identifying differences in the two analyses).

⁹⁴ *Graver Tank*, 339 U.S. at 608-09. See Handley, *supra* note ___, at 41 (comparing the "different in principle" test to the function-way-result test traditionally applied in doctrine of equivalents cases).

⁹⁵ See, e.g., *Texas Instruments, Inc. v. United States Int'l Trade Comm.*, 805 F.2d 1558, 1563 (Fed. Cir. 1986); *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 941-42 n.4 (Fed. Cir. 1987) (en banc) (Bennett, J., dissenting); Robert P. Merges & Richard Nelson, *On the Complex Economics of Patent Scope*, 90 **Colum. L. Rev.** 839, 855 (1990).

⁹⁶ It is also worth noting that the reverse doctrine of equivalents seems to involve evaluating equivalence between the claimed invention and the accused product viewed as a whole, see *Texas Instruments*, 805 F.2d at 1558, as opposed to the element-by-element approach used in the doctrine of equivalents. See *Pennwalt*, 833 F.2d at 931.

⁹⁷ 927 F.2d 1565 (Fed. Cir. 1991).

⁹⁸ *Id.* at 1581.

⁹⁹ *Id.* See also *Leesona Corp. v. United States*, 530 F.2d 896, 906 (Ct. Cl. 1976); *Precision Metal Fabricators v. Jetstream Sys. Co.*, 693 F. Supp. 814 (N.D. Cal. 1988); *Beloit Corp. v. J.M. Voith*, 626 F. Supp. 991 (E.D. Va. 1986) (all finding no infringement based on reverse doctrine of equivalents). But see Kevin J. McGough & Daniel P. Burke, *A Case for Expansive Patent Protection of Biotechnology Inventions*, 6 **Harv. J.L. & Tech.** 85, 96-97 (1992) (arguing that *Scripps* provides weak precedent for the reverse doctrine of equivalents, since the court also noted possible differences between the products produced by the two methods).

Commentator Michael Greenfield offers another potential application of the reverse doctrine of equivalents in the biotechnology field. He suggests that patents on human gene-fragment sequences called "express sequence tags" (ESTs) should not preclude the later use of those gene sequences in recombinant protein production.¹⁰⁰ The case he poses is instructive for our purposes. The patented ESTs are primarily useful in gene mapping -- a valuable use, but not nearly as valuable as the use of the gene sequence to produce recombinant proteins would be.¹⁰¹ Where the value of the improvement greatly exceeds the value of the original invention, application of the reverse doctrine of equivalents seems most likely.¹⁰²

While the reverse doctrine offers relief from infringement for radical improvers, its application by the courts to excuse literal infringement is rare.¹⁰³ The existence of the doctrine provides protection for radical improvers who nonetheless literally infringe the original patent -- those whose improvements change the original invention "in principle" or in a substantial way, but who still fall within the literal language of the claims.¹⁰⁴ The reverse doctrine of equivalents

¹⁰⁰ Greenfield, *supra* note __, at 1090-91. For a general discussion of the patentability of ESTs, and a brief review of past efforts to patent them, see Rebecca S. Eisenberg & Robert P. Merges, *Opinion Letter as to the Patentability of Certain Inventions Associated with the Identification of Partial cDNA Sequences*, 23 **AIPLA Q.J.** 1 (1995).

¹⁰¹ Eisenberg & Merges raise this point obliquely when they suggest that patents on research tools are more troubling than patents on end products because of the danger that research patents will restrict further productive uses of those research tools. However, they do not treat the problem explicitly under the reverse doctrine of equivalents. See Eisenberg & Merges, *supra* note __, at 19; Scott A. Chambers, *Comments*, 23 **AIPLA Q.J.** 53 (1995); Rebecca S. Eisenberg & Robert P. Merges, *Reply*, 23 **AIPLA Q.J.** 61 (1995).

¹⁰² For a discussion of how to calibrate these values in practice, as well as the economic implications of the reverse doctrine of equivalents, see *infra* Part V.

¹⁰³ See Geld, *supra* note __, at __ (only 5 reported decisions accept a reverse doctrine of equivalents argument; the vast majority of courts reject the argument when it is presented to them). Merges and Nelson suggest that the doctrine must be rarely used in order to preserve the certainty (and therefore the incentive effect) associated with the patent. Merges & Nelson, *supra* note __, at 867 n. 120.

¹⁰⁴ Radical improvers who do not fall within the literal language of the claims do not, strictly speaking, benefit from the reverse doctrine of equivalents, which applies only in cases of literal infringement. See Merges & Nelson, *supra* note __, at 867 n. 120. In practical terms, however, the effect of applying the reverse doctrine is the same as failing to find infringement under the doctrine of equivalents -- in either case, the question is whether there are substantial differences between the patented method and the accused product. Thus, in some sense all findings of nonequivalence have the same basis.

therefore benefits radical improvers at the expense of the original patentee, and so encourages radical improvements, just as the blocking patents rule provides some lesser encouragement to significant improvements.¹⁰⁵

III. Treatment of Improvements in Copyright Law

A. The Scope of Protection Under Copyright Law

While the basic incentive structure of copyright law is the same as patent law -- a limited grant of exclusive rights to creators in order to encourage both more creation and the dissemination of existing works -- there are substantial differences between the two doctrines. Copyright law does not require examination by the government or the "issuance" of a copyright; instead, original works of authorship are protected immediately upon their creation.¹⁰⁶ While there are certain requirements for protection -- the work must fall within the scope of copyright protection,¹⁰⁷ must be original,¹⁰⁸ and must be fixed in a tangible medium of expression¹⁰⁹ -- they are nowhere near as stringent as the requirements imposed by the patent law. And the duration of copyright protection is much longer than the term of patent protection -- usually 75 years or more.¹¹⁰

¹⁰⁵ For an interesting suggestion that application of the reverse doctrine of equivalents may actually benefit patentees in some circumstances by cementing the *validity* of the patent claims, see Karl Bozicevic, *The "Reverse Doctrine of Equivalents" in the World of Reverse Transcriptase*, 71 **J. Pat. & Trademk. Ofc. Soc'y** 353 (1989).

¹⁰⁶ One caveat is in order here. Under U.S. copyright law, registration of the copyrighted work is a prerequisite to filing suit for copyright infringement. 17 U.S.C. § 411(a). In that limited sense, a copyright in a work is only a potential right until it is registered.

¹⁰⁷ 17 U.S.C. § 102(a) provides a non-exclusive list of works eligible for copyright protection.

¹⁰⁸ See *Feist v. Rural Telephone Serv.*, 111 S.Ct. 1282 (1991).

¹⁰⁹ 17 U.S.C. § 101 (quote fixation definition). The fixation requirement is quite easily satisfied, at least under certain modern cases. See *MAI v. Peak Computing*, 991 F.2d 511, 518 (9th Cir. 1993).

¹¹⁰ The term of a copyright depends on who creates it. In the case of individual authors, it extends for the life of the author plus 50 years. 17 U.S.C. § 302(a). In the case of works made for hire, the term is 75 years from the date

Taken together, these facts about copyright -- the automatic protection of a broad range of works for a long period of time, with minimal requirements -- suggest that it is a more powerful intellectual property right than patent law. The power of copyrights is tempered in practice by two significant limitations on what activities infringe a copyright, however.¹¹¹ First, copyright protection does not extend to the ideas, facts, or functional elements of a work, but only to the author's original expression of those ideas or elements.¹¹² Thus, a copyright owner in a database of facts cannot prevent a user from copying the facts themselves from the database. Only the creative effort (if any) that has gone into the selection or organization of materials is entitled to protection.¹¹³ Similarly, copyright owners cannot protect the basic ideas of their novels or movies¹¹⁴ or the functional aspects of their lamps or computer programs,¹¹⁵ though they are entitled to protect the particular implementations of those ideas or functions to the extent that the implementations are original and creative. For works whose value resides primarily in ideas or functional attributes, therefore, copyright is inferior to patent as a means of protection.¹¹⁶

The second limitation on the power of copyright owners relative to patent owners lies in the nature of activities deemed infringing. Anyone who makes, uses or sells a product within the

of publication, or 100 years from creation, whichever is shorter. 17 U.S.C. § 302(c). Legislation currently pending before Congress would extend each of these terms by 20 years. [cite bill]

¹¹¹ The fair use defense to infringement is a third significant limitation on copyright. Fair use is discussed in more detail in the next section.

¹¹² 17 U.S.C. § 102(b).

¹¹³ *Feist*, 111 S. Ct. at ____.

¹¹⁴ *See, e.g., Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930).

¹¹⁵ *Mazer v. Stein*, 347 U.S. 201 (1954); *Computer Associates v. Altai*, 982 F.2d 693 (2d Cir. 1992).

¹¹⁶ Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 **Colum. L. Rev.** 2308 (1994); A. Samuel Oddi, *An Uneasier Case for Copyright than for Patent Protection of Computer Programs*, 72 **Neb. L. Rev.** 351 (1993).

claims of a patent infringes that patent,¹¹⁷ whether or not they copied the idea from the patent owner, and indeed whether or not they were even aware that the patented technology existed. By contrast, a copyright protects its owner only against those who have actually taken the plaintiff's work. Independent development of the work is a complete defense.¹¹⁸ As a result, copyright infringement cases frequently focus on the defendant's actions and intentions in preparing the accused work.¹¹⁹ Further, copyright law normally does not prevent another from *using* the copyrighted work, as long as she does not make a copy of the work or perform or display it publicly.¹²⁰

B. Evaluating Infringement by Improvers

Unlike patents, copyrights do not have claims. Infringement is tested by comparing the accused work to the copyrighted work to determine whether substantial copying has occurred.¹²¹ The simplest case is one in which the entire copyrighted work has been copied verbatim. This of course constitutes infringement,¹²² just as copying the patent owner's invention infringes the

¹¹⁷ Subject to the narrow limitation discussed *supra* section ____.

¹¹⁸ See, e.g., 2 Goldstein, *supra* note ___, at ____.

¹¹⁹ Because direct evidence of copying is unavailable, courts allow evidence that a defendant had access to the copyrighted work and that the two works are substantially similar to serve as a surrogate for proof of copying. See, e.g., *Sid & Marty Krofft Television v. McDonald's Corp.*, 562 F.2d 1157 (9th Cir. 1977); *Arnstein v. Porter*, 154 F.2d 464 (2d Cir. 1946).

¹²⁰ See 17 U.S.C. § 106 (a copyright gives the owner the exclusive right to copy, adapt, distribute, and in some cases publicly perform or display the work). The exception to this rule is digitized information, where the courts have effectively enabled the copyright owner to control private uses of the work by defining any use in a computer or computer network as involving the creation of a copy. See, e.g., *MAI v. Peak Computing*, 991 F.2d 511 (9th Cir. 1993). For criticism of this approach, see Jessica Litman, *The Exclusive Right to Read*, 13 *Cardozo Arts/Ent. L.J.* 29 (1994).

¹²¹ While courts often confuse the issue of "substantial similarity" between two works as evidence of copying with the issue of whether substantial protected expression has in fact been taken, the two issues are analytically distinct. See Amy Cohen, *Masking Copyright Decisionmaking: The Meaninglessness of Substantial Similarity*, 20 *U.C. Davis L. Rev.* 719 (1987).

¹²² Subject to the fair use defense. See *Sony Corp. v. Universal City Studios*, 464 U.S. 417 (1984) (verbatim copying of an entire work can be fair use in some circumstances).

patent. Beyond this point, however, the patent and copyright infringement tests diverge. For one thing, it is possible to infringe a copyright by copying only a small portion of the copyright owner's work. Copying even a few hundred words from a book,¹²³ or a few seconds of music from a song,¹²⁴ may be enough to infringe the copyright in the entire work. By contrast, copying part but not all of a claimed invention is not patent infringement, since every element of the claimed invention (or an equivalent) must be present in the accused device.¹²⁵ Thus, improvers may be liable for copying even a relatively small portion of the original work.¹²⁶

Further, copyright infringement is not limited to cases of verbatim copying. The courts long ago recognized that such a limitation would render copyright protection ineffective, allowing "plagiarists to escape by immaterial variations."¹²⁷ Defendants may infringe the copyright by taking only the "nonliteral" elements of a work, such as the plot outline of a movie,¹²⁸ the structure, sequence and organization of a computer program,¹²⁹ or even the "total concept and feel" of a song, a television show, or a greeting card.¹³⁰ While one might analogize this protection against nonliteral infringement to patent's doctrine of equivalents, in fact the

¹²³ *Harper & Row Publishers v. Nation Enterprises*, 471 U.S. 539 (1985).

¹²⁴ *Jarvis v. A&M Records*, 827 F. Supp. 282 (D.N.J. 1993); *Grand Upright Music v. Warner Bros.*, 780 F. Supp. 182 (S.D.N.Y. 1991).

¹²⁵ *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931 (Fed. Cir. 1987) (en banc).

¹²⁶ There are a number of defenses in the Copyright Act permitting various acts of copying for certain public interest purposes, or allowing certain acts on the payment of a compulsory license fee. *See* 17 U.S.C. §§ 107-120. One of these defenses, the fair use doctrine, is discussed in greater detail *infra* notes ___-___ and accompanying text.

¹²⁷ *Nichols v. Universal Pictures*, 45 F.2d 119, 121 (2d Cir. 1930).

¹²⁸ *See, e.g., Sheldon v. MGM Pictures*, 309 U.S. 390 (1940).

¹²⁹ *Whelan Assoc. v. Jaslow Dental Labs*, 797 F.2d 1222 (3d Cir. 1986); *Computer Associates v. Altai*, 982 F.2d 693 (2d Cir. 1992).

¹³⁰ *See Arnstein v. Porter*, 154 F.2d 464 (2d Cir. 1946); *Sid & Marty Krofft Television v. McDonald's Corp.*, 562 F.2d 1157 (9th Cir. 1977); and *Roth Greeting Cards v. United Card Co.*, 429 F.2d 1106 (9th Cir. 1970), respectively.

animating principle is somewhat different. Nonliteral copyright infringement involves the copying of elements of a work which, while not literally contained in the physical manifestation of the work, nonetheless constitute part of the original expression of the work, as distinguished from its idea or its functional attributes.¹³¹ Thus, improvements in the text of a work which keep the structure identical likely will not escape the web of nonliteral copyright infringement. On the other hand, the fact that two different plot devices for a mystery novel are *functionally equivalent* does not mean that one infringes the other under copyright. By contrast, in patent law the test for the doctrine of equivalents -- insubstantial differences, as measured by factors such as reasonable interchangeability -- allows it to reach different works that operate on similar functional principles.

In addition to the broad definition of a copy subject to the constraints of the Copyright Act, section 106(2) of the Act also gives the copyright owner the right to control the making of adaptations, or "derivative works." It is not clear precisely how a derivative work differs from a nonliteral copy, or what section 106(2) adds to the provisions of 106(1).¹³² Section 101 of the Copyright Act defines a derivative work only in terms of examples:

A derivative work is a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgement, condensation, or any other form in which a work may be recast, transformed, or adapted.¹³³

¹³¹ See *Sheldon v. MGM*, 309 U.S. 390 (1940) (successful movie which was found to be based in part on a copyrighted play could be enjoined, even though only a small part of the movie was infringing material); see also *Abend v. MCA, Inc.*, 863 F.2d 1465 (9th Cir. 1988), *aff'd on other grounds sub nom.* *Stewart v. Abend*, 495 U.S. 207 (1990) (where movie "Rear Window", a derivative work based on plaintiff's original short story, was validly licensed at the time it was made, it would be inequitable to enjoin continued distribution of the movie, but plaintiffs were nonetheless entitled to damages for continued use).

¹³² See, e.g., Paul Goldstein, *Derivative Rights and Derivative Works in Copyright*, 30 **J. Copyright Off. Soc'y** 209 (1983). Goldstein suggests that copies end -- and derivative works begin -- where the alteration of the original work causes it to compete in a new market. Thus, movie version of books and French translations of English works are both derivative works, since in both cases the new work competes in a different market from the original. *Id.* at __; accord *Lone Ranger Television, Inc. v. Program Radio Corp.*, 740 F.2d 718, 721 (9th Cir. 1984).

¹³³ 17 U.S.C. § 101.

Under this definition, a derivative work can be infringing despite having no literal text in common (for example, in the case of a Navajo translation of an Hungarian work). Nonetheless, many of the same limitations that apply to infringement by copying apply equally to infringement by derivation. For example, in *Litchfield v. Spielberg*,¹³⁴ Litchfield claimed that a screenplay she had written and submitted to the defendants called "Lokey from Maldomar" was infringed by defendants' enormously popular movie "E.T." The defendants denied copying the script, and the Ninth Circuit concluded that it could not infer copying because the two works were not "substantially similar."¹³⁵ The court rejected Litchfield's claim that "E.T." was a derivative work for the same reasons, holding that "a work is not derivative unless it has been substantially copied from the prior work. . . . We have stated that a work will be considered a derivative work only if it would be considered an infringing work if the material which it has derived from a prior work had been taken without the consent of a copyright proprietor of such prior work."¹³⁶

In light of this, it is not evident what section 106(2) adds to the rights already granted under section 106(1).¹³⁷ A few theories have been advanced. For example, the derivative works right may extend the reach of the protection against copying in certain limited factual circumstances -- for example, where the derivative work is not fixed in a tangible medium of expression and therefore does not constitute a "copy."¹³⁸ It may preclude owners of a particular

¹³⁴ 736 F.2d 1352 (9th Cir. 1984).

¹³⁵ *Id.* at ____.

¹³⁶ *Id.* at ____; *Accord* *Vault Corp. v. Quaid Software*, 847 F.2d 255, 267-68 (5th Cir. 1988) (copying of only an insignificant portion of the plaintiff's work cannot constitute creation of a derivative work).

¹³⁷ In his treatise, Nimmer refers to section 106(2) as "completely superfluous." 2 **Melville Nimmer & David Nimmer, Copyright** § 8.09[A], at 8-114. *See also* Sterk, *supra* note ___, at 1215-16 (arguing that in most cases derivative rights are pure economic rents to copyright owners).

¹³⁸ Section 106(2) does not require that a derivative work be fixed in order to be infringing. On this point, compare *Midway Mfg. Co. v. Artic Int'l*, 704 F.2d 1009 (7th Cir. 1983) (circuit which speeds up copyrighted video

copy of a work from altering or transforming that copy notwithstanding the first sale doctrine,¹³⁹ though such an application of the adaptation right has been controversial.¹⁴⁰ And in conjunction with section 103 of the Act, it may allow copyright owners to protect a "chain" of works, even though works at the end of the chain bear little or no resemblance to the original works in the chain. Thus, Disney might protect a book, a script derived from that book, a movie made from the script, and stuffed animals derived from the movie, even though the stuffed animals have no resemblance to anything described in the original book.¹⁴¹

Finally, in some cases copyright law will extend to cover an "improvement" which does not copy from the original work at all, but is merely designed to interoperate with the copyrighted work. In two cases, courts have held that a copyrighted talking teddy bear which contained an audio tape controlling its voice was infringed by a competitor's audio tape containing different sounds, but which was designed to be played in the same bear by people

games creates unlawful derivative works) with *Lewis Galoob Toys, Inc. v. Nintendo of America*, 780 F. Supp. 1283, 1291 (N.C. Cal. 1991), *aff'd* 964 F.2d 965 (9th Cir. 1992) (game device which speeds up copyrighted video games does not create unlawful derivative works). The Ninth Circuit's decision in *Galoob* acknowledged that an accused work did not need to be "fixed" within the meaning of the Copyright Act in order to infringe, but did hold that it must incorporate the copyrighted material in some concrete or permanent form. 964 F.2d at 967-68. It is not clear how this incorporation would differ from fixation, which has been given an expansive interpretation by other decisions. See, e.g., *MAI v. Peak Computing*, 991 F.2d __ (9th Cir. 1993). See Carol S. Curme, Note, *Derivative Works of Video Game Displays*, 61 **U. Cinn. L. Rev.** 999, 1022-27 (1993) (criticizing the *Galoob* court's treatment of the derivative works issue).

¹³⁹ See, e.g., *Mirage Editions v. Albuquerque A.R.T. Co.*, 856 F.2d 1341 (9th Cir. 1988); *Munoz v. Albuquerque A.R.T. Co.*, 829 F. Supp. 309 (D. Alaska 1993); *National Geographic Society v. Classified Geographic, Inc.*, 27 F. Supp. 655 (D. Mass. 1939) (all permitting the copyright owner to restrict purchasers of copies from cutting up magazines or books and reassembling them in different form). The first sale doctrine, 17 U.S.C. § 109(a), generally permits a purchaser to dispose of the purchased copy at his discretion, but it does not apply to derivative works.

¹⁴⁰ See 2 Goldstein, *supra* note __, at 5:81-82 (condemning *Mirage* as an unwarranted extension of the Copyright Act).

¹⁴¹ Of course, section 103 (which provides that derivative works containing new original expression are separately copyrightable) is arguably sufficient to take care of this by itself. It is not clear what section 106(2) adds to the "chain of copyright" theory.

who already own the bear.¹⁴² Other cases have given more favorable treatment to independent works which interoperate with an original copyrighted work, but they have generally done so under the fair use doctrine after concluding that the production of such works constituted infringement.¹⁴³

C. Mechanisms for Protecting Improvers

One thing that the derivative works right does do is make it clear that copyright law is intended to reach improvers as well as counterfeiters. The copyright owner's control over works in markets other than the one he entered is no accident, but part of the scheme of copyright protection. Nonetheless, there are a few legal rules which function to protect improvers in copyright law. To compare these rules to analogous doctrines in patent law, let us once again hypothesize three types of improvers: minor improvers, significant improvers, and radical improvers.¹⁴⁴

Minor Improvers. In Part II, I defined a minor patent improver as one who advances social utility by adding to the basic invention, but who does not contribute enough to justify receiving a patent in her own right on the improvement. For consistency, I will adopt the same definition here. Because copyright protection is so much easier to obtain than patent protection, however, the effect of this rule is to make the group of "minor improvers" very small. Most improvements will be sufficiently original that they would ordinarily qualify for copyright protection in their own right, and will therefore fall into the category of "significant"

¹⁴² See *Worlds of Wonder, Inc. v. Veritel Learning Sys.*, 658 F. Supp. 351 (N.D. Tex. 1986); *Worlds of Wonder, Inc. v. Vector Intercontinental*, 653 F. Supp. 135 (N.D. Ohio 1986). For criticism of these decisions, see Christian H. Nadan, Comment, *A Proposal to Recognize Component Works: How a Teddy Bears on the Competing Ends of Copyright Law*, 78 **Cal. L. Rev.** 1633 (1990).

¹⁴³ See, e.g., *Bateman v. Mnemonics, Inc.*, ___ F.2d ___ (11th Cir. 1995); *Sega of America v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992); *Lewis Galoob Toys v. Nintendo of America*, 964 F.2d 965 (9th Cir. 1992).

¹⁴⁴ Glynn Lunney attempts a somewhat similar taxonomy. See Lunney, *supra* note ___, at ___.

improvements. Nonetheless, certain improvements to an original work can be classified as "minor" even under this restrictive definition. Editorial corrections or revisions which do not themselves contribute copyrightable material fall into this category, as do factual corrections to a database or certain types of restoration efforts to works of art.

Minor improvers receive no special protection under copyright law. They are subject to the same rules of copyright infringement as any other copier, notwithstanding their improvements. Thus, it is possible that minor improvements will qualify as a fair use, particularly if they are done in the context of copies made for a public benefit and which do not harm the market for the original work.¹⁴⁵ But most copies that contain only minor improvements will not qualify as fair uses. And while it is theoretically possible that the changes made to the original work by the minor improver will cause the improved work to be non-infringing, in practice the likelihood of a change being both sufficiently minor as not to qualify for copyright protection and sufficiently major as to preclude a finding of substantial copying (or the derivative works right) are minimal. Minor improvers are therefore likely to be guilty of copyright infringement. As with minor improvements that infringe patents,¹⁴⁶ improvements that infringe copyrights are effectively captured by the copyright owner, since anyone copying the new work would similarly be guilty of infringing the copyright on the original work.¹⁴⁷

Significant Improvers. This class of improvers is quite broad, encompassing any improvement to a copyrighted work that itself contains original, creative expression, up to some

¹⁴⁵ See, e.g., *Sony Corp. v. Universal City Studios*, 464 U.S. 417 (1984).

¹⁴⁶ See *supra* notes ___-___ and accompanying text.

¹⁴⁷ See *Lipton v. Nature Co.*, 71 F.3d 464 (2d. Cir. 1995) (innocent copying of a work will not protect copier from infringement if the copied work itself infringed another work); 1 **Nimmer on Copyright** § 8.01[C].

arbitrary limit separating significant from radical improvements.¹⁴⁸ Virtually any work that qualifies as a "derivative work" under the definition in section 101 will qualify as at least a significant improvement, since the additional effort involved in adapting the original work to a new market will almost always include original expression contributed by the improver. Thus, translating an original work into a new language, making a movie from a screenplay, and even producing stuffed animals based on a movie involve the inclusion of significant new creative elements. Further, nonliteral copies that compete directly with the original will often qualify as significant improvements as well. A novel may copy the detailed plot structure of an original work, for example, but contribute entirely new text and characters. In all of these cases, the improver is guilty of copying from the original work, but has also contributed valuable material to the new work.

In the patent context, we referred to this situation as involving "blocking patents." The improver could not legally use the material covered by the original patent without permission, but the original patent owner similarly could not use the new material contributed by the improver. Perhaps surprisingly, there is no analogous doctrine of "blocking copyrights." Instead, section 103 of the Act provides that original works of authorship contributed as part of the creation of a derivative work are copyrightable only by the original copyright owner or his licensee.¹⁴⁹ This means, for example, that if an improver makes a movie which is later determined to have infringed the copyright on a book on which it was based, the improver is not

¹⁴⁸ Because there is no equivalent in copyright to the "nonobviousness" and "utility" requirements in patent law, it is even possible that changes with a negative social value will fall into the category of significant improvements. *See, e.g., Dallas Cowboys Cheerleaders v. Pussycat Cinema*, 604 F.2d 200 (2d Cir. 1979) ("improvement" consisted of pornographic movie portraying the plaintiffs).

¹⁴⁹ 17 U.S.C. § 103(a) provides:

The subject matter of copyright as specified by section 102 includes compilations and derivative works, but protection for a work employing preexisting material in which copyright subsists does not extend to any part of the work in which such material has been used unlawfully.

entitled to any copyright protection for the movie -- even those portions of the movie which were contributed by the improver.¹⁵⁰

The effect of this rule is to allow the original copyright owner to capture the value of even significant improvements made by others. While the improvements themselves are nominally in the public domain, no one can use those improvements *in conjunction with the original work* without infringing the copyright on that work.¹⁵¹ Further, the existence of this power of capture may influence license negotiations between copyright owners and potential improvers, tipping the balance in favor of the creators of original works at the expense of improvers.¹⁵² Relative to patent law, then, copyright law provides less encouragement for significant improvements, and gives more power to original copyright owners.¹⁵³

¹⁵⁰ See, e.g., *Gracen v. Bradford Exchange*, 698 F.2d 300 (7th Cir. 1983); *Pamfiloff v. Giant Records, Inc.*, 794 F. Supp. 933, 938 (N.D. Cal. 1992); *Dynamic Solutions, Inc. v. Planning & Control, Inc.*, 646 F. Supp. 1329, 1340 (S.D.N.Y. 1986); *Gallery House, Inc. v. Yi*, 582 F. Supp. 1294 (N.D. Ill. 1984); *Eden Toys, Inc. v. Florelee Undergarment Co.*, 526 F. Supp. 1187 (S.D.N.Y. 1981), *rev'd on other grounds* 697 F.2d 27 (2d Cir. 1982); 1 **Nimmer on Copyright** § 3.06, at 3-34.5 to 3-34.6.

Because section 103 of the Act denies copyright only in the "part of the work" which incorporates infringing material, some infringing derivative works may nonetheless be copyrightable in part. This is particularly true in the case of compilations, where the infringing material can be separated easily from other parts of the work. Thus, the House Report accompanying the 1976 Act provides that "an unauthorized translation of a novel could not be copyrighted at all, but the owner of copyright in an anthology of poetry could sue someone who infringed the whole anthology, even though the infringer proves that publication of one of the poems was unauthorized." H.R. No. 94-1476, 94th Cong., 2d Sess. 57-58 (1976).

¹⁵¹ See *Central Point Software, Inc. v. Nugent*, ___ F. Supp. ___ (E.D. Tex. 1995) (upgrades to copyrighted software made without permission were infringing derivative works and fell within the scope of the original copyright grant). Cf. *Grove Press, Inc. v. Greenleaf Publishing*, 247 F. Supp. 518 (E.D.N.Y. 1965) (copyright owner of original French novel could prevent the copying of English translations of his work, even though the English translation had fallen into the public domain, since copying the public domain translation would infringe the copyright owner's right to prepare derivative works); *Russell v. Price*, 612 F.2d 1123 (9th Cir. 1979) (a derivative work in the public domain cannot be performed publicly without violating the performance right in the original work). See Nevins, *The Doctrine of Copyright Ambush: Limitations on the Free Use of Public Domain Derivative Works*, 25 **St. Louis U.L.J.** 58 (1981).

¹⁵² For more discussion on this point, see *infra* Part IV.

¹⁵³ For criticism of this result, see, e.g., Goldstein, *supra* note ___, at ___; Wendy Gordon, *Toward a Jurisprudence of Benefits: The Norms of Copyright and the Problem of Private Censorship*, 57 **U. Chi. L. Rev.** 1009 (1990); Christian H. Nadan, *A Proposal to Recognize Component Works: How a Teddy Bears on the Competing Ends of Copyright Law*, 78 **Cal. L. Rev.** 1633 (1990).

Radical Improvers. The final case involves improvers who have made a major contribution to social value, for example a work in which the new material predominates over infringing material. In this situation, patent law offers the possibility of complete immunity from infringement under the reverse doctrine of equivalents. Copyright law has no corresponding doctrine. Radical improvers still infringe the original copyright so long as they have copied any substantial portion of the original work. Thus, the maker of a major motion picture relying on only a small portion of a play,¹⁵⁴ the publisher of a news story which includes 300 words quoted from a forthcoming biography,¹⁵⁵ and the composer who writes a song which is similar in only a few notes to a previously published song¹⁵⁶ are all subject to suit for copyright infringement notwithstanding the undisputed value of their contributions.¹⁵⁷ Infringement under the derivative works right may even extend to complementary goods that do not directly copy any of the underlying work, as in *Addison-Wesley Publishing Co. v. Brown*,¹⁵⁸ where the court held that a copyrighted physics textbook which included problems for students was infringed by the publication of a manual containing the solutions to those problems.¹⁵⁹

At least one decision does offer protection to the creators of derivative works, though that protection is razor-thin. In *Lewis Galoob Toys, Inc. v. Nintendo of Am.*, 964 F.2d 965 (9th Cir. 1992), the Ninth Circuit held that individual consumers of Nintendo game cartridges who used the plaintiff's device to speed up or alter the parameters of their Nintendo games were not guilty of copyright infringement, both because the temporarily-altered games did not qualify as derivative works and because the private home use of the Galoob device was a fair use. However, this decision cannot be read to offer solace to the creators of derivative works in more permanent form who wish to market those works.

¹⁵⁴ *Sheldon*, 309 U.S. at 390.

¹⁵⁵ *Harper & Row v. Nation Ents.*, 471 U.S. 539 (1985).

¹⁵⁶ *Arnstein v. Porter*, 154 F.2d 464 (2d Cir. 1946); *see id.* at __ (Clark, J., dissenting).

¹⁵⁷ *See* 2 **Paul Goldstein, Copyright** § 5.3, at 5:79 (derivative works right may extend to derivations "that will sometimes contain only the faintest trace of the underlying work.").

¹⁵⁸ 223 F. Supp. 219 (E.D.N.Y. 1963).

¹⁵⁹ *Id.* at __. Goldstein describes this case as residing at the "speculative outer edges of the derivative right". 2 **Goldstein**, *supra* note __, at 5:80.

To be sure, copyright's fair use doctrine does offer some protection to improvers in certain circumstances. The fair use doctrine provides a defense to some charges of infringement on a case-by-case basis, generally where there is a public interest served by the copying and/or where the copying is unlikely to have a significant market impact.¹⁶⁰ While the fair use doctrine may serve to protect radical improvers in some cases, it is not expressly designed to do so. Fair use may be invoked to protect pure copiers -- those who do not improve at all -- as well as to prefer radical improvers.¹⁶¹ It does not play a role akin to the reverse doctrine of equivalents in patent law, for several reasons.

First, a critical factor in fair use analysis is the market impact of the use on the copyright owner. The Supreme Court has described this impact as "undoubtedly the single most important element of fair use,"¹⁶² and Melville Nimmer has gone so far as to say that it is determinative "Fair use, when properly applied, is limited to copying by others which does not materially impair the marketability of the work which is copied."¹⁶³ And the courts have further made it clear that this market impact includes not just the potential for lost sales of the original work, but also potential losses in the markets for derivative works¹⁶⁴ and licensing fees.¹⁶⁵ This emphasis

¹⁶⁰ 17 U.S.C. § 107 provides a list of four nonexclusive factors to consider in determining whether a particular use is fair. Those factors are the nature and purpose of the use, the nature of the copyrighted work, the amount of the copyrighted work taken, and the potential market impact on the copyright owner. It is clear that fair use protects the creators of derivative works as well as those who make more traditional copies. *See, e.g.,* Campbell v. Acuff-Rose, 114 S. Ct. 1164 (1994); Lewis Galoob Toys, Inc. v. Nintendo of Am., 964 F.2d 965 (9th Cir. 1992).

¹⁶¹ *See, e.g.,* Sony Corp. v. Universal City Studios, 464 U.S. 417 (1984) (creation of verbatim copies of movies for private use was a fair use, since the movies were broadcast for free over a television network, and the plaintiffs therefore suffered no economic harm).

¹⁶² Harper & Row Publishers v. Nation Ents., 471 U.S. 539, ___ (1985). *See also* Campbell v. Acuff-Rose Music, 114 S. Ct. 1164, ___ (1994) (a defendant claiming fair use "would have difficulty carrying the burden of demonstrating fair use without favorable evidence about relevant markets."); Wendy J. Gordon, *Fair Use As Market Failure: A Structural and Economic Analysis of the Betamax Case and its Predecessors*, 82 **Colum. L. Rev.** 1600, 1615 (1982).

¹⁶³ 1 **Nimmer**, *supra* note ___, § 1.10[D], at 1-87, quoted with approval in *Harper & Row*, 471 U.S. at ___.

¹⁶⁴ *Campbell*, 114 S. Ct. at ___.

on market harm to the original copyright owner seems to preclude the possibility that a radical improvement which competes with the original work, or even with actual or potential licensed derivatives of that work, can nonetheless be a fair use. For example, in *Triad Systems v. Southeastern Express*,¹⁶⁶ the Ninth Circuit held that the copyright in software components of an auto parts inventory system could be used to prevent the defendants from servicing that system, since in servicing the system the defendants necessarily had to make RAM copies of the software. The court rejected Southeastern's claim of fair use, reasoning that "market harm" to the copyright owner rightfully included loss of revenues it received for servicing the computer system.¹⁶⁷ The fact that sales may be attributable to the improvement itself will not help the improver if those sales are taken away from the original copyright owner, at least under the rationale of cases like *Triad*.¹⁶⁸

Second, the focus of the fair use analysis is on the material taken from the original copyright owner, not on the material added by the improver. Numerous courts have held that a

¹⁶⁵ *American Geophysical Union v. Texaco, Inc.*, 60 F.3d 913 (2d Cir. 1994). The Sixth Circuit had taken a contrary position in *Princeton Graphics v. MDS*, ___ F.3d ___ (6th Cir. 1996), but that opinion was withdrawn for en banc consideration. ___ F.3d ___ (6th Cir. 1996).

¹⁶⁶ 64 F.3d 1330, 1336 (9th Cir. 1995).

¹⁶⁷ *Id.* It is reasonable to disagree with the court's conclusion that a computer operating system copyright extends to the service market for that system, allowing the copyright owner to capture the entire market for such service. See generally David McGowan, *Regulating Competition in the Information Age: Computer Software as an Essential Facility Under the Sherman Act*, 18 **Hastings Comm/Ent. L.J.** ___ (forthcoming 1996). *Triad*'s conclusion is at odds with the Ninth Circuit's prior holding in *Sega Ents. v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992), which allowed copying of a computer game console in an effort to make new programs that competed with the copyright owner's games. The *Triad* decision may also be inconsistent with the antitrust laws. See *Image Technical Servs. v. Kodak Corp.*, 112 S. Ct. 2052 (1992) (illegal to monopolize market for service of your own product by tying).

¹⁶⁸ This situation should be distinguished from cases where the effect of a defendant's work is to suppress demand for the copyrighted work on its merits. For example, a critical book review may reduce sales of the book it criticizes, but that is not the sort of market loss relevant to the fourth factor of fair use doctrine. *Campbell*, 114 S. Ct. at ___; *Fisher v. Dees*, 794 F.2d 432, 438 (9th Cir. 1986).

defendant cannot "excuse the wrong by showing how much of his work he did not pirate."¹⁶⁹ In fair use, the focus of the third factor -- amount copied -- has almost exclusively been on the portion of the original copyrighted work taken, not on the percentage of the *infringing* work that contains copyrighted material.¹⁷⁰ The one notable exception to this rule, the Supreme Court's decision in *Harper & Row Publishers v. Nation Enterprises*, uses the percentage of the defendant's work which consists of copies to defeat rather than to support a fair use claim.¹⁷¹ Thus, the contributions made by an infringer are not directly considered in the fair use analysis.

Finally, the traditional focus of fair use doctrine on the purpose of the use is unlikely to benefit radical improvers, except perhaps incidentally. Traditional applications of this first factor in fair use analysis have tried to distinguish between uses that served some public (generally nonprofit) interest, such as education, research, or news reporting, and those which were commercially motivated.¹⁷² The Supreme Court has even gone so far as to create a presumption that commercially motivated uses are unfair,¹⁷³ though it backed off from that

¹⁶⁹ *Sheldon v. Metro-Goldwyn Pictures Corp.*, 81 F.2d 49, 56 (2d Cir. 1936). See *Harper & Row Publishers v. Nation Ents.*, 471 U.S. 539, __ (1985).

¹⁷⁰ See *Meeropol v. Nizer*, 560 F.2d 1061, 1071 (2d Cir. 1977); *Roy Export Co. v. CBS, Inc.*, 503 F. Supp. at 1145.

¹⁷¹ 471 U.S. at __. In that case, the defendant's story on the Ford memoirs took only a tiny portion (less than 1%) of the plaintiff's book, but the excerpts taken represented a more significant percentage of the defendant's story (around 13%).

¹⁷² See, e.g., *American Geophysical Union*, 60 F.3d at __ (characterizing efforts by Texaco research scientists along the commercial-public interest continuum); *Sega Ent's. v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992) (commercial nature of copying favors copyright owner in fair use analysis); *Basic Books v. Kinko's Graphics Corp.*, 758 F. Supp. 1522 (S.D.N.Y. 1991) (reproduction of copyrighted materials by "copy shop" for sale to university students was commercially motivated and therefore unfair). This analysis of the first factor finds support in section 107, which requires the courts to determine "the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes". 17 U.S.C. § 107(1).

¹⁷³ *Sony*, 464 U.S. at __ ("If the Betamax were used to make copies for a commercial or profit-making purpose, such use would presumptively be unfair").

presumption in its most recent treatment of fair use.¹⁷⁴ Reliance on the commercial nature of a use would likely doom many fair use claims by radical improvers, since improvers are more likely to be motivated by commercial purposes than many classes of users, such as teachers and reporters.

The first factor does offer some hope for radical improvers, however. Courts and commentators have focused increasing attention in recent years on the "transformative" character of a use in evaluating the first factor.¹⁷⁵ The Supreme Court spoke effusively of transformative works in its most recent fair use opinion:

The central purpose of this [fair use] investigation is to see, in Justice Story's words, whether the new work merely 'supersedes the objects' of the original creation, or instead adds something new, with a further purpose or different character, altering the first with new expression, meaning, or message; it asks, in other words, whether and to what extent the new work is 'transformative.' Although such transformative use is not absolutely necessary for a finding of fair use, the goal of copyright, to promote science and the useful arts, is generally furthered by the creation of transformative works. Such works thus lie at the heart of the fair use doctrine's guarantee of breathing space within the confines of copyright, and the more transformative the new work, the less will be the significance of other factors, like commercialism, that may weigh against a finding of fair use.¹⁷⁶

Taken seriously, these words might spark the development of something akin to the reverse doctrine of equivalents -- protection for radical improvers against any claim of copyright

¹⁷⁴ *Campbell*, 114 S. Ct. at ___ (Court of Appeals erred by "giving virtually dispositive weight to the commercial nature" of the use under *Sony*). The *Campbell* Court held that "[t]he language of the statute makes clear that the commercial or nonprofit educational purpose of a work is only one element of the first factor enquiry into its purpose and character." *Id.* For academic criticism of the Court's reliance on the commercial nature of a use, see Robert A. Kreiss, *Accessibility and Commercialization in Copyright Theory*, 43 **UCLA L. Rev.** 1, 62-63 (1995); William F. Patry & Shira Perlmutter, *Fair Use Isconstrued: Profit, Presumptions, and Parody*, 11 **Cardozo Arts & Ent. L. Rev.** 667 (1993) (commercial use presumption inappropriate in the context of parodies).

¹⁷⁵ For the origins of the idea of transformative vs. superseding uses, see *Folsom v. Marsh*, 9 F. Cas. 342 (C.C.D. Mass. 1841); Pierre N. Leval, *Toward a Fair Use Standard*, 103 **Harv. L. Rev.** 1105 (1990).

¹⁷⁶ *Campbell*, 114 S. Ct. at ___.

infringement.¹⁷⁷ But the evolution of the transformative use doctrine in this regard will depend critically on how the transformative nature of the use is weighed against market harm to the copyright owner. Expansive definitions of market harm, like those adopted in *Triad* and *American Geophysical Union*, may render the transformative use analysis a mere secondary consideration, unlikely to protect radical improvers who use their improvements to compete with the original copyright owner.¹⁷⁸ This is particularly true if market harm is used to trump a finding of transformative use, giving the fourth factor primacy.¹⁷⁹

The Supreme Court's statement in *Harper & Row* that "[t]o negate fair use one need only show that if the challenged use should become widespread, it would adversely affect the potential market for the copyrighted work"¹⁸⁰ certainly suggests that market harm is already the

¹⁷⁷ But see Roxana Badin, Comment, *An Appropriate(d) Place in Transformative Value: Appropriation Art's Exclusion from Campbell v. Acuff-Rose Music, Inc.*, 60 **Brooklyn L. Rev.** 1653, 1653-54 (1995) (arguing that *Campbell* carved out a narrow exception for commercial parodies that will hurt the fair use case for other forms of appropriative art).

Commentators have debated the wisdom of the transformative use doctrine. Those endorsing some form of transformative use analysis include Jay Dratler, Jr., *Distilling the Witches' Brew of Fair Use in Copyright Law*, 43 **U. Miami L. Rev.** 233, 291-92 (1988); William W. Fisher III, *Reconstructing the Fair Use Doctrine*, 101 **Harv. L. Rev.** 1661, 1730 (1988); Leval, *supra* note __, at 1105. Those opposed to its use, or at least to certain aspects of the way it has been applied, include Laura G. Lape, *Transforming Fair Use: The Productive Use Factor in Fair Use Doctrine*, 58 **Alb. L. Rev.** 677 (1995); L. Ray Patterson, *Free Speech, Copyright, and Fair Use*, 40 **Vand. L. Rev.** 1, 45-46 n.149 (1987); Lloyd L. Weinreb, *Fair's Fair: A Comment on the Fair Use Doctrine*, 103 **Harv. L. Rev.** 1137, 1143-44 (1990).

¹⁷⁸ Cf. Douglas J. Ellis, Comment, *The Right of Publicity and the First Amendment: A Comment on Why Celebrity Parodies are Fair Game for Fair Use*, 64 **U. Cin. L. Rev.** 575, 611 (1996) (suggesting that uncertainty regarding the theoretical basis for copyright means that "transformative use will have a checkered and inconsistent application."). For discussion of the role of theoretical approaches to copyright in treating radical improvers, see *infra* Part IV.

¹⁷⁹ See Pamela Samuelson, *Modifying Copyrighted Software: Adjusting Copyright Doctrine to Accomodate a Technology*, 28 **Jurimetrics J.** 179 (1988) (fair use is unlikely to protect those who modify software, because of the Court's emphasis on harm to both original and potential derivative markets); Stephen B. Thau, *Copyright, Privacy and Fair Use*, 24 **Hofstra L. Rev.** 179, 189 (1995) ("While the Court often purports to use fair use 'to avoid rigid application of the copyright statute when, on occasion, it would stifle the very creativity which that law is designed to foster,' in actuality the analysis always turns on the economic harm suffered by the plaintiff."); see also Lape, *supra* note __, at 715-16 (arguing against giving primacy to the market harm factor).

¹⁸⁰ 471 U.S. at 568.

de facto test for fair use. Even *Campbell* itself may represent only an illusory victory for the transformative use doctrine, since the Court in that case indicated that the defendants bore the burden of proving the absence of harm to the market for derivative works on remand, notwithstanding the transformative nature of their use.¹⁸¹ Further, the "commercial use" prong of factor one is not dead, and at least one court has used it to negate the impact of transformative use -- in effect holding that transformative but commercial uses cancel each other out, leaving the first factor neutral.¹⁸² In either case, fair use protection appears effectively to be foreclosed to transformative works designed to compete with the original or its derivative progeny.¹⁸³

IV. Is Differential Treatment of Improvement Justified?

Comparing the treatment of improvers under patent and copyright law leads to a rather surprising result: copyright law is significantly more hostile to improvements than is patent law. What is surprising is not so much that the rules differ,¹⁸⁴ but the way in which they differ. Copyright is traditionally thought to afford weaker, not stronger, protection than patent law, in part to compensate for the facts that copyrights are so much easier to obtain than patents and last so much longer.¹⁸⁵ In this Part, I consider several possible reasons that might be offered to

¹⁸¹ *Campbell*, 114 S. Ct. at ____.

¹⁸² *College Entrance Examination Board v. Pataki*, 889 F. Supp. 554, 568 (N.D.N.Y. 1995). The neutrality of the first factor in that case allowed the copyright owner to prevail by showing of market harm. *Id.* at ____.

¹⁸³ Of course, where a use is both transformative *and* does not harm the market for the original work (or licensed derivatives thereof), it will likely be found to be fair. This was the court's conclusion, for example, in *New York Times Co. v. Roxbury Data Interface, Inc.*, 434 F. Supp. 217 (D.N.J. 1977). But many of the most important transformative uses of a work will compete with the work, or at least will compete in markets which the original copyright owner could foreseeably enter. In these cases, fair use will be ineffective to protect such transformations.

¹⁸⁴ *But see* John S. Wiley, Jr., *Copyright at the School of Patent*, 58 U. Chi. L. Rev. 119, 180-81 (1991) (arguing that patent and copyright share the same purposes, and so should be consistent).

¹⁸⁵ *See supra* notes ____-____ and accompanying text (discussing the different rules in each area of law).

explain this differential treatment. Because I find those reasons ultimately unpersuasive, I proceed in Part V to compare the two rules on their merits.¹⁸⁶

My goal in this section is not to argue that patent and copyright should be coextensive in all respects. Obviously they are not. Rather, this section focuses on the specific justifications that might be offered for treating improvement differently in copyright law than in patent law. One can imagine at least three different types of arguments along these lines. First, one might argue that copyright law serves a different purpose than patent law -- notably, the protection of the moral rights of authors. Refusing to allow others to improve on a copyrighted work without the copyright owner's permission grants the copyright owner a sort of moral right against alteration of her work. I shall refer to this as the "moral rights" argument. Second, one might explain the difference in treatment by reference to the different sorts of works that copyrights and patents protect. Perhaps there is simply more need for improvement in patent law, and hence more need to encourage it. I shall call this the "different works" argument. Finally, one might argue that copyright's broad prohibitions against unlicensed improvement are justified by the very fact that copyright provides a narrower scope of protection than patent law -- that the one makes up for the other. I shall call this the "balance of power" argument. Let us consider each argument in turn.

A. Moral Rights Justifications

The moral rights argument has some intuitive appeal. There is a strong moral rights tradition in copyright theory, primarily outside the United States, that is almost entirely lacking in patent theory.¹⁸⁷ Thus, a moral rights justification would explain why copyright but not

¹⁸⁶ Thus, arguments that seek to justify the copyright rule, but would also justify the same rule in patent cases, are treated in Part V, not in this Part, since they are not at base arguments in favor of differential treatment.

¹⁸⁷ Even what Sam Oddi calls the "reward theory" of patent law is essentially incentive-based: inventors must be rewarded in order to (a) encourage more inventions or (b) prevent "free-riding." See Oddi, *supra* note __, at 275-77 (discussing reward theory). A rare example of a natural law justification in patent law is the French Patent statute of

patent law was affected. Further, copyright's restrictions on improvement might be thought to further important moral rights. Signatories to the Berne Convention are in theory required to recognize certain minimal moral rights protections for authors, including the right to attribution of authorship and the right to object to modifications to the work.¹⁸⁸ The failure of the United States to create such moral rights protection despite its accession to Berne has caused considerable controversy.¹⁸⁹ Precluding improvers from creating derivative works without the permission of the original copyright owner may have the effect of creating a "right to object to modifications" in the original creator.¹⁹⁰ For some, this may be sufficient to justify the rule.

There are a number of problems with such a justification, however. First, even if the rule against unauthorized improvements does create a de facto moral rights rule in the United States,

1791, which was premised on the belief that "every novel idea whose realization or development can become useful to society belong primarily to him who conceived it, and that it would be violation of the rights of man in their very essence if an industrial invention were not regarded as the property of its creator." Oddi, *supra* note __, at 274 (quoting French statute). Even this example, while it suggests a natural law basis for patents, does not justify the equivalent of the moral rights of attribution and integrity found in the copyright context.

¹⁸⁸ Berne Convention for the Protection of Literary and Artistic Works, art. 6^{bis} (Paris 1971).

¹⁸⁹ See, e.g., Edward J. Damich, *The Right of Personality: A Common-Law Basis for the Protection of the Moral Rights of Authors*, 23 **Ga. L. Rev.** 1 (1988); Roberta Rosenthal Kwall, *Copyright and the Moral Right: Is an American Marriage Possible?*, 38 **Vand. L. Rev.** 1 (1985); but cf. 3 Goldstein, *supra* note __, at 15:181 n.10 ("Congress' position on moral rights reflects neutrality, not antipathy."). While the United States did adopt limited moral rights protection in the Visual Artists Rights Act of 1990, 17 U.S.C. § 106A, that section is by no means a general moral rights statute. Accord 3 Goldstein, *supra* note __, at 15:179. It is limited to works of visual art, does not give protection to the artist if the work is made for hire, and is subject to numerous exceptions. Furthermore, the rights granted in section 106A are limited to the life of the author, and may be waived by the author in writing.

¹⁹⁰ Some commentators have taken this position. See, e.g., 2 Goldstein, *supra* note __, at 5:80 & n.12 ("The broad scope of derivative rights enables them to secure reputational interests as well as strictly economic interests by protecting authors against disfigurement of their works. . . . The derivative right is in this respect akin to the moral right against distortion of an author's work."); cf. J.H. Reichman, *Electronic Information Tools -- The Outer Edge of World Intellectual Property Law*, 17 **U. Dayton L. Rev.** 797, 813 (1992) ("the recent expansion of derivative works rights in United States law has helped to align the copyright countries and the authors' rights countries without necessarily sacrificing the utilitarian ethos to which the former subscribe."). For an argument that trademark law might have a similar effect, providing indirect moral rights protection, see Mark A. Lemley, *Rights of Attribution and Integrity in Online Communications*, 1995 **J. Online L.** art. 2, ¶ 14-20.

it is not at all clear that that is a good thing.¹⁹¹ The economic and political critiques of moral rights are powerful ones, and do not stem solely from the Chicago-based view that all rights should presumptively be alienable.¹⁹² Establishing a moral right imposes a real economic and political cost on society. In the best of circumstances, those who would use a copyrighted work must now deal with two sets of owners -- the economic copyright owner and the holder of the moral right. Further, since moral rights cannot be disclaimed in gross, dealing with the author is not a simple matter of signing a contract, but involves a continuing relationship in which each new use is at the mercy of the author.¹⁹³ This adds to the difficulty and cost of making any

¹⁹¹ This debate is long-standing and complex; I do not propose to resolve it here, or indeed to do more than touch briefly on some of the important issues at stake.

¹⁹² Certainly adherents to the Chicago view would seem unlikely to support a strong version of moral rights, since they are by their nature rights personal to the author which cannot be transferred. *See generally* Neil Netanel, *Alienability Restrictions and the Enhancement of Author Autonomy in United States and Continental Copyright Law*, 12 **Cardozo Arts & Ent. L.J.** 1 (1994) (most continental moral rights are not alienable, though they can be waived in particular circumstances; rules vary from country to country despite Berne). But others have criticized moral rights claims on political and artistic grounds. For example, Beyer argues that the moral rights position "that at its root is actually one of cultural conservatism, inhibited expression, and unnecessary deference to creators' intentions," since it gives original artists the power to restrict subsequent interpretations and critiques of their work. Lawrence Adam Beyer, *Intentionalism, Art, and the Suppression of Innovation: Film Colorization and the Philosophy of Moral Rights*, 82 **Nw. U.L. Rev.** 1011, 1018 (1988). *See also* Thomas J. Davis, Jr., *Fine Art and Moral Rights: The Immoral Triumph of Emotionalism*, 17 **Hofstra L. Rev.** 317, 358-59 (1989) (permitting moral rights claims short-changes the public interest); Geri J. Yonover, *The Precarious Balance: Moral Rights, Parody and Fair Use*, 14 **Cardozo Arts & Ent. L.J.** 79 (1996) (the law must balance the rights of original artists and parodists); Note, *An Author's Artistic Reputation Under the Copyright Act of 1976*, 92 **Harv. L. Rev.** 1490, 1494 (1979) (same).

¹⁹³ Consider the few cases brought to date under state and federal moral rights statutes. Most have involved efforts to move or take down site-specific sculpture years after it was installed in a building, and frequently where ownership of the building had changed since the art was installed. *E.g.* *Carter v. Helmsley-Spear*, 71 F.3d 77 (2d Cir. 1995); *Serra v. General Services Admin.*, 667 F. Supp. 1042 (S.D.N.Y. 1987), *aff'd* 847 F.2d 1045 (2d Cir. 1988); Eric Brooks, *Tilted Justice: Site-Specific Art and Moral Rights After U.S. Adherence to the Berne Convention*, 77 **Cal. L. Rev.** 1431 (1989).

While compelling building owners to display works of art might seem to raise constitutional problems of compelled speech under cases like *Wooley v. Maynard*, __ U.S. __ (1977); *West Virginia Bd. of Educ. v. Barnette*, 319 U.S. 624 (1943), courts have generally dismissed First Amendment claims in the copyright context rather summarily. *See Kalem Co. v. Harper Bros.*, 222 U.S. 55, 63 (1911); *Los Angeles News Service v. Tullo*, 24 U.S.P.Q.2d 1026 (9th Cir. 1992); *Sid & Marty Krofft Television v. McDonald's Corp.*, 562 F.2d 1157 (9th Cir. 1977). *See generally* Melville Nimmer, *Does Copyright Abridge the First Amendment Guarantees of Free Speech and Press?*, 17 **UCLA L. Rev.** 1180 (1970).

productive use of a copyrighted work.¹⁹⁴ Finally, many of the best productive uses of a work may be foreclosed entirely under a moral rights regime, since most authors will consider parodies of their works (and even many satires based on their works)¹⁹⁵ to be objectionable "mutilation."¹⁹⁶ Even if one values the moral rights of artists, it is disturbing that there is no mechanism in the law for measuring that value or balancing it against the value of the improvements that will be lost.¹⁹⁷

Second, even if one is persuaded by the case for moral rights, the rule on derivative works does not seem a particularly good way of establishing such rights. For one thing, it seems odd that a legal provision that ostensibly exists for the benefit of creators (artists or authors, for example) should confer rights instead on the *owners* of intellectual property rights. As anyone who has ever published a book, a screenplay, or a song can attest, authorship and ownership are not necessarily the same thing.¹⁹⁸ By allowing the right to produce derivative works to be

¹⁹⁴ But see Netanel, *supra* note __, at 6 (suggesting that strong moral rights may be tempered in practice by an informal social norm against asserting them too strongly).

¹⁹⁵ On the distinction between parody and satire in copyright law, see *Campbell v. Acuff-Rose Music*, 114 S. Ct. 1164, __ (1994).

¹⁹⁶ See Beyer, *supra* note __, at 1011. Davis, *supra* note __, at 319, points to proponents of moral rights who explicitly assert "the right to be free from excessive criticism, to publish a reply to such criticism, and to be protected from a whole category of unpredictable injuries to honor and reputation" as elements of the moral right. Certainly the recognition of such rights would interfere directly with political, literary and artistic freedom by giving artists and authors control over what is said about them, whether or not it was held to violate the First Amendment.

¹⁹⁷ It is possible to take some steps toward such a calibration by creating a fair use exception to the moral rights doctrine. The United States has done so in VARA. See 17 U.S.C. § 107. Nonetheless, the discussion in Part III suggests that as currently constituted, fair use doctrine does not effectively distinguish radical from minor improvements. See *supra* section III.C. Further, some cases suggest that the failure to comply with the moral rights of the original author, for example by refusing to attribute an author's work to her, will weigh heavily against a claim of fair use. See *Robinson v. Random House*, 877 F. Supp. 830 (S.D.N.Y. 1995). To the extent that this is true, the fair use defense to claims of infringement on moral rights may be largely illusory.

¹⁹⁸ According to a 1960 study, approximately 40% of all copyrights were works made for hire. See Varmer, *Works Made for Hire and On Commission*, in **Studies Prepared for the Subcommittee on Patents, Trademarks and Copyrights of the Senate Committee on the Judiciary**, Study No. 13, 86th Cong., 2d Sess. 139 (Comm. Print. 1960). It is reasonable to assume that that percentage has increased as computer programs have joined the list of copyrighted works. While the copyright act defines the "author" as the corporation in such a circumstance, that is

transferred with the ownership of the copyright -- and indeed separately licensed -- the copyright law has created what is at base an economic rather than a moral right.¹⁹⁹ Certainly, a provision designed for their benefit would have been much more effective if it gave control over alterations of a copyrighted work directly to the authors.²⁰⁰ Similarly, it is indicative of the law's concern with economic rather than moral rights that the copyright rule offers no recognition of the moral rights of improvers, whose works not only are considered infringing but are captured by the original copyright owner.²⁰¹ One might expect that a derivative works rule designed to protect the moral rights of authors would at least afford improvers some control over the independent expression they have created. But copyright law does not do so -- indeed, it gives the original copyright owner de facto exclusive rights over the works created by someone else.

In short, whatever one thinks of moral rights, the derivative works rule in the final analysis does not appear to be such a right. Rather, its primary purpose seems to be economic -- to "enable prospective copyright owners to proportion their investment to the returns they hope to receive not only from the market in which their work will first be published, but from other, derivative, markets as well."²⁰² It should stand or fall on its economic merits.²⁰³

merely a convenient fiction -- the actual authors are almost invariably individual employees. Further, even works for which authorship vests initially in an individual are frequently assigned to other individuals or to corporations.

¹⁹⁹ Even proponents of moral rights concede that the 1976 Copyright Act is primarily concerned with the economic incentives of copyright owners, rather than the moral rights of authors. *See* Kwall, *supra* note __, at 37.

²⁰⁰ *Cf.* Margaret Jane Radin, **Reinterpreting Property** 12 (1993) (arguing that the law of real property incorrectly assumes that individuals, not corporations, are the holders of most property).

²⁰¹ *See supra* notes __-__ and accompanying text.

²⁰² 2 Goldstein, *supra* note __, at 5:79; *see also* Kwall, *supra* note __, at 2-3 (goals of the 1976 Copyright Act are economic).

²⁰³ Some critics of the economic approach to copyright make a different claim -- that it is non-deterministic. *See* Alfred C. Yen, *When Authors Won't Sell: Parody, Fair Use and Efficiency in Copyright Law*, 62 **U. Colo. L. Rev.** 79 (1991). This criticism must be taken with a grain of salt, given that the alternatives to economic analysis generally advanced -- Yen's moral rights approach, or Lloyd Weinreb's ad hoc "fairness" analysis, *see* Lloyd Weinreb, *Fair's Fair: A Comment on the Fair Use Doctrine*, 103 **Harv. L. Rev.** 1137 (1990); *see also* William F.

B. Different Works Justifications

A second possible reason for treating improvement differently in copyright and patent law is that the two laws protect different kinds of works. Traditionally, copyright protection has been thought to be reserved for works exhibiting artistic or literary creativity, while patent protection applied to works of technical or industrial application.²⁰⁴ While both laws serve the larger purpose of providing incentives for creation and dissemination of new works, perhaps the different nature of the works involved means that the actual incentives needed are different. In particular, one could argue that patent law ought to be more concerned with improvement on existing works, since improvement is somehow more central to scientific endeavor than to art. If so, one would expect the law to favor improvement to a greater extent in patent than in copyright law.²⁰⁵

This explanation too is problematic. First, it grossly oversimplifies intellectual property law to divide it into artistic works protected by copyright and utilitarian works protected by patent.²⁰⁶ There have always been areas of significant overlap between the two. The scope of

Patry & Shira Perlmutter, *Fair Use Misconstrued: Profit, Presumptions, and Parody*, 11 **Cardozo Arts & Ent. L.J.** 667, 669-70 (1993) -- are hardly more likely to result in a deterministic outcome.

²⁰⁴ See J.H. Reichman, *Legal Hybrids Between the Patent and Copyright Paradigms*, 94 **Colum. L. Rev.** 2432, 2448 (1994) (documenting this division). As Reichman observes, this division has never been strictly observed in practice. There have always been certain categories of protection that crossed over or fell between the bipolar patent-copyright paradigms. *Id.* at 2453-2500.

²⁰⁵ Wiley makes a somewhat different argument along the same general lines. He contends that the procedural differences between copyright and patent stem from the fact that copyrightable works are so much more common than patentable works. He points to the fact that while less than 6 million patents have been issued in the history of the United States, people create millions of "original works of authorship" every day. Wiley, *supra* note __, at 182-83. On the implications of this difference in the improvement context, see *infra* notes __-__ and accompanying text.

²⁰⁶ John Wiley wrote in 1991 that the legal cultures of patent and copyright "divide at the wall of mathematics. High-tech inventors and their lawyers generally perceive themselves as having little in common with the stylishly literate world of novels, publishing, and studios, and vice versa. Artists think engineers are nerds. Inventors think fiction and movies are fun but ultimately useless. You never see anyone wearing both Gucci loafers and a plastic pocket protector." Wiley, *supra* note __, at 181. Ironically, 1991 is perhaps the last year in which those statements

copyright encompasses works that have a predominantly utilitarian function, and works that are entirely factual, though copyright law places some limitations on the protection of such works.²⁰⁷ Copyright in graphic, sculptural and architectural works in particular may overlap with utility patent protection for those same works.²⁰⁸ The overlap between copyright and design patent protection is even more striking.²⁰⁹ And the development of computer software threatens to erase the line between patentable and copyrightable subject matter entirely, as both copyright and patent are extended to cover precisely the same sort of material.²¹⁰ A general statement that improvement is "more important" in patent than in copyright is meaningless in the context of computer software, where both doctrines endeavor to create essentially the same incentives.²¹¹ Indeed, the very fact of overlap between patent and copyright protection may

could have been made with a straight face. If it accomplishes nothing else, the well-hyped convergence of computers and media during the 1990s should explode the myth that invention and creation have nothing in common.

²⁰⁷ See, e.g., *Mazer v. Stein*, 347 U.S. 201 (1954); *Hoehling v. Universal City Studios*, 618 F.2d 972, 978 (2d Cir. 1980). To be sure, copyright does not extend to pure collections of facts which lack originality in the compilation, see *Feist v. Rural Telephone Servs.*, 111 S. Ct. 1282 (1991), or to the separable utilitarian aspects of works that are both useful and artistic. 17 U.S.C. § 101; *Carol Barnhart v. Economy Cover* 773 F.2d 411 (2d Cir. 1985). But the very difficulty that courts have had in drawing these lines illustrates one problem with basing doctrinal differences on them.

²⁰⁸ See Reichman, *supra* note ___, at 2455, 2488.

²⁰⁹ *Id.*

²¹⁰ For example, the PTO's recently adopted Guidelines for the Examination of Computer-Implemented Inventions, 61 Fed. Reg. 7478 (Feb. 26, 1996) work hard to distinguish patentable from copyrightable subject matter, but ultimately fail. Neither an artistic-utilitarian distinction nor a writing-invention distinction is supportable in the context of computer code, where writing is functional in the most basic sense. A full discussion of this convergence between the doctrines is beyond the scope of this article. See generally Mark A. Lemley, *Convergence in the Law of Software Copyright*, 10 **High Tech. L.J.** 1 (1995); Samuel Oddi, *An Uneasier Case for Copyright than for Patent Protection of Computer Programs*, 72 **Neb. L. Rev.** 351 (1993); Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 **Colum. L. Rev.** 2308 (1994).

²¹¹ As the authors of the Manifesto point out, the incentives intellectual property law seeks to foster in the software industry are for the creation of new and useful software design features. These design features lie somewhere in between the traditional subject matter of patent and copyright, and possess some elements of each. Samuelson et al., *supra* note ___, at ___. Thus, the problem is not simply one of disentangling the patent incentives for the production of software inventions from the copyright incentives for the production of software creations -- the two laws serve to promote the *same* incentives. Cf. Pamela Samuelson, *Modifying Copyrighted Software: Adjusting*

make having different rules inefficient, since it provides opportunities for intellectual property owners to game the system, obtaining protection in the copyright sphere that nullifies the rights of improvers in the patent sphere.

Further, even if a subject matter distinction can be drawn, it is not at all clear that improvement *should* be considered more important in technical fields than in creative ones. The argument for such a distinction presumably rests on the idea that scientific endeavor is more nearly linear than art, and the importance of building on prior work is therefore correspondingly greater. For example, if an original invention is highly constrained by the laws of physics, subsequent developers cannot simply ignore those laws -- they must work within the parameters of the physical laws, and hence may be forced to build on the original inventor's work. Artists and writers presumably face no similar constraint (or at least a less restrictive one), since it is possible simply to create a new work "from scratch" in a completely different genre.²¹²

But a moment's reflection will demonstrate that this assumption is unwarranted. There are certainly cases in patent law where several alternative approaches will yield roughly equal results, and therefore where improvement on an original idea is neither the only possible path nor indeed necessarily the best one. There may be good reason to discourage scientists from building on an original idea in some cases, on the grounds that a fresh start is precisely what is

Copyright Doctrine to Accommodate a Technology, 28 **Jurimetrics J.** 179, 210 (1988) (suggesting that copyright should adopt patent's rules regarding improvements in the software context because software is more like a patentable invention than it is like other copyrighted works).

²¹² Some scholars have challenged this assumption. Applying the now-familiar techniques of literary deconstruction, they argue that all creations are largely a product of communal forces. Dividing the stream of intellectual discourse into discrete units -- each owned by and closely associated with a particular author -- is therefore a logically incoherent exercise subject more to the political force of asserted authors' groups than to recognition of inherent claims of "personhood." See, e.g., Martha Woodmansee & Peter Jaszi, eds., **The Construction of Authorship: Textual Appropriation in Law and Literature** (1994); James Boyle, *A Theory of Law and Information: Copyright, Spleens, Blackmail and Insider Trading*, 80 **Cal. L. Rev.** 1413 (1992); Peter Jaszi, *Toward a Theory of Copyright: The Metamorphoses of "Authorship,"* 1991 **Duke L.J.** 455. While this view is inconsistent with the idea that an author can simply create from scratch, one need not subscribe to this radical critique of authorship in order to doubt the premise that improvement is less important in the copyright context.

needed.²¹³ Similarly, in many cases improvement will be absolutely necessary to creative endeavor. Parodies are a good example of creative works that "improve" (in the sense of adding to or transforming) an original work, and that could not survive without the ability to build on the prior work. Even some nonparodic works of fiction require a prior work on which to build; consider Tom Stoppard's play *Rosencrantz and Guildenstern are Dead*, which builds on Shakespeare's *Hamlet* in a particularly creative way. Other examples include written works in the social sciences, where knowledge is advanced in large part by analyzing and critiquing the work of others; and political discourse, which takes place largely in the context of what has come before.²¹⁴ In short, it is not possible to speak monolithically about the relative importance of improvement in the patent and copyright contexts. Absent some persuasive evidence that there is an identifiable distinction between the two, the different nature of the works involved cannot justify different categorical rules regarding the treatment of improvements.

Finally, let us consider John Wiley's point that copyright and patent differ in large part because so many more things are copyrightable than patentable.²¹⁵ Certainly this is true. Wiley uses this difference to explain why patents face strict and time-consuming examination procedures, while copyrights do not -- it would simply not be feasible to examine every new

²¹³ Murray Gell-Mann analogizes the situation to traveling over uncertain terrain. If your goal is to climb as high as possible, you will not be well served by a rule of decision which says "always travel upwards." That rule may bring you to the top of a low hill and strand you there, in sight of a much larger mountain. He suggests that some combination of improvement on existing ideas and the creative use of "noise" will produce the most innovative ideas. See Murray Gell-Mann, *The Quark and the Jaguar* __ (1994). Ironically, in such a case a broad construction of the patent system would seem most conducive to innovation, but only because it forced subsequent work to deviate from improving on the original work into more productive avenues. Cf. Edmund Kitch, *The Nature and Function of the Patent System*, 20 *J.L. & Econ.* 265 (1977) (arguing for a broad "prospect" theory of patents).

²¹⁴ Cf. Netanel, *supra* note __, at __ (copyright must underwrite and protect deliberation and debate in the political sphere in order to promote a democratic civil society). Netanel argues that in the copyright context, "our strong interest in expressive diversity overrides any possible efficiency advantage in giving one person broad control over all transformative uses of an existing work of authorship." *Id.* at __.

²¹⁵ See Wiley, *supra* note __, at __.

"work of authorship" for novelty, nonobviousness, etc.²¹⁶ Can the same fact be used to justify the difference in rules regarding improvement? It is hard to see how. If anything, one would expect that the more common a right was, the less each right would constrain the behavior of subsequent developers. The rarer a right is, and the harder it is to acquire, the more powerful we should expect it to be. Vesting greater control over improvement in copyright than in patent runs counter to this expectation.²¹⁷

It is certainly true that copyright and patent protect different kinds of works, though the dichotomy is not as clear as one might initially believe. But there is no reason to think that those differences can explain the differential treatment of improvement between the two statutes.

C. Balance of Power Arguments

In some important respects, copyright is a weaker right than patent.²¹⁸ Copyright precludes only actual reliance on the copyrighted work, while patent prohibits even independent development of the same ideas.²¹⁹ Copyright has a number of statutory limitations that allow users to make copies, notably the fair use doctrine; patent law has no analogous rules.²²⁰ One

²¹⁶ *Id.* There is an element of circularity to this argument. If it were easy to protect patents without registration, and copyrights required exhaustive examination procedures, it would certainly be the case that the number of patents would increase and the number of copyrights would decline.

²¹⁷ Of course, this argument oversimplifies the case. It is possible that copyright is weaker than patent in other areas, so that the argument in the text is counterbalanced to some extent by other forces. I discuss this argument in the next section. It is also possible to argue that copyrights should be more powerful than patents precisely *because* they are more common, on the theory that expanding the control of the copyright owner will encourage licensing. Evaluation of this neoclassical argument in detail must wait until Part V.

²¹⁸ See Netanel, *supra* note __, at __ ("Copyright has traditionally been of much narrower scope than patent").

²¹⁹ 35 U.S.C. § 271(a).

²²⁰ The closest exception, for "experimental use" of a patented technology, is extremely narrow, and does not protect uses unless they truly have no possible practical or commercial application. See *Roche Prods. v. Bolar Pharmaceutical Co.*, 733 F.2d 858, 863 (Fed. Cir. 1984); Rebecca Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 **U. Chi. L. Rev.** 1017 (1989); Note, *Experimental Use as Patent Infringement: The Impropriety of a Broad Exception*, 100 **Yale L.J.** 2169 (1991).

possible justification for giving copyright owners broader control over improvements is to counterbalance these restrictions on copyright. In particular, one might think that improvers who have actually copied from the original creator, and whose uses are not "fair" under section 107, are somehow more culpable than at least that subset of patent improvers who independently developed the infringing technology.

This is a difficult claim to evaluate, largely because it assumes that some normative baseline (the "right" balance) has already been defined, when in fact no such definition has been offered. Nonetheless, there are several things about this argument that suggest that it is problematic as a justification for the different rules regarding improvement. First, the balance of power justification seems to accept equivalence between patent and copyright as an overarching goal. It is only because copyright is perceived as weaker in certain areas that its stronger controls on improvement are justified. Thus, this argument is inconsistent with the first two arguments offered in this section. Further, its success depends critically on its ability to demonstrate that patent is in fact a stronger right than copyright. That is far from evident. There are certainly respects in which patent is stronger than copyright. But there are also ways (besides the improvement rules) in which copyright is a more powerful right than patent. Copyrights last far longer than patents -- an average of 75 years or so (soon to be raised to 95 years), versus a maximum of 20 years for patents.²²¹ The standard for protection of a copyright is much lower than for patents -- the copyright owner need only prove a minimum level of originality, as opposed to the more rigorous patent tests of novelty, nonobviousness, and enablement.²²² Copyrights do not need to be examined, which means that they are available to

²²¹ Compare 17 U.S.C. § 302 with 35 U.S.C. § 154(a)(1).

²²² See *supra* notes __-__ and accompanying text (discussing these requirements).

protect a new work almost immediately,²²³ rather than two to three years down the road.²²⁴ The scope of rights afforded copyright owners, traditionally thought to be narrower than patent's all-encompassing "make, use or sell," may actually be broader for some types of works.²²⁵ And the penalties for copyright infringement are sometimes more severe than those for patent infringement.²²⁶ Taking all of these factors into account, at the very least it is not clear that the "balance of power" is shifted strongly in favor of patents without the compensating effect of the differing improvement rules.

Finally, I am dubious of the claim that improving on someone else's work is somehow more culpable than independent development of a work that happens to be similar. Copyright infringement is a strict liability offense. It is no defense that the copying was unconscious, or even that the defendant was merely quoting or selling material that he had no way of knowing

²²³ Registration with the Copyright Office is not required for copyright protection, but is still required before bringing an infringement action. 17 U.S.C. § __. However, the copyright owner need only fill out a simple form to apply for registration -- even if the Copyright Office rejects the application, he can still file suit. 17 U.S.C. § 411(a).

²²⁴ See Lemley, *supra* note __, at __ (average patent spends over two years in prosecution).

²²⁵ 17 U.S.C. § 106 enumerates the exclusive rights of a copyright owner. The most significant rights absent from that list are the rights to control use and resale of the work once it has first been sold by the copyright owner or a licensee. However, copyright owners have recently acquired those rights in a backhanded way in the context of digital information, as recent court decisions have held that any use or transfer of a work in electronic form involves the making of multiple copies. *E.g.* MAI v. Peak Computing, 991 F.2d 511 (9th Cir. 1993); Triad Systems v. Southeastern Express, 64 F.3d 1330, (9th Cir. 1995); *cf.* NII Working Group on Intellectual Property Rights, **Intellectual Property and the National Information Infrastructure** (1995) (endorsing this result). The result has been to give copyright owners control over the use of their works even after sale, and to circumvent the first sale doctrine by precluding resale of electronic works. See Jessica Litman, *The Exclusive Right to Read*, 13 **Cardozo Arts/Ent. L.J.** __ (1994).

By contrast, patent law's prohibitions on "using" and "selling" patented technology are tempered by implied license and the doctrine of patent exhaustion, which provides that a license to a supplier to "make" and "sell" a patented product permits the purchaser of that product to use and resell it. See *Intel Corp. v. United States Int'l Trade Comm'n*, 946 F.2d 821 (Fed. Cir. 1991); *Unidisco Inc. v. Schattner*, 824 F.2d 965 (Fed. Cir. 1987). The result is that the patentee has less control over post-sale use of his patented goods than does the owner of the copyright in works in digital form.

²²⁶ For example, willful copyright infringement for commercial gain is a felony. 17 U.S.C. § 506(a). There is no similar criminal penalty for patent infringement.

was itself copied from another source.²²⁷ Copyright infringers are not necessarily any more at fault than patent infringers, despite the requirement of "copying" in the former, at least if by fault we mean *mens rea*. Both patent and copyright infringement can be willful, or they can be completely innocent. Instead, the argument seems to be that taking material from another (as copyright does require) is inherently worse than developing it on your own.

In the context of improvements, this argument seems misguided. The value of improvements is precisely that they allow developers to build on what others have done before them, rather than having to start from scratch. It would be perverse indeed to require that "improvers" not make any use of the material they are supposedly improving. It would also be inefficient, putting improvers to a significant duplication of effort for no appreciable societal gain. Whatever one thinks is the appropriate treatment of improvements under the law, surely its goal cannot be to encourage the recreation of identical works by competitors from scratch.

V. Optimal Improvement Rules

If there are no persuasive reasons to think that the rule in patent cases *should* differ from that in copyright cases, it is reasonable next to ask whether one of the rules makes more sense than the other. Which rule better serves the economic goals of intellectual property law? There are two basic models of intellectual property which correspond loosely with the copyright and patent rules, respectively. Both models operate within the general rubric of economic theory, attempting to provide optimal incentives for innovation and creation. The first model may be termed property rights theory. The fundamental precept of this theory is that efficient innovation will be encouraged (and wasteful races to invent be prevented) by assigning broad property rights to original inventors. In opposition to property rights theory is a theory of "tailored incentives" advanced by Merges and Nelson. Their fundamental precept is that competition, not

²²⁷ See, e.g., *Lipton v. Nature Co.*, 71 F.3d 464 (2d. Cir. 1995).

monolithic ownership, most efficiently promotes invention. Merges and Nelson dispute the presumption of property rights theorists that rivalry in innovation is wasteful. They suggest that "when it comes to invention and innovation, faster is better," and that "we are much better off with considerable rivalry in invention than with too little."²²⁸ They offer empirical evidence to support their position.²²⁹ Merges and Nelson's approach is consistent with the traditional economic approach, which viewed intellectual property as a creation of limited rights by the government for a specific purpose, along the lines described in Part I.²³⁰ Even Landes and Posner, noted advocates of property rights theory in other contexts, treat intellectual property as

²²⁸ Merges & Nelson, *supra* note ___, at 876-79.

²²⁹ *Id.* at 881-908.

²³⁰ See Oddi, *supra* note ___, at 273-81 (discussing various theoretical approaches); Martin Adelman, *The Supreme Court, Market Structure, and Innovation*, 27 **Antitrust Bull.** 457 (1982); Ward Bowman Jr., **Patent and Antitrust Law: A Legal and Economic Appraisal** 32-34 (1973); F.M. Scherer, **Industrial Market Structure and Economic Performance** 443-50 (2d ed. 1980); Kevin Rhodes, Comment, *The Federal Circuit's Patent Nonobviousness Standards: Theoretical Perspectives on Recent Doctrinal Changes*, 85 **Nw. U.L. Rev.** 1051, 1053 (1991).

It is important to distinguish the issue discussed in the text from the "property rule-liability rule" framework for remedies introduced by Calabresi and Melamed in their famous article. See Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 **Harv. L. Rev.** 1089 (1972). As should be evident from even a cursory review of intellectual property cases, successful plaintiffs in intellectual property cases benefit from a strong "property rule" -- they are entitled to injunctive relief in all but the most extraordinary cases. See Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 **Colum. L. Rev.** 2655 (1994). Establishing that intellectual property remedies are governed by a "property rule" does not, however, tell us the extent to which original creators are entitled to real-property-like control over improvements within the scope of their original work. Cf. Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 **Harv. L. Rev.** 713 (1996). Kaplow and Shavell suggest that liability rules are appropriate to protect individuals against negative externalities, while property rules are appropriate to protect individuals from a (physical) deprivation of property. Where intellectual property rights fall on this spectrum is arguable.

In any event, there is a stronger argument for the use of property rules in intellectual property cases: it is extremely difficult for courts to put a value on intellectual property rights. Employing property rather than liability rules allows courts to avoid such valuation decisions. See generally A. Mitchell Polinsky, **An Introduction to Law and Economics** (1983). I discuss this issue in more detail *infra* notes __-__ and accompanying text.

primarily concerned with the balancing of incentives rather than the initial allocation of property interests.²³¹

Where property rights theory assigns broad initial rights and then leaves the parties to bargain to an efficient outcome, the tailored incentives approach pays closer attention to the particular allocation of rights that is made. Merges and Nelson's approach, if valid, undermines the fundamental tenets of a property rights approach to intellectual property, since (as noted above) invention and creation are unquestionably cumulative activities.²³² My argument diverges from theirs in that I am agnostic about the relative value of competition and property in motivating invention. I argue in this Part that even if the property rights approach is efficient in theory, in practice it faces insurmountable obstacles. Those obstacles can best be overcome by a scheme of divided entitlements similar to that which currently exists in patent law. The value of this argument is twofold: it is not highly dependent on one's theory of the innovation process, and (in part for that reason) it is generalizable to copyright as well as patent cases.

I will begin to address these issues in section A by taking a closer look at the property rights argument supporting the copyright rule, and some of the assumptions on which it relies. In section B, I will examine what happens when we relax some of the less realistic assumptions in property rights theory.

²³¹ For example, Landes and Posner argue that

Copyright protection -- the right of the copyright's owner to prevent others from making copies -- trades off the costs of limiting access to a work against the benefits of providing incentives to create the work in the first place. Striking the correct balance between access and incentives is the central problem in copyright law. For copyright law to promote economic efficiency, its principal legal doctrines must, at least approximately, maximize the benefits from creating additional works minus both the losses from limiting access and the costs of administering copyright protection.

William M. Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 **J. Legal. Stud.** 325, 326 (1989).

²³² See *supra* note __ (collecting sources); Kenneth W. Dam, *Intellectual Property in an Age of Software and Biotechnology*, Univ. Chicago L. & Econ. Working Paper No. 35, at 4 (1995) ("in the overwhelming majority of instances each innovation builds on past innovations.").

A. Property Rights Theory

In 1977, Edmund Kitch offered a new theory of the patent system, one which he said would "reintegrate[] the patent institution with the general theory of property rights."²³³ The property rights theory of intellectual property is rooted in many of the same economic traditions as incentive theory, but its focus is on the ability of intellectual property ownership to force the efficient use of inventions and creations through licensing.²³⁴ The fundamental economic bases of this approach are the "tragedy of the commons" and the hypothetical Coasean world without transactions costs. The tragedy of the commons is a classic economic story, in which common property will be over-used by people who have access to it, since each individual reaps all of the benefits of his personal use, but shares only a small portion of the costs. Thus, lakes open to the public are likely to be over-fished, with negative consequences for the public (to say nothing of the fish!) in future years. Common fields will be over-grazed, with similarly unfortunate consequences. The economic solution to the tragedy of the commons is private property. If everyone owns a small piece of land (or lake), and can keep others out of it (with real or legal "fences"), then the private and public incentives are aligned. People will not over-graze their own land, because if they do they will suffer the full consequences of their actions.²³⁵ Further, if

²³³ Kitch, *supra* note ___, at 265.

²³⁴ See Kitch, *supra* note ___, at 276-78; Wendy J. Gordon, *Of Harms and Benefits: Torts, Restitution, and Intellectual Property*, 21 **J. Legal Stud.** 449, 473 (1992); Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 **Colum. L. Rev.** 2655 (1994).

²³⁵ While in theory it is possible for cattle-owners to agree to limit their grazing in the public interest, any such effort at agreement is likely to run into insurmountable problems. Not only will organizing and policing such an agreement take effort that will not be rewarded, but individual grazers have an incentive to free ride, reaping the benefits of reduced grazing by others while refusing to reduce their own grazing. For more on these problems, see Mancur Olson, **The Logic of Collective Action** (1961). One commentator views this internalization of (positive) externalities as a key function of property. Harold Demsetz, *Toward a Theory of Property Rights*, 57 **Am. Econ. Rev.** 347, 348 (1967).

On the other hand, for a rejection of the tragedy of the commons approach in certain contexts, see Carol Rose, *The Comedy of the Common: Custom, Commerce, and Inherently Public Property*, 53 **U. Chi. L. Rev.** 711

dealmaking between neighbors is costless, as Coase postulated but did not believe,²³⁶ transactions will allow neighbors with large cattle herds to purchase grazing rights from others with smaller herds. Such transactions should occur until each piece of land is put to its best possible use.²³⁷

In the context of intellectual property, Kitch's article remains one of the most significant efforts to integrate intellectual property with property rights theory.²³⁸ Kitch argues that the patent system operates not (as traditionally thought) as an incentive-by-reward system, giving exclusive rights to successful inventors in order to encourage future inventors, but as a "prospect" system analogous to mineral claims. In this view, the primary point of the patent system is to encourage further commercialization and efficient use of as yet unrealized ideas by patenting them, just as privatizing land will encourage the owner to make efficient use of it.²³⁹ Society as a whole should benefit from this equalization of private with social interests.

Fundamental to this conclusion are three assumptions. First, Kitch argues that

a patent prospect increases the efficiency with which investment in innovation can be managed. . . . [T]echnological information is a resource which will not be efficiently used absent exclusive ownership. . . . the patent owner has an incentive to make investments to maximize the value of the patent without fear

(1986). Rose is surely correct that private division of land is not always efficient. Consider the problematic task walking through your neighborhood would be if every piece of sidewalk were privately owned by a different person, and you were required to obtain permission to take each step.

²³⁶ See Ronald H. Coase, *The Problem of Social Cost*, 3 **J.L. & Econ.** 1 (1960).

²³⁷ See Guido Calabresi & A. Douglas Melamed, *Property Rights, Liability Rules, and Inalienability: One View of the Cathedral*, 85 **Harv. L. Rev.** 1089 (1972) (discussing this implication of Coase).

²³⁸ For other property-based views of intellectual property, see, e.g., Dam, *Software*, *supra* note __; I. Trotter Hardy, *Property in Cyberspace*, __ **U. Chi. L.F.** __ (forthcoming 1996); Edmund Kitch, *Patents: Monopolies or Property Rights?*, __ **Res. L. & Econ.** 31 (1986).

²³⁹ Kitch, *supra* note __, at 270-71, 275 (making the analogy to land explicit).

that the fruits of the investment will produce unpatentable information appropriable by competitors.²⁴⁰

This is analogous to the tragedy of the commons argument that only with private ownership do private incentives match social incentives. In the tragedy of the commons, the private incentive to "invest" in a field or lake -- for example by letting it lie fallow, or limiting grazing, in order to permit it to grow -- is less than the social value of such an investment. In the patent context, Kitch makes an analogous argument: that the private incentive to improve and market an invention will be less than the social value of such efforts unless the patent owner is given exclusive control over all such improvements and marketing efforts.

Second, Kitch argues that "[n]o one is likely to make significant investments searching for ways to increase the commercial value of a patent unless he has made previous arrangements with the owner of the patent. This puts the patent owner in a position to coordinate the search for technological and market enhancement of the patent's value so that duplicative investments are not made and so that information is exchanged among the searchers."²⁴¹ This is the Coase theorem at work. Under that theory, giving one party the power to control and orchestrate all subsequent use and research relating to the patented technology should result in efficient licensing, both to end users and to potential improvers -- assuming, that is, that information is perfect, all parties are rational, and licensing is costless.²⁴²

Finally, for social benefit to be maximized, the property owner must make the invention (and subsequent improvements) available to the public at a reasonable price -- ideally, one that

²⁴⁰ *Id.* at 276.

²⁴¹ *Id.*

²⁴² See Anastasia P. Winslow, *Rapping on a Revolving Door: An Economic Analysis of Parody and Campbell v. Acuff-Rose Music, Inc.*, 69 **S. Cal. L. Rev.** 767, 780 (1996) (Coase theorem suggests that initial assignment of property rights between original creators and improvers is irrelevant). For a discussion of what happens when we relax these unrealistic assumptions, see *infra* section V.C. On the importance of efficient licensing to the case for intellectual property protection, see Wendy J. Gordon, *Asymmetric Market Failure and Prisoner's Dilemma in Intellectual Property*, 17 **U. Dayton L. Rev.** 853, 857 (1992).

approaches marginal cost as much as is feasible.²⁴³ But a property owner will have no incentive to reduce his prices toward marginal cost unless he faces competition from others. If the property owner is alone in the market, he may be expected to set a higher monopoly price for his goods, to the detriment of consumers (and social welfare). Kitch notes this problem, but does not resolve it. He merely points out that not all patents confer monopoly rights, and that in some cases the creators of intellectual property rights will face competition from the makers of other fungible goods, and therefore that their individual firm demand curves will be horizontal rather than downward-sloping.²⁴⁴ If one assumes such competition, intellectual property owners may be expected to price competitively, just as producers of wheat do.

While Kitch makes his argument in the patent context, it is copyright rather than patent law that seems to have taken his theory to heart. The prospect theory of intellectual property strongly implies that the way to obtain efficient investment in improvements is to give all rights to those improvements to the original intellectual property owner. This should accomplish two things, according to the theory: give the original owner of the copyright or patent sufficient incentive to disseminate information about the original invention, and give her (or her licensees) sufficient incentive to invest resources in searching for improvements. As we have seen, it is copyright, not patent law that gives the original creator nearly exclusive control over alterations or improvements to her work. Indeed, some commentators have argued that copyrights are a species of property rights.²⁴⁵

²⁴³ It is not possible to price intellectual property *at* its marginal cost and still stay in the business of producing new works, since developing those new works requires a fixed investment of resources (time, research money, etc.), one that frequently dwarfs the marginal cost of making and distributing copies of the idea once it has been developed.

²⁴⁴ Kitch, *supra* note __, at 274. Kitch does not, as Professor Oddi suggests, conclude that demand curves are generally horizontal in patent cases. Compare Oddi, *supra* note __, at 281 with Kitch, *supra*, at 274-75.

²⁴⁵ See Frank H. Easterbrook, *Intellectual Property is Still Property*, 13 **Harv. J.L. & Pub. Pol'y.** 108 (1990); Kenneth W. Dam, *Some Economic Considerations in the Intellectual Property Protection of Software*, 24 **J. Legal Stud.** 321, 332 & n.44 (1995). Wendy Gordon also points to detailed similarities between copyright law and common law property. See Wendy J. Gordon, *An Inquiry Into the Merits of Copyright: The Challenges of*

B. Complicating the Bargaining Structure

Unfortunately, as Coase himself recognized,²⁴⁶ the real world is substantially more complex than the idealized picture painted in some of the property rights literature. Each of the fundamental assumptions that underlies Kitch's model is problematic in the context of actual intellectual property rights. In this section, I explore each of those assumptions in more detail. The picture that emerges gives us not only a somewhat deeper view of the role of improvement and licensing in intellectual property, but also suggests reasons to prefer patent law's more nuanced treatment of improvements to copyright law's absolutist view.

1. Identifying and Organizing Improvers

At the heart of the prospect theory of intellectual property is the assumption that assigning property rights to original inventors will promote efficient investment in improvements, by allowing a single party with the proper incentives to coordinate the search for such improvements, either by investing more resources itself in research and development or by

Consistency, Consent, and Encouragement Theory, 41 **Stan. L. Rev.** 1343 (1989). Cf. Wendy J. Gordon, *Of Harms and Benefits: Torts, Restitution, and Intellectual Property*, 21 **J. Legal Stud.** 449, 460 (1992) (improvements to intellectual property are good candidates for a restitution claim, since the improver is readily identifiable). To be sure, Gordon's position on this issue is complex. She acknowledges that the common law places limits on the power of property owners to control their property, *id.* at 1361-64, and her ultimate reasons for favoring strong copyright protection do not track Kitch's economic arguments. See *id.* at 1465-68. Further, in other articles Gordon has suggested that strong copyright protection may not be appropriate in circumstances where it may inhibit rather than promote improvements by others. See Wendy J. Gordon, *On Owning Information: Intellectual Property and the Restitutionary Impulse*, 78 **Va. L. Rev.** 149, 247 (1992); Wendy J. Gordon, *Fair Use As Market Failure*, 82 **Colum. L. Rev.** 1600, 1630-35 (1982).

Other scholars who adopt the property rights view of copyright, at least in part, include Landes & Posner, *supra* note __, at 354-55.

²⁴⁶ Coase, *supra* note __, at __.

licensing the right to make improvements to other companies in a better position to conduct such research.²⁴⁷

Unfortunately, identifying the right party to improve a technology is not always easy, and certainly not always costless. Consider for a moment the curious nature of Kitch's defense of the patent system. He argues that awarding patents to those who have identified an invention but might not yet have commercialized it makes sense, because making those inventors property owners will give them the right incentive to improve and commercialize their invention.²⁴⁸ But if it is the property incentive that is critical, why wait for a first inventor to file a detailed patent application, which after all must reduce the invention to practice and enable others to make it?²⁴⁹ After all, mineral claims on private land belong to the private landowner, whether or not he is the first to discover them.²⁵⁰ In many other contexts, we assign property rights virtually arbitrarily, and expect transactions to take care of the rest: we did not wait to see who would build a high-rise building during the Oklahoma land rush, for example. Assigning property rights in advance of any invention -- perhaps to the first person to request them in a particular field -- seems perfectly consistent with the prospect theory.²⁵¹ Indeed, it should be preferable to the current patent system on this theory, since it will allow efficient investment in *initial* research as well as improvements, and prevent wasteful races to be the first to invent the initial technology.²⁵²

²⁴⁷ See Kitch, *supra* note ___, at ___.

²⁴⁸ *Id.* at ___.

²⁴⁹ 35 U.S.C. § 112 ¶ 1; *Fiers v. Revel*, 984 F.2d 1164 (Fed. Cir. 1993)

²⁵⁰ Kitch discusses mining claims on public rather than private land. Kitch, *supra* note ___, at ___.

²⁵¹ For a proposal along these lines, see William Kingston ed., **Direct Protection of Innovation** 59-86 (1987) (proposing an "innovation warrant" to be awarded in advance of promised innovation). See also Ben T. Yu, *A Contractual Remedy to Premature Innovation: The Vertical Integration of Brand-Name Specific Research*, 22 **Econ. Inquiry** 660 (1984) (suggesting that manufacturers might contract with potential inventors before they invent); Ben T. Yu, *Potential Competition and Contracting in Innovation*, 24 **J.L. & Econ.** 215 (1981).

²⁵² On wasteful races to invent, see Scherer, *supra* note ___, at ___.

The problem with handing out property rights in advance of invention is the same problem with Kitch's prospect theory -- it is unrealistic to expect that property owners will be uniquely good at identifying potential future inventors or improvers. Even if assigning property rights *ex ante* gives the property owner the proper financial incentives to invest in research (or to search for the "right" inventor),²⁵³ there is more to invention than research dollars. Modern economic literature is replete with evidence of how hard it is to predict invention in advance, or even to replicate an invention once it has been made.²⁵⁴ Further, even companies that successfully invent may be unable to efficiently commercialize the invention, and in many cases may not even recognize the significance of their own invention. Economic history provides some striking examples of inventors who grossly understated the market value of their own inventions.²⁵⁵ Expecting one party -- original inventor or not -- to perfectly identify the potential uses of a new invention, how it might be improved, and who can best improve it is simply not realistic.

²⁵³ It is not clear that even this assumption is reasonable. Merges points to economic literature suggesting that a company with a successful invention will choose to focus on one or two basic applications of that invention, rather than investing money and effort in researching implications of its invention that lie outside its core competencies. *See Merges, Rent Control, supra* note __, at 371-73 (citing sources). *See also* David J. Teece & Mark A. Lemley, *Assessing Competition, Firm Performance, and Market Power in the Context of Innovation* (working paper 1996).

²⁵⁴ For more detail on this issue, see, e.g., Michael Porter, *The Structure Within Industries and Companies' Performance*, 51 **Rev. Econ. & Stat.** 214 (1979) (differences in local input markets are important in determining the success of innovation); Richard P. Rumelt, *Heterogeneity Under Competition*, 29 **Econ. Inquiry** 774 (1991) (even firms that have innovated successfully may not be able to replicate their invention on a broader scale); David J. Teece, *Profiting from Technological Innovation*, 15 **Res. Pol.** 285 (1986) (successful innovation may depend on a firm's ability to control complementary assets); Teece & Lemley, *supra* note __, at __ (collecting literature).

²⁵⁵ [T]he full commercial potential of many major inventions is not immediately recognized by the inventor or the marketplace. Rosenberg cites a number of examples of such unrecognized potential: Marconi expected the radio to be used for point-to-point communication, not broadcasting; the transistor was expected to be used primarily in hearing aids for the deaf; Bell called his telephone a mere "improvement in telegraphy."

The future was "obviously not obvious", Stan. Observer, May-June 1994, at 13.

A much more likely solution is to find a way for improvers -- those with new ideas for how to make the invention better, or for how to market it -- to identify themselves. Of course, as Kitch points out, granting patents on original inventions is one way to do that. If the original inventor has the power to control all subsequent uses and improvements on the invention, he argues, those who are thinking of investing time and money in improving or marketing the invention will first come to the patent owner seeking a license.²⁵⁶ In this way, granting patents may facilitate the self-identification of improvers.

The rather absolute power the original inventor is given to control improvements means that rational potential improvers will come to the patent owner *before they invest any time or money in improving the patent*. If the patent owner has the right to control any improvement made to her invention, there is no point in improving her invention unless you first get permission from her to do so. To do otherwise would simply be giving the patent owner the fruits of your labor. This is a logical result of Arrow's information paradox.²⁵⁷ The actual improver coming to the negotiating table with a patent owner possesses valuable information (the improvement), which he would like to disclose to the patent owner in exchange for money. Unfortunately, there is no way for the patent owner to assess the value of the improvement without finding out what it is. And if the patent owner finds out what the improvement is, under the prospect theory she is free to use it without compensating the improver.²⁵⁸

²⁵⁶ Kitch, *supra* note __, at __. See also Wendy J. Gordon, *Of Harms and Benefits: Torts, Restitution, and Intellectual Property*, 21 **J. Legal Stud.** 449, 472-73 (1992). Gordon argues that giving intellectual property rights to creators will encourage those who wish to use an invention to come to the intellectual property owner for a license. While this is no doubt true of most users, the situation is somewhat different in the case of improvers, as explained below.

²⁵⁷ Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in **The Rate and Direction of Inventive Activity: Economic and Social Factors** 609, 614-16 (Nat'l Bureau of Econ. Res. 1962). See also Gordon, *Harms and Benefits*, *supra* note __, at 475-76 (identifying this problem, though in the analogous context of intellectual property creators trying to license their work in a world without legal protection).

²⁵⁸ See Merges, *Blocking Patents*, *supra* note __, at 81. While there are partial solutions to Arrow's paradox in this context, they all involve giving the improver some sort of legal control over the improvement. More on this *infra* notes __-__.

From the perspective of someone trying to identify the optimal improvers, though, the fact that only potential rather than actual improvers will seek a license is a real problem.²⁵⁹ The patent owner has no good way of evaluating potential improvers and choosing the most efficient one (or ones). It would be far more efficient to find a way for improvers to invent first, and then bargain with the original patent owner over the allocation of rights to the improved invention. The original inventor would only have to deal with a small subset of all potential improvers -- those that were successful. Further, both sides would know what they were bargaining over, since the improvement would already have been made. Of course, for any such bargaining to occur, we must find a way around Arrow's paradox.

The current rule of blocking patents provides just such a bargaining mechanism. Improvers have an incentive to invest in research even in the shadow of an original invention, since they can obtain a patent on their improvement. And the fact that that improvement patent gives them some real bargaining power gives them an incentive to come to the bargaining table, and indirectly, an incentive to invest in improvement in the first place.²⁶⁰ In short, where original patent owners have less than perfect information about improvements, providing improvers rather than original patent owners with a legal entitlement to the improvement should encourage the efficient identification of actual rather than merely potential improvers.²⁶¹ The same result should hold for the same reasons in copyright law.²⁶²

²⁵⁹ See Merges & Nelson, *supra* note __, at 875 ("In our own research, we have not found a single case where the holder of a broad patent used it effectively through tailored licensing to coordinate the R&D of others.").

²⁶⁰ The mechanics of such bargaining are considered further in the next section.

²⁶¹ A proponent of property rights might point to two alternative means of achieving the same result even where the original inventor controls all rights to improvements. First, one might try to avoid Arrow's paradox by vesting actual improvers with a trade secret right in their improvement. Thus, improvers might be able to negotiate a confidentiality agreement with the original patent owner prior to disclosing their invention. Unfortunately, such agreements have proven difficult to enter into and enforce. Many companies refuse to sign such agreements under any circumstances, because they fear that the "improver" will disclose an idea that the company has already been working on, and will later sue for misappropriation. See *Whitfield v. Lear*, 751 F.2d 90 (2d Cir. 1984) (noting a general practice of rejecting unsolicited movie scripts); *Davis v. General Foods Corp.*, 21 F. Supp. 445 (S.D.N.Y.

2. Licensing Improvers

Even assuming that the patent owner in Kitch's model can perfectly identify potential improvers, he must still come to terms with them by licensing the right to improve on his original invention. In theory, the original patent owner should grant such permission in exchange for a royalty based upon the value of the new improvement. In practice, however, efficient licensing negotiations will not always take place, for a number of reasons.

Transactions Costs. First, it is simply not true that licensing transactions are costless. At a minimum, all transactions cost time and money -- the purchaser must figure out what they need, determine who has it, contact them, negotiate a payment, and exchange the payment for the good or service they require. In some contexts, most of these costs are fairly trivial -- you know you will find apples at your corner grocery, and the grocery has already fixed a price and set up a mechanism (the cash register) to take your money in exchange for the apples. Intellectual property licenses are more complex and certainly more costly than simple purchases of goods. For one thing, licenses may involve complex assignments of partial legal rights, and they therefore typically involve lawyers drafting the licenses. For another, these licenses frequently

1937) (unsolicited recipe rejected with form letter). On the other hand, if the confidentiality agreement permits such independent development, it arguably does not provide particularly robust protection to the improver disclosing the information, since it is often hard to prove that an idea was stolen rather than developed independently.

Alternatively, a patent owner might try to license any and all potential improvers by granting them a limited property right in whatever they later invent. This would in effect mimic the blocking patents rule by contract. While in a strict Coasean world such broad agreements would be equivalent to giving patents to improvers by legal rule, in fact they impose significant and unnecessary transactions costs (as discussed in the next section) to achieve the same result as the law already does.

²⁶² See Goldstein, *supra* note __, at __ (suggesting that the creators of unauthorized derivative works should have rights in their original creations). While the interests at stake are somewhat different in copyright cases, where the "improvement" is more likely to consist of a number of small expressions rather than a single idea, the same problem with pre-disclosure bargaining still occurs. Indeed, the existence of Hollywood script registries testify to one copyright industry's attempts to deal with the problem. See Robert M. Winteringham, Note, *Stolen from Stardust and Air: Idea Theft in the Entertainment Industry and a Proposal for a Concept Initiator Credit*, 46 **Fed. Comm. L.J.** 373 (1994).

create an ongoing relationship between the parties, one which may require monitoring. Further, the scope of most intellectual property rights is not evident from the face of the patent (and impossible to determine from the existence of a copyright). This means that even identifying who the proper parties to a license are can be a significant problem,²⁶³ and sometimes an insurmountable one (as where the best improver does not yet exist, or is working in a garage somewhere, as was quite common in the early days of the software industry). Finally, while the parties ideally would base the cost of a license on the value of the right licensed, that value will likely be difficult to determine accurately in the case of unique goods like intellectual property rights.²⁶⁴ This problem is exacerbated in the context of licensing potential improvements, since if it is hard to value an invention that has already been made, it is well-nigh impossible to value one that might be made in the future.

The result of all these factors is that the transactions costs of intellectual property licenses are significant.²⁶⁵ Various commentators have estimated that cost at 20% of the total value of the underlying technology license,²⁶⁶ or at as much as \$100,000 per transaction.²⁶⁷ These data are of limited value, since they are taken from international technology licenses, where the costs

²⁶³ See *supra* notes __-__ and accompanying text.

²⁶⁴ See, e.g., Peter Killing, *Technology Acquisition: License Agreement or Joint Venture*, **Colum. J. World Bus.** 38, 44-45 (Fall 1980) ("neither buyer nor seller of technology seems to have a clear idea of the value of the commodity in which they are trading"); David J. Teece, *The Market for Know-How and the Efficient International Transfer of Technology*, **Annals Am. Acad. Pol. & Soc. Sci.** 81, 88 (Nov. 1981).

²⁶⁵ But see Dam, *Software*, *supra* note __-, at n.108 (assuming that transactions costs are relatively low in the software arena and that likely new developers can easily be identified, but offering no evidence to support this assumption).

²⁶⁶ See David J. Teece, **The Multinational Corporation and the Resource Cost of International Technology Transfer** 43-44 (1976).

²⁶⁷ See Farok J. Contractor, **International Technology Licensing: Compensation, Costs, and Negotiation** 105 (1981).

are no doubt higher than for the average licenses.²⁶⁸ Nonetheless, even the average transactions costs associated with an intellectual property license are unlikely to be trivial.

To be sure, there are institutions such as ASCAP that have developed to reduce the transactions costs of intellectual property licensing, normally by doing it in bulk.²⁶⁹ There have also been attempts to reduce the per-unit cost through standardization, notably in the distribution of computer software through "shrinkwrap licenses."²⁷⁰ But these mechanisms for reducing transactions costs are far more effective at licensing standard end uses than at licensing the creation of improvements. Improvements are hard to categorize and assign set fees; different uses will incorporate different amounts of the original work, and will occur in different markets. Further, copyright owners are likely to want the power to review each individual use by an improver, while they may be willing to waive such rights in the case of standardized, consumptive end uses. Thus, an "improvers' ASCAP" may well face insurmountable problems.

The presence of these costs in intellectual property licensing transactions leads to two types of first-order deviations from the efficient behavior predicted by economic models that do not account for transactions costs. First, some original inventors will inefficiently choose not to license potential improvers for their technology. This may happen either because the perceived value of the improvements is sufficiently small that it is overwhelmed by the transactions costs of licensing, or because the marginal value of having a third party (rather than the original

²⁶⁸ See Richard E. Caves et al., *The Imperfect Market for Technology Licenses*, 45 **Oxford Bull. Econ. & Stats.** 249, 260-62 (1983). Cf. Mark A. Lemley, *Shrinkwraps in Cyberspace*, 35 **Jurimetrics J.** 311, 323 (1995) (suggesting that the growth of the Internet may reduce transactions costs for many types of licenses).

²⁶⁹ See Stanley Besen et al., *An Economic Analysis of Copyright Collectives*, 78 **Va. L. Rev.** 385 (1992); Merges, *Property Rules*, *supra* note __, at 2672; Robert P. Merges, *Contracting Into Liability Rules: Institutions Supporting Transactions in Intellectual Property Rights*, 84 **Cal. L. Rev.** __ (forthcoming 1996).

²⁷⁰ For more detail on such licenses, see Mark A. Lemley, *Intellectual Property and Shrinkwrap Licenses*, 68 **S. Cal. L. Rev.** 1239 (1995).

inventor) develop the improvements does not outweigh the transactions costs of licensing.²⁷¹ Second, some potential improvers who would seek a license for their improvements will no longer do so because of transactions costs. A subset of these potential improvers who forego licenses will nonetheless proceed to improve without a license,²⁷² opening themselves up to a suit for infringement. A second subset will forego the improvements process entirely because they could not secure a license, even though it would have been efficient for them to engage in the effort of seeking to improve the original work.

Uncertainty. Some of the problems that increase the cost of transacting in intellectual property licenses, particularly the difficulty of valuing both original inventions and improvements, may also prevent bargaining parties from coming to terms.²⁷³ In the Coasean world, two parties may be expected to agree if there is surplus to be gained from the agreement. The value of the surplus (the "gains from trade") is what will be divided during the negotiation. For example, if I can commercialize my invention to produce a profit of \$500, and you could produce a profit of \$700 commercializing the same invention, the logical thing for me to do is to sell you the right to commercialize my invention for some price greater than \$500 but less than \$700. The gains from trade in this transaction are \$200.

But in order for the parties to divide the gains from trade, they must know what those gains are. Uncertainty over the value of an invention (or in our case, over the value of potential improvements to the invention) can prevent the parties from agreeing to an efficient license transaction. So can uncertainty over the scope of a patent -- that is, over whether the licensing

²⁷¹ Indeed, Merges declares that "it seems whimsical to assume that all improvers and potential improvers will be able to bargain with the holders of pioneering patents." Merges, *Rent Control*, *supra* note __, at 374.

²⁷² For example, consider an author who wishes to excerpt from the work of another, but is unable to track down the successors in interest of a dead author or a defunct publisher.

²⁷³ See Merges, *Property Rules*, *supra* note __, at 2657-59 (explaining why uncertainty over the relative value of original inventions and improvements is likely).

transaction is necessary at all.²⁷⁴ This may happen in one of two ways. First, uncertainty may prevent the parties from recognizing that there are any gains to be had from trade. In the example above, if neither of us recognize that you would be better at commercializing the invention than me, we won't enter into a license agreement. Second, even where the parties recognize that licensing would be beneficial, uncertainty may cause them to disagree over the appropriate price in a way that prevents the bargain from taking place. Again using the example above, suppose that while you would actually be able to commercialize the invention for a \$700 profit, because of uncertainty I think your efforts will result in profits of \$900, while you think they will produce profits of only \$600. You will be unwilling to accept my demand that you pay me \$700 for the exclusive right to commercialize the product, even though to me that demand represents a fair division of what I perceive to be the gains from trade. Rational Coasean bargaining assumes perfect information, a characteristic strikingly absent from negotiations involving intellectual property.²⁷⁵

Externalities. Improvements which produce positive externalities -- that is, social benefits produced by a work that cannot be captured by the work's owner -- may not be efficiently produced under a property rights licensing scheme. The willingness of an original copyright owner to license his work to an improver under a property rights scheme depends, not

²⁷⁴ Some have suggested that the scope of a patent is "clearly demarcated in the patent itself." See Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 24 **J. Legal Stud.** 247, 267 (1994); see also *Markman v. Westview Instruments*, 52 F.3d 967, 986 (Fed. Cir. 1995) ("if the patent's claims are sufficiently unambiguous for the PTO, there should exist no factual ambiguity"), *aff'd* 116 S. Ct. 1384 (1996). But that statement is clearly wrong as a factual matter. There is considerable uncertainty over the scope of most patents, for many reasons: because of drafting ambiguities, because of the doctrine of equivalents, and because of uncertainty about the validity of the patent. See *supra* notes ___-___ and accompanying text; cf. Paul N. Higbee Jr., *The Jury's Role in Patent Cases: Markman v. Westview Instruments, Inc.*, 3 **J. Intell. Prop. L.** 407, 420-25 (1996). All of these uncertainties complicate license negotiations.

²⁷⁵ See 4 Kenneth J. Arrow, **Collected Papers of Kenneth J. Arrow: The Economics of Information** 222-24 (1984). Cf. Steven N. Wiggins & Gary D. Libecap, *Oil Field Unitization: Contractual Failure in the Presence of Imperfect Information*, 75 **Am. Econ. Rev.** 368 (1985) (providing empirical evidence that divergent valuations of oil field revenue led to the breakdown of oil field development negotiations in a significant number of cases).

surprisingly, on the improver's willingness to pay. The improver's willingness to pay, in turn, depends (among other things) on the revenue the improver expects to receive from the improvement. Where the improver's expected revenue matches society's expected benefit, externalities do not interfere with efficient licensing between the parties. However, where the improver's work would create a significant social benefit that the improver cannot capture, the improver (and thus the original copyright owner) will undervalue that work. The result is that the improver may be unwilling or unable to pay for a license to use an original work, even though the aggregate benefit to society would more than make up for the license fee demanded.

As an example, consider the efficient production of law review articles.²⁷⁶ Many law review articles, this one included, rely heavily on both the ideas and the words of scholars who have written before. In an absolutist property rights world, those prior scholars might well hold the right to prevent any discussion or quotation of their work without permission, on the theory that they would be willing to license their works for use by subsequent scholars. That theory might work if law professors were actually paid to publish law review articles that contained valuable contributions to legal theory.²⁷⁷ But because law review authors aren't compensated, at least not directly, they may not be willing to pay for the right to quote prior scholars, notwithstanding the social value that such a quotation would add to the article. Less trivial examples of positive externalities in improvements include news reporting, speech on matters of public concern, and explanatory material.

Strategic Behavior. Even if the parties have sufficient information that they can rationally sit down to bargain, strategic behavior on the part of one or both may prevent them from reaching an efficient agreement. The Coase theorem postulates that parties with a surplus

²⁷⁶ I will ignore the cynic's view that the socially efficient number of law review articles might be zero.

²⁷⁷ See Gordon, *Fair Use*, *supra* note ___, at 1630 ("revenues from scholarly articles are arguably smaller than such [social] benefit would warrant.").

to divide will divide it, but it does not specify how the surplus will be divided. One might think that dividing the surplus down the middle is "fair," but in point of fact a myriad of factors may enter into this calculation. To a party trying to divide a \$200 surplus, there is a big difference between getting \$1 of the surplus and getting \$199, or even between getting \$100 and getting \$25.

How does one maximize one's share of the gains from trade? One way is to lie, or at the very least to conceal information. If you can convince your opponent that your contribution is worth more than it is, or perhaps just that you *believe* it is worth as much as you say, you may be able to extort more money out of him, skewing the gains from trade in your favor. Alternatively, you might play a game of "chicken," convincing your opponent that you are irrational enough to kill the whole deal unless you get more than your "fair" share.²⁷⁸ Such strategies are rational in the sense that they may produce asymmetric gains skewed in favor of the party that employs them. However, they may also result in the parties failing to come to terms at all, particularly if both parties aggressively seek the lion's share of the gains from trade.²⁷⁹

Bob Cooter has modeled the consequences of strategic behavior for such negotiations,²⁸⁰ and Rob Merges has applied that model in the patent context.²⁸¹ Merges treats a hypothetical situation involving two negotiating parties, one an original inventor whose invention produces

²⁷⁸ See William Poundstone, **Prisoner's Dilemma** 212-13 (1992) (discussing the advantages of perceived irrationality in game-theoretic models of "chicken").

²⁷⁹ While one might object that one or both parties should back down if they see that the entire negotiation is at risk, that is not always the case. Where one party is a repeat player in license negotiations, it may profit that player to develop a reputation for refusing to back down, since that reputation will in turn influence the behavior of its opponents in subsequent negotiations.

²⁸⁰ See, e.g., Robert Cooter & Steven Marks, *Bargaining in the Shadow of the Law: A Testable Model of Strategic Behavior*, 11 **J. Legal Stud.** 225, 243 (1982); Robert Cooter, *The Cost of Coase*, 11 **J. Legal Stud.** 1, 20-21 (1982); Robert Cooter, *Decentralized Law for a Complex Economy: A Structural Approach to Adjudicating the New Law Merchant*, 144 **U. Pa. L. Rev.** 1643, 1676 (1996).

²⁸¹ Merges, *Blocking Patents*, *supra* note ___, at 82-83. See also Merges, *Property Rules*, *supra* note ___, at 2659-60; Merges & Nelson, *supra* note ___, at 865-66.

profits of \$100, and the second an improver whose improvement will produce a total of \$1000 in profits if used in conjunction with the original invention.²⁸² He suggests that giving absolute control over improvements to the original inventor encourages that original inventor to seek a larger share of the gains from trade than the improver, even though the improver has contributed the majority of the value of the improved invention.²⁸³ This strategic behavior threatens to prevent the parties from concluding a deal, and indeed Merges notes several examples of what he calls "bargaining breakdown" in patent history.²⁸⁴ As with the problems of transactions costs and uncertainty, the effect of strategic behavior is that parties in some cases will not enter into efficient licensing agreements.²⁸⁵

Noneconomic Incentives. Finally, some efficient licensing arrangements may not occur simply because the parties take account of other, noneconomic considerations. Some of these considerations may be idiosyncratic. For example, a patent owner might be unwilling to license her work to a Californian, for no other reason than that she doesn't like Californians. Perhaps more likely, she may be unwilling to license her work to her ex-husband, for reasons that have nothing to do with his willingness to pay. Depending on how broadly one is willing to define rationality, such refusals might be termed "irrational."²⁸⁶ But certainly they do happen all the time. In the normal goods market, we don't worry too much about them -- if your corner grocery won't sell to Californians, the one down the street is likely to. But in the context of intellectual

²⁸² *Id.* at 79.

²⁸³ *Id.* at 81.

²⁸⁴ *Id.* at 84-89.

²⁸⁵ Indeed, Cooter goes so far as to characterize hard bargaining as a negative externality. Cooter, *Law Merchant*, *supra* note ___, at ___.

²⁸⁶ If one is willing to take enough noneconomic factors into account in defining rationality, virtually all refusals to license will be rational. For example, licensing your work to someone you don't like may impose a "psychic cost" that would have to be taken into account in determining the market-clearing license price.

property, where the "goods" are unique and the markets therefore "thin," such refusals may be more problematic.

There are some cases where such noneconomic refusals to license are endemic. For example, very few novelists or playwrights will be willing to grant the right to excerpt from their material to critics who intend to write a devastating review of their work. Similarly, few people would be willing to license their books or songs (or for that matter their names or images)²⁸⁷ to those who would ridicule them, for example by parodying their earlier work. Several scholars have identified parody and criticism as areas where markets fail because the intellectual property owner cannot be expected to act "rationally" in licensing his work.²⁸⁸ While this is not necessarily market failure in a strict sense -- from the intellectual property owner's perspective, in some cases it may make perfect *economic* sense to refuse to license parody or criticism if one fears the effects on one's reputation or sales; at the least, an author might be expected to charge more for parodies than for other types of licenses -- what frequently happens in parody and criticism cases is that intellectual property owners refuse to license such works on terms that are substantially equal to the terms they would give nonparodic uses of similar type and quantity.²⁸⁹

²⁸⁷ The expansion of intellectual property has led to numerous efforts to control references to or criticism of a person, using trademark law and the right of publicity. See, e.g., *Waits v. Frito-Lay, Inc.*, 978 F.2d 1093 (9th Cir. 1992); *Midler v. Ford Motor Co.*, 849 F.2d 460 (9th Cir. 1988); *White v. Samsung Electronics*, 971 F.2d 1396 (9th Cir. 1992). For criticism of this trend, see *White v. Samsung Electronics*, 989 F.2d 1512 (9th Cir. 1993) (Kozinski, J., dissenting from denial of rehearing en banc).

²⁸⁸ See, e.g., Wendy J. Gordon, *Fair Use as Market Failure*, 82 **Colum. L. Rev.** 1600; Robert P. Merges, *Are You Making Fun of Me? Notes on Market Failure and the Parody Defense in Copyright*, 21 **AIPLA Q.J.** 305 (1993); Richard A. Posner, *When is Parody Fair Use?*, 21 **J. Legal Stud.** 67 (1992); Anastasia P. Winslow, *Rapping on a Revolving Door: An Economic Analysis of Parody and Campbell v. Acuff-Rose Music, Inc.*, 69 **S. Cal. L. Rev.** 767 (1996); Brian R. Landy, Comment, *The Two Strands of the Fair Use Web: A Theory for Resolving the Dilemma of Music Parody*, 54 **Ohio St. L.J.** 227 (1993).

²⁸⁹ An example of such a refusal to license a parody on any terms is the *Campbell v. Acuff-Rose* case. See Merges, *Making Fun*, *supra* note ___, at 308. Gordon refers to this as an "antidissemiation motive" and includes it in her catalogue of potential market failures. See Gordon, *Fair Use*, *supra* note ___, at 1632-45; Landy, *supra* note ___, at 250-51.

Noneconomic factors may also prevent licensing even in obviously commercial contexts. Economists may presume that corporations always act rationally, but any lawyer can recite cases where a corporation refused to do a deal or settle a lawsuit with a rival for no better reason than the bad feelings that past experience had left. Corporate intellectual property owners may refuse to license patent rights to a competitor not because there is anything wrong with the licensing deal, but simply because the proposed licensee *is* a competitor. From a social perspective, the effect is the same regardless of the reason: licensing that "should" take place from a strict economic perspective does not.

Implications of Imperfect Licensing. The material in this section suggests that, for a variety of reasons, licensing intellectual property is costly and uncertain. Despite the property rights model of efficient transactions, in the real world one cannot always expect that efficient transactions will occur. This problem has two sorts of implications for intellectual property law. First, because the efficiency of intellectual property is so closely tied to the assumption of efficient licensing, intellectual property law should be structured in such a way as to encourage efficient licensing transactions whenever possible. Second, because efficient licensing will not always occur, intellectual property law must do more than determine that *someone* owns a particular intellectual property right: it must give some thought to *who* ought to own that right. Unfortunately, there is some tension between these goals, as we shall see.

Cooter's basic model of bargaining suggests one way to encourage more licensing. Cooter suggests that negotiation in voluntary transactions is about dividing up the surplus profits to be gained from doing the deal.²⁹⁰ Many of the difficulties identified in this section, notably

²⁹⁰ Cooter, *supra* note __, at __; *see also* Merges, *Blocking Patents*, *supra* note __, at 81. *But see* Merges, *Contracting*, *supra* note __, at __ (suggesting that unified property rights will encourage the development of licensing organizations such as ASCAP designed to overcome the transactions costs of bargaining). The ASCAP model of market facilitation is based on statistical estimation of the uses that are made of copyrighted works. This model works well for market transactions which are frequent, low in individual value, and susceptible to standardization. Copyright licenses to end users may possess those characteristics, but licenses to likely improvers do not. It is difficult to imagine how ASCAP or its equivalent could come up with a statistical model and royalty structure that would capture the complexities of potential improvements to the satisfaction of all parties involved.

the problems of transactions costs and uncertainty, interfere with licensing because they reduce (in the case of transactions costs) or obscure (in the case of uncertainty) the size of the surplus profit to be divided. Thus, if the surplus from a transaction is \$500, transactions costs of \$400 will make the deal much less attractive, and transactions costs of \$600 will make it entirely infeasible. Similarly, if each party is uncertain about the value of the surplus by ± 250 , such uncertainty could reduce or even eliminate the *perceived* gains from trade. If it is possible to increase the gains from trade without substantially increasing the transactions costs or uncertainty associated with trading, doing so should increase the likelihood that efficient bargaining will occur.²⁹¹ Transactions costs of \$400 or even \$600 will be much less likely to block a deal with a surplus of \$2000 than one with a surplus of \$500.

How can intellectual property law affect the gains from trade? One way is to increase the costs of failing to come to an agreement. To some extent this seems to be what the blocking patents rule is designed to do. As Merges explains, a rule of absolute control by the original inventor over improvements will leave very little for original inventors and improvers to bargain over -- the original inventor is entitled by law to capture the full value of the improvement, and the improver's only bargaining leverage is the threat to withhold the discovery of the improvement, a threat that is hard to translate into money because of Arrow's paradox.²⁹² The result is fewer licenses with improvers, but also fewer unsolicited improvements. Granting patents to both the original inventor and the improver, by contrast, gives each a much larger stake in the success of the licensing negotiation. Unless the parties agree, neither party can use the improved invention. Thus, the blocking patents rule increases the surplus being bargained

²⁹¹ Of course, such an increase in the surplus will not eliminate the incentive to engage in strategic behavior, and may even increase it (since more money will be at stake in each transaction). Nor is it likely to eliminate all noneconomic barriers to trade, though at least some of those barriers should disappear when a sufficient amount of money is at stake.

²⁹² See Merges, *Blocking Patents*, *supra* note ___, at 80-81.

over by imposing a cost on original inventors who fail to come to terms with improvers.²⁹³ The analysis of Cooter's model above suggests that the result of blocking patents doctrine should be an increase in the number of deals struck between original inventors and improvers.²⁹⁴

Unfortunately, dividing the entitlement in order to increase the gains from bargaining is a risky strategy. While doing so may make licensing more likely, it cannot guarantee that it will occur. And where licensing does not occur, the result under a blocking patents rule is more problematic for society than under either of the two possible absolute property rules -- *no one* gets to use the improvement. This danger suggests that it is not always appropriate to divide the property entitlement in cases of improvement. In those cases where the property entitlement is not divided, who gets the property right (the original inventor or the improver) may be of considerable importance.

²⁹³ How much the gains from trade increase depends on how important the improvement was in relation to the original invention. I consider the implications of this fact *infra* notes ___-___ and accompanying text.

²⁹⁴ In a recent article, Ian Ayres and Eric Talley argue that dividing legal entitlements may encourage negotiation between the parties owning partial entitlements. Their argument is not the one presented in the text, that increasing the gains from trade will increase the incentive to come to terms. Rather, they suggest that using liability rather than property rules (and thus giving compulsory licenses to improvers on the payment of a reasonable royalty set by a court) would encourage the parties to forego strategic behavior in the bargaining process, primarily because it increases uncertainty as to the outcome of the negotiation. See Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade*, 104 **Yale L.J.** 1027, 1092-94 (1995). For discussion of their model, and possible countervailing factors, see Louis Kaplow & Steven Shavell, *Do Liability Rules Facilitate Bargaining? A Reply to Ayres and Talley*, 105 **Yale L.J.** 221, 227 (1995); Ian Ayres & Eric Talley, *Distinguishing Between Consensual and Nonconsensual Advantages of Liability Rules*, 105 **Yale L.J.** 235 (1995).

The recent addition of section 104A to the Copyright Act should provide a test of the Ayres-Talley thesis. As part of its effort to restore copyright ownership to certain works in the public domain, Congress provided an exception for good faith creators of derivative works. Those who have created derivative works based on a once-public-domain work in which copyright has been restored can continue to produce the derivative work, as long as they pay "reasonable compensation" to the owner of the restored copyright. 17 U.S.C. § 104A(d)(3)(A). If the parties cannot agree on compensation, either party may go to court to obtain a court order setting compensation. *Id.* at § 104A(d)(3)(B). If Ayres and Talley are correct, this use of liability rules should reduce strategic behavior among parties negotiating "reasonable compensation."

I discuss objections to the use of liability rules in intellectual property cases in more detail *infra* notes ___-___ and accompanying text.

In Parts II and III, I distinguished three classes of improvements, termed "minor," "significant" and "radical," respectively.²⁹⁵ For illustration, let us define the value of the original invention or creation as \$200, and imagine a minor improvement worth an additional \$10, a significant improvement worth an additional \$200, and a radical improvement worth an additional \$1200. The copyright system presumptively gives control over all three classes of improvements to the original creator. By contrast, the patent law has different rules in each of the three cases, which roughly correspond to the value of the improvement in relation to the original invention. Minor improvements are captured by the original inventor, just as in copyright law, while radical improvements are the property of the improver.²⁹⁶ (The rule for significant improvements in patent law is somewhere in between -- the parties divide the property entitlement.)²⁹⁷ Not only is the radical improver excused from patent liability to the original inventor under the reverse doctrine of equivalents, but she can presumably patent her improvement, thus excluding the original inventor (and everyone else) from practicing the improvement without a license.

The copyright approach of assigning a property right in radical improvements to the original creator will produce an efficient result in circumstances where the parties can be expected to come to terms -- the copyright owner will presumably license the right to make the valuable improvement to the radical improver. If licensing is imperfect, however, patent law's treatment of radical improvers makes much more sense than copyright's. If the parties cannot be expected to come to terms in all cases, a default rule giving all rights in a radical improvement to

²⁹⁵ See *supra* notes __-__ and accompanying text.

²⁹⁶ While Merges refers to this as an exception to property-rule treatment of intellectual property rights, see Merges, *Property Rules*, *supra* note __, at 2668, that characterization seems inaccurate to me. Radical improvers can sell their improvement and prevent others from doing so; original inventors have no power over them. This is as much a property rule as giving original inventors the same power would be, though of course the party holding the property rule is different.

²⁹⁷ See *supra* notes __-__ and accompanying text.

the original intellectual property owner is likely to encourage overinvestment in initial works and underinvestment in radical improvements. To borrow an example from Grady and Alexander,

Allowing someone who has invented a crude telephone to control the entire communications industry creates such a large reward that inventors would dissipate rents by trying to be the pioneer. In the perverse equilibrium that would result from a system awarding full control to the inventor who is first, the costs of developing dreams that ultimately fail would equal or exceed the benefit to society of those that succeed.²⁹⁸

At the same time, potential radical improvers would have significantly less incentive to improve on original works, since the original intellectual property owner would ultimately be able to control their improvement in the case of bargaining breakdown.

The reverse doctrine of equivalents in patent law provides a way to avoid this problem. In the small subset of cases where the improver's invention is such a major advance over the original invention that its value is much greater than the original, the incentive theory of intellectual property suggests that we should be more concerned about encouraging improvements than we are about encouraging original inventions. While it is true that the reverse doctrine of equivalents reduces the incentives for original inventors somewhat from what they would be under a copyright-style regime, the loss is small²⁹⁹ and it is outweighed by the encouragement of improvements which are themselves more valuable than the original.

Why then have a blocking patents rule at all? Why not simply divide the world into "minor" and "radical" improvements, and assign property rights based on whether the pioneer's

²⁹⁸ Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 **Va. L. Rev.** 305, 307-08 (1992). While Grady and Alexander offer Bell's telephone patent as an example, perhaps a better one is the crude incandescent light bulb patent issued to Sawyer and Man. If a copyright rule were to prevail, Sawyer and Man would have had the right to prevent Edison from marketing his greatly-improved light bulb. *Cf.* The Incandescent Lamp Patent, 159 U.S. 465 (1895).

²⁹⁹ See Merges, *Blocking Patents*, *supra* note __, at 101-103 (arguing that ex ante incentives to invent will hardly be affected by the reverse doctrine of equivalents, since its application in any particular case is highly contingent and extremely unlikely).

or the improver's invention is more valuable? I suggested one justification for the blocking patents doctrine above -- it may encourage efficient licensing transactions in situations where they otherwise would not occur due to market imperfections. A second reason is that in the real world it is not simple to determine even the relative value of original inventions and improvements. Some improvements are clearly minor in relation to the underlying invention; others are clearly radical. In between, there may be a significant degree of uncertainty as to which invention is actually more valuable. In such a case, where the proper default rule is unclear, the intermediate approach of the blocking patents doctrine seems appropriate.

3. Market Power and Holdup Problems

A third set of problems with efficient licensing of intellectual property has to do with the relationship between intellectual property rights and market power. Fundamental economic theory instructs us that consumers of a product (and improvers, who are after all consumers too) will make efficient use of that product only if it is priced at marginal cost.³⁰⁰ It also tells us that producers will price at marginal cost only if they are forced to by the existence of competition. A producer who controls a market will cut output and raise prices, increasing its profits but reducing both consumer and aggregate social welfare.³⁰¹ Because intellectual property rights generally give their owner the power to prevent competitors from using the technology that is the subject of the right, one might conclude that intellectual property rights confer a "monopoly" on their owner.³⁰² If so, intellectual property rights should be expected to result in prices that are above marginal cost, and therefore in an inefficiently low use of the patented technology.³⁰³

³⁰⁰ Paul Samuelson, *Economics* 469 (11th ed. 1980).

³⁰¹ *Id.*

³⁰² Several early court decisions came to precisely this conclusion. *See supra* note __ (citing cases).

³⁰³ *See* Fisher, *supra* note __, at 1700-02 (explaining how an intellectual property owner with market power can charge supracompetitive prices).

It is well-established, however (at least among economists), that intellectual property rights do *not* automatically confer market power.³⁰⁴ Patents confer exclusive rights to use a particular technology, but that technology need not be coextensive with an economic market. Patented technologies can and frequently do compete with each other, and that competition will constrain monopoly pricing. Competition is even more likely in the case of other intellectual property rights, since those other rights do not restrict all uses of the intellectual property by competitors.³⁰⁵

Unfortunately, it is possible to take this important insight too far. The prospect model of the patent system works best under the opposite assumption, sometimes made by commentators - that intellectual property rights can *never* confer market power on their owner.³⁰⁶ This assumption is wrong, however, as even Kitch acknowledges.³⁰⁷ Intellectual property rights can confer market power in certain circumstances; think of Morse's telegraph patent,³⁰⁸ for example, or Bell's telephone patent,³⁰⁹ both of which controlled the most effective means of distance

³⁰⁴ See *supra* note __ (citing sources).

³⁰⁵ For example, copyright permits independent derivation in most circumstances, see *Gaste v. Kaiserman*, 863 F.2d 1061 (2d Cir. 1988), and permits some forms of reverse engineering in computer software cases. See *supra* note __ (collecting cases). Trade secrets law permits both independent discovery and reverse engineering. Uniform Trade Secrets Act § 1cmt. f; **Restatement (Third) Unfair Competition** § 43.

³⁰⁶ For example, Judge Easterbrook suggests that patent's "right to exclude is no different in principle from General Motors' right to exclude Ford from using its assembly line." Frank H. Easterbrook, *Intellectual Property is Still Property*, 13 **Harv. J.L. & Pub. Pol'y.** 108, 109 (1990). See also Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 **J. Legal Stud.** 247, 249-50 (1994) ("without the benefit of empirical research, it is entirely plausible to conclude that in the great bulk of instances no significant market power is granted [by patents]"). Dam's assertion may be correct, though he offers no reason to believe it is. Judge Easterbrook's statement is clearly wrong -- patent law extends far beyond the use of a certain set of tangible assets, and indeed extends beyond the realm of copying of ideas, as we have seen.

³⁰⁷ Kitch, *supra* note __, at 274-75.

³⁰⁸ See *O'Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853).

³⁰⁹ See *The Telephone Cases*, 126 U.S. 1, 534 (1887).

communication that existed at the time. Further, intellectual property has the potential in certain specialized circumstances to give its owner market power that extends beyond the scope of the intellectual property right itself. This is particularly likely where there are strong standardization effects in a market, so that a standard once adopted is likely to be durable. Intellectual property rights reinforce market power in such circumstances. If the intellectual property right includes copyright-style control on the making of improvements, it may make it difficult or impossible for competitors to break free of the standard even after the standard has become obsolete.³¹⁰

Original intellectual property owners in such a market are in a position to hold up the innovation process. Because improvement in such a market virtually requires the improver to build on the technology that has become a market standard, the owner of the standard can preclude any such improvements, thus maintaining her market share.³¹¹ At the very least, she may be expected to charge supracompetitive prices to improvers who wish to license her intellectual property. Basic economic theory suggests that the effect of charging "monopoly license fees" will be that consumers of those licenses (improvers) will not buy enough of them.

³¹⁰ For more on such markets and the effect of intellectual property, see Mark A. Lemley, *Antitrust and the Internet Standardization Problem*, 28 **Conn. L. Rev.** __ (forthcoming 1996). For an example of how the copyright rule can produce such a result, see *infra* notes __-__ and accompanying text.

³¹¹ Whether it is economically rational for original inventors to suppress such improvements, rather than licensing them for a fee, is a matter of considerable debate among economists. For historical evidence of such suppression, see Mark Clark, *Suppressing Innovation: Bell Laboratories and Magnetic Recording*, 34 **Tech. & Cult.** 516, 532 (1993); Dunford, *Suppression of Technology*, 32 **Admin. Sci. Q.** 512 (1987). While it might seem irrational to think that an original inventor would suppress an improvement within her control if it truly was valuable, several circumstances might induce her to do so. If the improvement requires a new manufacturing technology or a different market approach, there may be substantial fixed costs associated with switching over production from the old to the new way. The further removed the improvement is from the original invention, the worse this problem is likely to be. Cf. David J. Teece, *Profiting from Technological Innovation*, 15 **Res. Pol.** 285 (1986) (much of the profit from innovation may come from a firm's ability to capture "complementary assets" that relate uniquely to the particular technology used). The alternative to switching over production facilities -- licensing the improver to compete with the original inventor, for a fee -- is also unlikely to be attractive to the original inventor. Even if the licensor could extract the full value of the improvement in a licensing transaction, which seems unlikely, its market control will disappear along with the intellectual property right. Innovation is associated with strong first-mover advantages, so the first company to manufacture and sell a product is likely to maintain its dominant position even after the patent expires. Thus, the improver, rather than the original inventor, would likely come out the victor in the long run.

Thus, monopoly pricing for licenses to improve original works should result in underproduction of improvements.

Patent law's reverse doctrine of equivalents offers a way out for improvers in such a market. Under this doctrine, original inventors cannot prevent improvers from using their basic invention where the improvement is so radical that it fundamentally changes the nature of the invention. By permitting radical improvers to appropriate the original invention so long as their contribution is sufficiently radical, the reverse doctrine of equivalents provides at least some relief from the holdup problem.³¹²

C. Conclusions

The copyright rules governing improvements closely track the property rights model of innovation, under which a strong unified grant of property rights leads to efficient licensing of the invention and efficient incentives to produce improvements. Unfortunately, the property rights story is incomplete. Problems of imperfect information, transactions costs, strategic behavior, and market power all impose barriers to the hypothetical efficient license.³¹³

There is no reason to believe that these problems are uniquely confined to patent rather than copyright licensing. If anything, some of the problems that prevent efficient licensing are

³¹² Other doctrines common to both patent and copyright cases, notably the misuse defenses, may also be called upon to provide relief in this situation. See Dam, *Patent System*, *supra* note __, at 260-61; see also Julie E. Cohen, *Reverse Engineering and the Rise of Electronic Vigilantism: Intellectual Property Implications of "Lock-Out" Programs*, 68 **S. Cal. L. Rev.** 1091, 1181-98 (1995) (suggesting that such holdups can be cured by applications of the misuse doctrines). However, applying antitrust and related doctrines to achieve structural relief in standardized markets may be futile, as I have suggested elsewhere. See Mark A. Lemley, *Antitrust and the Internet Standardization Problem*, 28 **Conn. L. Rev.** __ (forthcoming 1996).

³¹³ I am sensitive to Wendy Gordon's concern that "occasional cases of market failure should not immediately trigger judicial exceptions," given the high administrative cost of case-by-case decisionmaking. Gordon, *Harms and Benefits*, *supra* note __, at 474. Nonetheless, two factors lead me to believe that varying property rights in accordance with the patent model is the more appropriate solution. First, that variance operates by dividing cases into classes, rather than treating each one individually, a fact which should reduce the administrative costs of decisionmaking. Second, I do not believe the circumstances detailed in this Part can be dismissed as "occasional" instances of market failure.

worse in the copyright context than in the patent context. There are more potential authors and artists who could improve a particular work than there are engineers who could improve a particular invention, largely because the degree of specialization required is less in the artistic world than in engineering. Thus, the problem of identifying improvers is at least as large for copyrighted works. Similarly, the uncertainty associated with the success of a work of art or literature is probably greater than with inventions, which at least function (or fail to function) according to defined principles. While the bargaining costs per transaction are probably less in absolute terms in copyright licenses than in patent licenses, the underlying value of the transaction is also less. There is no reason to believe that transactions costs as a percent of value are any less in the copyright context. Indeed, for at least one important class of copyrighted works (multimedia works), the transactions costs of the licensing required threaten to stifle an entire industry.³¹⁴ Finally, copyright owners are more likely than patent owners to object to uses of their work for noneconomic reasons, perhaps because they are more personally involved with their works.³¹⁵ Thus, there is no reason to think that copyright owners are better able to overcome these licensing problems than patent owners.

Patent law seems better equipped than copyright law to deal with these real-world barriers. The doctrine of blocking patents helps to overcome search problems, allowing patent owners to bargain with actual rather than merely potential improvers. It also minimizes some of the effects transactions costs and uncertainty can have on the bargaining process. The reverse doctrine of equivalents sets an efficient default rule, accounting for cases in which efficient

³¹⁴ See generally Robert D. Sprague, *Multimedia: The Convergence of New Technologies and Traditional Copyright Issues*, 71 **Denv. U.L. Rev.** 635, 659-69 (1994); Heather J. Meeker, Note, *Multimedia and Copyright*, 20 **Rutgers Comp. & Tech. L.J.** 375 (1994).

³¹⁵ See Margaret Jane Radin, *Property and Personhood*, 34 **Stan. L. Rev.** 957 (1982) (suggesting that the personal economic value of some forms of property predominates over its economic value); see also Neil Netanel, *Copyright Alienability Restrictions and the Enhancement of Author Autonomy: A Normative Evaluation*, 24 **Rutgers L.J.** 347 (1993) (applying Radin's theory in the copyright context).

bargaining does not take place. It also serves to counteract some of the holdup problems introduced by intellectual property rights which confer market power.

The basic structure of the patent model is quite simple. The treatment of improvements is a function of the value and significance of the improvement in relation to the original invention. Improvements which are minor in relation to the original invention are likely to be found to infringe, either literally or under the "insubstantial differences" test for doctrine of equivalents infringement.³¹⁶ More significant improvements within the range of the original claims still infringe the original patent, but in such cases the improver is entitled to a patent of his own. This not only encourages the development of significant improvements, but gives improvers bargaining leverage in licensing negotiations in direct proportion to the relative value of their improvements. Finally, truly radical improvements are exempted from liability to the original patent owner, regardless of whether they fall within the literal scope of the original claims, in order to encourage such improvements and to ensure that they reach the market.³¹⁷

The model also has advantages over the compulsory-licensing schemes that are sometimes proposed to limit the property rights of intellectual property owners.³¹⁸ Unlike the compulsory licensing approach, the model still treats licensing as something to be worked out in the market, rather than by the courts. It merely suggests a set of default parameters that will maximize the chance that bargaining will occur, and minimize the damage if it does not occur. It is therefore consistent with the warnings of Wendy Gordon and others that judicial or

³¹⁶ *Hilton-Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (en banc). Judge Newman, concurring in *Hilton-Davis*, suggests that making minor improvers liable for infringement under the doctrine of equivalents will not only serve the function of encouraging original inventors, but may also encourage better improvements, since improvers will be forced into "leapfrogging" rather than incremental advances over the prior art. *Id.* at 1532-33 (Newman, J., concurring).

³¹⁷ This model is in line with the conclusions Merges and Nelson draw regarding patent law. See Merges & Nelson, *supra* note __, at 909 ("Once a court completes its assessment of the significance of the patented device, it should consider in addition the importance of the advance represented in the *accused* device.").

³¹⁸ See Fisher, *supra* note __, at 1725-26; Merges, *Making Fun*, *supra* note __, at __.

administrative intervention is doubtful as a way to reach efficient results,³¹⁹ and with the suggestion of Kaplow and Shavell that property rules may be appropriate in this situation.³²⁰

VI. Implications of the Improvements Model

Application of the improvements model just described is generally consistent with existing patent law doctrine. However, its application in the copyright law context would necessitate some changes to existing law, at least as currently interpreted by the courts. In this section, I consider how the law could be made consistent with the model, and offer some examples of how the new rules would work.

A. Patent Law

While the model presented in Part V is derived from patent law doctrine, and therefore is consistent with that doctrine, it does have implications for one controversial aspect of patent law: the treatment of pioneer inventions. A pioneer invention is (in the words of the Supreme Court case establishing the doctrine of pioneer invention) "a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what has gone before."³²¹ Other courts have used various

³¹⁹ See Gordon, *Asymmetric Market Failure*, *supra* note __, at 868-69. While high transactions costs have been offered as a justification for the imposition of liability rules (such as compulsory licensing in the intellectual property context), Merges has persuasively argued that liability rules may not be justified in intellectual property cases to the extent that private organizations will efficiently contract into liability rules themselves. See Robert P. Merges, *Contracting Into Liability Rules: Institutions Supporting Transactions in Intellectual Property Rights*, 84 *Cal. L. Rev.* __ (forthcoming 1996); Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 *Colum. L. Rev.* 2655 (1994).

³²⁰ See Kaplow & Shavell, *Economic Analysis*, *supra* note __, at 762 (property rules are superior to liability rules where initial possessors of a thing place greater idiosyncratic value on it than those who take it from them, and where courts have difficulty in valuing a thing). For the reasons discussed in the last section, both of these circumstances are likely in the case of intellectual property. Of course, deciding that a property entitlement is appropriate does not answer the question of who should receive that property entitlement. See *supra* note __.

³²¹ *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 561-62 (1898).

terms (a "broad breakthrough" or a "major advance", for example) in an attempt to distinguish pioneering from normal inventions.³²² However defined, the basic idea is that pioneer inventions are somehow more fundamental than the average patentable invention. They open up a new industry, or at least a new avenue of approach.³²³ Under long-standing judicial doctrine, pioneer patents receive a broader range of protection under the doctrine of equivalents than other patented inventions.³²⁴ Further, the range of equivalents is calibrated even more finely than that, with the effective scope of a patent depending on the significance of the patented invention.³²⁵ While some commentators have defended the doctrine³²⁶ and even suggested ways to extend it,³²⁷ others have attacked some of its implications.³²⁸ The Federal Circuit cast doubt on the

³²² *E.g.* Sun Studs Inc. v. ATA Equip. Leasing Inc., 872 F.2d 978, 987 (Fed. Cir. 1989) (broad breakthrough); Universal Gym Equip. v. ERWA Exercise Equip., 827 F.2d 1542, 1548 (Fed. Cir. 1987) (major advance); *see also* John R. Thomas, *The Question Concerning Patent Law and Pioneer Inventions*, 10 **High Tech. L.J.** 35, 48 (1995) (collecting cases describing pioneer patents in various ways).

³²³ It is important to distinguish pioneer inventions, as that term is used in patent law, from the "original inventions" at issue in this paper. My model assumes a "first" invention and subsequent improvements on that invention purely for the sake of simplicity. In practice, the "original" invention in the model is likely to itself be an improvement on what came before it, and it may or may not be a pioneering invention.

³²⁴ *See, e.g.*, Graver Tank & Mfg. Co. v. Linde Air Prods., 339 U.S. 605, 608 (1950).

³²⁵ Thus, inventions that are important but not pioneering are entitled to fairly broad scope, though less than pioneering patents. *E.g.* Hughes Aircraft Co. v. United States, 717 F.2d 1351 (Fed. Cir. 1983). Inventions that are narrow advances within a highly developed art receive a very limited range of equivalents. *E.g.* Thomas & Betts Corp. v. Litton Sys., 720 F.2d 1572, 1580 (Fed. Cir. 1983).

³²⁶ *See* Esther Steinhauser, Note, *Using the Doctrine of Equivalents to Provide Broad Protection for Pioneer Patents: Limited Protection for Improvement Patents*, 12 **Pace L. Rev.** 491 (1992).

³²⁷ *See* A. Samuel Oddi, *Beyond Obviousness: Invention Protection in the Twenty-First Century*, 38 **Am. U.L. Rev.** 1097, 1128-37 (1989) (proposing a new class of "revolutionary patent" for pioneer inventions which would have broader scope and extended duration); Harold C. Wegner, *Equitable Equivalents: Weighing the Equities to Determine Patent Infringement in Biotechnology and Other Emerging Technologies*, 18 **Rutgers Comp. & Tech. L.J.** 1 (1992) (recommending that pioneer status be relevant in deciding whether to apply the doctrine of equivalents at all).

³²⁸ *See* Thomas, *supra* note __, at 95 (suggesting that pioneer status should depend on the social implications of a new invention, rather than merely its technological significance).

status of the doctrine in its 1995 en banc decision in *Hilton-Davis*, which reformulated the doctrine of equivalents in a way that did not include the pioneer status of the invention.³²⁹

The pioneer invention doctrine is entirely consistent with the model of improvements derived in Part V. That model identifies the *relative* importance of the original invention and the improvement as the critical factor in determining how the improvement will be treated *once it is determined to be infringing*.³³⁰ This approach implicitly accounts for pioneering inventions in one respect: the significance of the original invention will help determine how important an improvement must be to qualify as "significant" or "radical." An improvement worth \$500 may be radical if it is made to an original invention worth only \$100, but not if made to an original invention worth \$2000. The fundamental insight of the pioneer invention doctrine is the same as that of the improvements model -- efficiency is best served by some sort of calibration, however rough, between the importance of the invention and the scope of the patent.

B. Copyright Law

Copyright law would need to change in two ways to accomodate the model. First, the current copyright rules regarding the ownership of derivative works is inconsistent with the model's treatment of significant improvements. Second, as currently interpreted, copyright's fair use doctrine does not provide effective protection for radical improvers in all cases. In this section, I suggest how copyright law could be modified to fit the improvements model, and offer some examples of how such modifications would affect actual copyright cases.

1. Derivative Works

³²⁹ *Hilton-Davis*, 62 F.3d at 1512.

³³⁰ By contrast, the pioneer invention doctrine works towards the same goal as the model in a different way, by basing the infringement determination itself in part on the significance of the patent.

Current copyright doctrine effectively assigns the rights in unlicensed improvements made by third parties to original creators, by denying the improver copyright protection in his original expression and declaring any creation of such derivative works to be infringement.³³¹ The rule that derivative works infringe the copyright in the original stems from section 106(2) of the Copyright Act,³³² and is consistent with the rule in patent law that even significant improvements can infringe the patent if they fall within the scope of the claims. The rule precluding improvers from owning their original expression stems from section 103(a),³³³ and is inconsistent with the blocking patents rule. For the reasons explained in Parts IV and V, the copyright rule cannot be justified, and should be replaced by a rule permitting improvers to own their original expression.³³⁴ Such a rule protects substantial improvers -- those who have contributed significant copyrightable expression of their own. It will not protect minor improvers, however.³³⁵

³³¹ See *supra* notes __-__ and accompanying text (discussing copyright's treatment of derivative works).

³³² 17 U.S.C. § 106(2).

³³³ 17 U.S.C. § 103(a):

The subject matter of copyright as specified by section 102 includes compilations and derivative works, but protection for a work employing preexisting material in which copyright subsists does not extend to any part of the work in which such material has been used unlawfully.

Based on the language of this section, it is possible for improvers to copyright their derivative works so long as the infringing material is separable from the original expression. Thus, an infringing song on a CD of otherwise original songs will presumably not bar copyright in the original songs. But when the original and derivative contributions are intertwined, as is the case in most derivative works (such as movies based on books, translations, and computer programs), the improver loses any claim to his original contributions to the derivative work.

³³⁴ Goldstein has taken a similar position. He writes: "[t]he rule is, however, hard to justify when applied to derivative works such as the motion picture in *Sheldon v. MGM* in which the underlying work represents only a small part of the value of the derivative work but, because it underlies the whole, will defeat copyright protection for the entire derivative work." Goldstein, *supra* note __, at 244. See also Gordon, *Asymmetric Market Failure*, *supra* note __, at 865-66 (criticizing the broad control copyright owners have over derivative works); Nadan, *supra* note __, at 1660-72 (offering an alternative proposal to recognize component works as noninfringing and separately copyrightable).

³³⁵ Courts have required that substantial original material be contributed by an improver in order to make the derivative work separately copyrightable (and therefore eligible for the proposed blocking copyrights rule). See,

Neil Netanel objects that creating a "blocking copyrights" doctrine will have little practical effect, since the original copyright owner will still be able to bring suit for infringement against the creator of derivative works.³³⁶ It is certainly true that a blocking copyrights rule will not give substantial improvers freedom to act. Nonetheless, it will significantly improve their bargaining position vis-a-vis original creators in at least two ways.³³⁷

First, it will give improvers something to bargain with, particularly where the value of their improvement is significant. As an example, consider the owner of a copyright in a book and the "improver" who makes a movie based on the book. Under the current copyright regime, the book owners have no incentive to bargain with those who have created a movie based on the book, since those derivatives effectively belong to the book owners already.³³⁸ A blocking copyrights rule will force original creators to deal with improvers if they wish to use the improvement. Even if the book owners are willing to go to the trouble of creating their own movie, a blocking copyrights rule will place certain constraints on their ability to do so, since substantial similarity between the two movies may lead to a finding that the book owners have infringed the movie-maker's copyright.³³⁹ Both effects will encourage the book owners to bargain with those who have already added to their original work.

e.g., *Gracen v. Bradford Exchange*, 698 F.2d 300 (7th Cir. 1983); *Durham Indus. v. Tomy Corp.*, 630 F.2d 905, 910 (2d Cir. 1980); *L. Baitlin & Son v. Snyder*, 536 F.2d 486, 489-91 (2d Cir. 1976); see Landes & Posner, *supra* note __, at 356 (justifying this requirement on the grounds that it would otherwise be difficult to distinguish original from derivative works). *But see* Goldstein, *supra* note __, at 243 (criticizing this heightened standard for derivative work copyrights).

³³⁶ Netanel, *supra* note __, at __ n.204 (suggesting that "a rule that makes such derivative works an infringement, and often subjects derivative authors to property-rule damages and injunction, is such a substantial impairment of the incentive to create such new works that depriving infringing derivative authors of their own copyright, while probably overkill, has little additional incentive impairing effect.").

³³⁷ See also Reichman, *supra* note __, at 815 (suggesting that broad derivative rights protection allows original developers of computer programs to capture functional attributes of those programs).

³³⁸ See *supra* notes __-__ and accompanying text.

³³⁹ See *Harper Bros. v. Klaw*, 232 F. 609, 610 (S.D.N.Y. 1916) (dramatic work produced by licensee based on novel "follows the novel quite closely, and it would (I think) be quite impossible to make another play that really

An example of how such a system might work can be seen in the case of *Harper Bros. v. Klaw*.³⁴⁰ In that case, the plaintiff (Wallace) owned the copyright in the 1899 novel "Ben Hur." Wallace had licensed to Harper Brothers the rights to produce a dramatic version of the novel for the purposes of stage production.³⁴¹ After the development of motion pictures, both sides to the license claimed that they owned the exclusive rights to produce a screenplay version of Ben Hur. The court found that Harper had not been granted the right to produce a screenplay, but that Wallace could not do so without infringing on the rights that had been licensed to Harper. Noting that "it does not always follow that, because one owns a certain thing, he may use it to the detriment of another," the court enjoined *both* parties from producing a screenplay without the agreement of the other.³⁴² This dual injunction -- and the obvious incentive it provides for the parties to come to terms -- are the essential features of the blocking patents regime.

A blocking copyrights rule may also relieve pressure on improvers in a second way: by reducing the incentives for opportunistic copyright suits by plaintiffs claiming, for example, that a successful movie is based on their book or screenplay. Under current law, plaintiffs may be enticed to sue by the knowledge that if they are successful in asserting that the movie is a derivative work, they will effectively own the movie. Examples of suits in this category include *Litchfield v. Spielberg*,³⁴³ where the plaintiff claimed that the movie "E.T." was based on her

told the story of Ben Hur without presenting substantially the same sequence of ideas as is presented by the copyrighted version"). Cf. Amy Cohen, *Masking Copyright Decisionmaking: The Meaninglessness of Substantial Similarity*, 20 **U.C. Davis L. Rev.** 719 (1987) (distinguishing similarity probative of copying and similarity constituting unlawful appropriation). Of course, if it truly is impossible to make another movie version of the book without using material from the first, the doctrine of merger might come into play. See *Morrissey v. Proctor & Gamble*, cite.

³⁴⁰ 232 F. 609 (S.D.N.Y. 1916). Because there is no blocking copyrights rule in current law, this case is not a perfect example. The dual injunctions in the case were the function of a prior license agreement between the parties.

³⁴¹ *Id.* at 610.

³⁴² *Id.* at 613.

³⁴³ 736 F.2d 1352 (9th Cir. 1984).

screenplay "Lokey from Maldomar," *Sheldon v. MGM*,³⁴⁴ where the plaintiff successfully alleged that the movie "Letty Lynton" was based upon their play, and *Abend v. MCA*,³⁴⁵ where the plaintiffs sought to terminate defendant's right to distribute the movie "Rear Window," which was based on a license from their book.

Some suits of this sort undoubtedly have merit -- indeed, some have been successful -- but others are brought primarily in the hope that the plaintiff will capture the value contributed by the defendants, even though the value of the improvement vastly exceeds the value contributed by the original work.³⁴⁶ A blocking copyrights rule will not eliminate such suits, whether baseless or not -- plaintiffs may still hope to get money out of a defendant through the threat of an injunction, or by an apportionment of the profits that the court decides is attributable to the original work.³⁴⁷ But it should reduce the incentive to bring such suits, since plaintiffs cannot hope to capture the value of the defendant's work directly, since the defendant would own the copyright in her contributions.

2. Fair Use

Copyright's fair use doctrine has the potential to protect radical improvers by exempting them from infringement liability. That potential is evident in the "transformative use" doctrine which has recently gained currency among courts and commentators. Unfortunately, for the

³⁴⁴ 309 U.S. 390 (1940).

³⁴⁵ 863 F.2d 1465 (9th Cir. 1988), *aff'd sub nom. Stewart v. Abend*, 495 U.S. 207 (1990).

³⁴⁶ By citing these cases as examples, I do not intend to suggest that any of these plaintiffs acted in bad faith, nor to pass on the merits of their claims. I merely identify them as representative of the sort of lawsuit that is likely under the current rule.

³⁴⁷ For example, in *Sheldon*, the plaintiffs were entitled to enjoin the defendants from marketing their film, even though the court found that 80% of the value of the film was contributed by the defendants themselves. 309 U.S. at ___. But see *Abend*, 863 F.2d at ___ (refusing to enjoin distribution of "Rear Window" despite finding a valid copyright termination); Goldstein, *supra* note ___, at ___ (criticizing the holding in *Sheldon*).

reasons explained in Part III, the fair use doctrine has generally not interpreted in a way that would effectively protect radical improvers.³⁴⁸ The problem has been the tendency of the courts to focus primarily on market harm to the copyright owner, to the exclusion of all else.³⁴⁹

Reformulating the fair use doctrine to protect radical improvers does not require legislative change, or even the repudiation of prior court precedent. Nor does it mean that fair use will be available *only* to radical improvers, thus depriving other forms of copying or adaptation of protections they have long expected.³⁵⁰ What it requires is a more careful balancing of the relative contributions made by the original copyright owner and the improver. The transformative use doctrine already recognizes contributions made by improvers as an element favoring a finding of fair use. But courts must be willing to permit a use in circumstances where it adds a great deal of value relative to what has been copied, even if the result is to harm the market for the original copyrighted work.³⁵¹

³⁴⁸ See *supra* notes __-__ and accompanying text.

³⁴⁹ Indeed, fair use itself is sometimes justified merely as a mechanism for implying agreement where the parties would have agreed but for transactions costs. See *Harper & Row Publishers v. Nation Ents.*, 471 U.S. 539, __ (1985); Gordon, *Fair Use*, *supra* note __, at 1629-30 & n.162. The implied agreement theory cannot explain fair use doctrine, however. It is hard to imagine a plaintiff bringing a lawsuit (much less going all the way to the Supreme Court) over a use small enough that she would have been willing to license it but for transactions costs. The absurd implication of this theory is that in any case important enough to be litigated, fair use should never apply! See Stephen B. Thau, *Copyright, Privacy, and Fair Use*, 24 *Hofstra L. Rev.* 179, 195-96 (1995) (making this point); Nimmer, *supra* note __, at § 13.05 (theory of implied consent is "fictional").

³⁵⁰ See *Campbell v. Acuff-Rose Music*, 114 S. Ct. 1164, __ (1994) (indicating that transformative use operates in addition to other factors favoring fair use, rather than as a replacement for them). Thus, the fear of some commentators that the transformative use doctrine will end up restricting fair use, see Nicole B. Casarez, *Deconstructing the Fair Use Doctrine: The Cost of Personal and Workplace Copying After American Geophysical Union v. Texaco, Inc.*, 6 *Fordham Intell. Prop., Media & Ent. L.J.* 641, 680-81 (1996) (focus on transformative use ignores language of statute); Gordon, 82 *Colum. L. Rev.* at 1601; Lape, 58 *Alb. L. Rev.* at 712-13, is unwarranted. Cf. Casarez, *supra* at 682-83 (suggesting that transformative use and public benefit analyses can coexist). Further, in some cases other statutory provisions (such as 17 U.S.C. § 117) may protect certain adaptations or copies from infringement liability. For example, Pam Samuelson argues that even minor changes should be permitted in computer software where necessary to correct errors. See Pamela Samuelson, *Modifying Copyrighted Software: Adjusting Copyright Doctrine to Accomodate a Technology*, 28 *Jurimetrics J.* 179, 205 & n.130 (1988).

³⁵¹ An alternative proposal which would accomplish some of the same goals as protecting radical improvers directly is to grant fair use where the court has determined that one of the market failures identified in Part V is likely to prevent effective licensing. See Jay Dratler, Jr., *Distilling the Witches' Brew of Fair Use in Copyright Law*,

The transformative use doctrine will serve as an effective vehicle for representing the interests of radical improvers only if there is some chance that the purpose or character of the accused use can outweigh a finding of market harm to the copyright owner. The structure of section 107 certainly suggests that the four listed factors are to be weighed together, with no one factor dominating the inquiry.³⁵² However, some courts have given primacy to the market effect test,³⁵³ with the result that a productive use which competes with the original work or actual or potential licensed derivatives of that work can never be a fair use. In my view, this approach defeats the purpose of the fair use inquiry and inefficiently prevents radical improvers from marketing their valuable works in circumstances where the original copyright owner prefers not to see the improvement sold. A better approach would be to acknowledge that a strong showing of transformation by a radical improver can outweigh even a showing of direct harm to the original copyright owner, particularly where the amount of the original work taken is relatively small.³⁵⁴ Of course, not all transformative uses will be radical improvements.³⁵⁵ For example,

43 **U. Miami L. Rev.** 233, 294-97 (1988) (proposing to treat market effect under the first factor, by determining whether "market failure" will prevent the efficient licensing of productive works). Dratler's approach would solve the problem of licensing failure, at least if courts can be counted on to identify and respond to such failures accurately. It would not solve the market power holdup problem, however.

Still others suggest that the fair use inquiry should be used to promote licensing by requiring fair use claimants to offer a reasonable royalty to the copyright owner before using the work. See Melanie A. Clemons, *Author v. Parodist: Striking a Compromise*, 46 **Ohio St. L.J.** 3 (1985); Landy, *supra* note __, at 251; Winslow, *supra* note __, at 805-06. Cf. Merges, *Making Fun*, *supra* note __, at __ (suggesting that copyright owner's failure to accept an offered royalty should weigh in favor of finding fair use). Introducing such evidence is intended to promote licensing and alleviate the perceived unfairness of the "all-or-nothing" fair use inquiry. However, such a scheme would introduce a host of problematic issues into the legal process: what happens when the author can't be found? when secrecy is an issue? how much money is "reasonable"? Further, given that many refusals to license in the parody context are noneconomic, it is not clear that such an offer would actually lead to much additional licensing.

³⁵² See 17 U.S.C. § 107.

³⁵³ See *supra* notes __-__ and accompanying text.

³⁵⁴ This is in accord with the rule in Germany, where under the doctrine of "free use" a use may be assumed to be free if "the individuality of the used work is thrust into the background and pales beside the individuality of the newly created work." Helmut Haberstumpf, *Der urheberrechtliche Schutz von Computerprogrammen* (II.), in Lehmann ed., *Rechthsschutz und Verwertung von Computerprogrammen* 139-46 (2. Auflage 1993); Jan-Hendrik

while it may be accurate to characterize a photocopy of a brief excerpt from a book as "transformative" because it is more portable and can be written on,³⁵⁶ such a use is surely not a "radical improvement" of the original work sufficient to set aside a finding of market harm.³⁵⁷

An example of how the radical improver rule might be applied in fair use is the First Circuit case of *Lotus v. Borland*.³⁵⁸ In that case, plaintiff Lotus sued Borland for copyright infringement of the menu command hierarchy of its Lotus 1-2-3 spreadsheet. The Lotus spreadsheet program was adapted from the earlier Visicalc program, and Lotus's program quickly became the industry standard. Borland did not copy the literal code of the Lotus program, but did copy the menu structure of the Lotus program in creating its own spreadsheet, called Quattro Pro. Quattro Pro was not a mere clone of Lotus 1-2-3; it was independently developed by Borland and by all accounts was a much better program than 1-2-3. Borland copied the Lotus menu structure for two reasons: in order to allow customers who had previously used Lotus to translate their files and macros into the new Borland program, and to allow customers who were more comfortable with the Lotus user interface to continue using that interface.³⁵⁹

The district court held that the menu command hierarchies were copyrightable, and that Borland infringed Lotus's copyright by incorporating them into its program.³⁶⁰ It rejected

Brunink, *Computer Software Users' Rights in Germany and the United States: A Comparison* 8-9 (working paper 1996).

³⁵⁵ See also Winslow, *supra* note __, at 811-12 (trivial changes should not trigger fair use defense).

³⁵⁶ See *American Geophysical Union v. Texaco, Inc.*, 60 F.3d __, __ (dissent).

³⁵⁷ Whether there *was* market harm in the *Texaco* case is another matter entirely. See *id.* at __ (pointing out that the majority's theory of market harm is circular).

³⁵⁸ 49 F.3d 807 (1st Cir. 1995), *aff'd by equally divided Court* 116 S. Ct. __ (1996).

³⁵⁹ For varying accounts of the facts of the case, see *id.*; *id.* at 821 (Boudin, J. concurring); and *Lotus Dev. Corp. v. Borland Int'l*, 799 F. Supp. 203 (D. Mass. 1992).

³⁶⁰ *Id.* at 216.

Borland's justifications for the copying.³⁶¹ Judge Keeton's opinion relied heavily on his prior decision in *Lotus v. Paperback Software*,³⁶² which had found Paperback liable for selling a clone of the Lotus 1-2-3 program. In both cases, Judge Keeton reasoned that the menu command hierarchy was copyrightable since it was detailed enough to include original expression, and was not completely dictated by functional considerations.³⁶³ On appeal, the First Circuit reversed. It held that Lotus's menu command hierarchy was entirely uncopyrightable as a "method of operation" of the program itself.³⁶⁴

Neither approach is particularly satisfactory. Judge Keeton's approach gives Lotus the power not only to control inherently functional aspects of its program under copyright, but also to lock up the industry with an inefficient program. Because the Lotus program represented an industry standard at the time Borland wrote its competing program (though not by the time of the First Circuit's decision), Borland would have been at a significant competitive disadvantage if it could not copy enough of Lotus's program to allow users to continue to use their stored files. At the same time, the First Circuit's reasoning is problematic. Not only is it in tension with decisions from other courts construing the "method of operation" exception narrowly,³⁶⁵ but it treats Borland and Paperback Software identically, even though one has invested a great deal in advancing the art of spreadsheet programming and the other has not.³⁶⁶ Judge Boudin's

³⁶¹ *Lotus Dev. Corp. v. Borland Int'l*, 831 F. Supp. 223 (D. Mass. 1993) (*Borland IV*).

³⁶² 740 F. Supp. 37 (D. Mass. 1990).

³⁶³ *Id.*, *Lotus*, 799 F. Supp. at 216.

³⁶⁴ *Lotus*, 49 F.3d at 815.

³⁶⁵ See, e.g., *Engineering Dynamics v. Structural Software, Inc.*, 26 F.3d 1335 (5th Cir. 1994); *Autoskill, Inc. v. National Educ. Support Sys.*, 994 F.2d 1476, 1495 n.23 (10th Cir. 1993); *Brown Bag Software v. Symantec Corp.*, 960 F.2d 1465, 1477 (9th Cir. 1992).

³⁶⁶ See Lemley, *Convergence*, *supra* note ___, at 31-32 (identifying this problem).

concurrence expressed his dissatisfaction with the majority's rationale, but failed to articulate a coherent alternative ground for decision.³⁶⁷

This case seems a good candidate for application of a radical improver doctrine in copyright. While it is possible to argue that Lotus's menu command hierarchy should not be copyrightable,³⁶⁸ there are problems with that argument. What does seem clear is that Borland has taken only a portion of the Lotus program, and that that taking is critical to Borland's ability to bring its own radically improved spreadsheet program to market. As with the series of reverse-engineering cases in the computer industry,³⁶⁹ the market impact on the original copyright owner is not really the result of the copying, but rather of the improvements that the copier has made. The fact that the improver has chosen to compete directly with the original copyright owner should not render it liable for copying where the improvements are sufficiently radical that the improver's product is for all intents and purposes a new one. This is particularly true where, as in *Lotus*, enforcing the copyright would permit the copyright owner to engage in holdup tactics.³⁷⁰

The same rationale may also explain the application of fair use in the context of parody, biography, literary criticism, and even certain fictional works in the same genre. Like the *Borland* case or the reverse engineering cases, these types of uses require the improver to start

³⁶⁷ *Lotus*, 49 F.3d at 822-23 (Boudin, J., concurring). See also Lunney, *Computer Programs*, *supra* note __, at 2418 (characterizing the *Lotus* case as a choice between underprotecting and overprotecting Lotus' spreadsheet).

³⁶⁸ See Dennis Karjala & Peter S. Menell, *Brief Amicus Curiae: Lotus Development Corp. v. Borland*, 10 **High Tech. L.J.** 177 (1995) (supporting the First Circuit's rationale); Lemley, *Convergence*, *supra* note __, at 21-22 (suggesting that the First Circuit could have reached the conclusion that it did under the rationale of *Computer Associates v. Altai*, 982 F.2d 693 (2d Cir. 1992)); Pamela Samuelson et al., *Brief Amicus Curiae of Copyright Law Professors in Support of Respondent in Lotus Development Corp. v. Borland International*, 2 **J. Intell. Prop. L.** __ (1996) (offering several alternative rationales for decision in Borland's favor).

³⁶⁹ See, e.g., *Bateman v. Mnemonics, Inc.*, __ F.3d __ (11th Cir. 1995); *Sega of America v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992); *Atari Games Corp. v. Nintendo of America*, 975 F.2d 832 (Fed. Cir. 1992).

³⁷⁰ See Fisher, *supra* note __, at 1728 (courts should be more willing to find fair use where the alternative is anticompetitive control of the market).

with some part of the original program,³⁷¹ but in many cases the improved product is sufficiently different from the original that it stands or falls on its own merits rather than the merits of the work it copied. As an example, consider Tom Stoppard's play *Rosencrantz and Guildenstern are Dead*.³⁷² The entire play focuses on two minor characters from Shakespeare's *Hamlet*, telling their story (and in the process, telling portions of *Hamlet* from a different perspective). *Hamlet* is of course in the public domain, at least for the time being.³⁷³ But if it were not, or if the play were instead based on Margaret Mitchell's *Gone With the Wind*, one can imagine the author of the underlying work wishing to capture the value of Stoppard's work as well, on the theory that it is after all derivative of their masterpiece. Such a copyright claim should fail, not because there is no copying (there is), but because the principal value of Stoppard's play lies not in what he has taken, but in what he has added.

Finally, the radical improver doctrine justifies fair use protection of independent works that merely interoperate with a copyrighted work,³⁷⁴ though it seems likely that the fair use doctrine as currently interpreted would already protect such works.³⁷⁵ For example, in many of the software and video game compatibility cases, the plaintiff seeks to prevent the defendant from copying the small portion of its game cartridge object code which serves as a "key,"

³⁷¹ For example, biographers may need to quote from the papers of their subjects in order to prove a point in their book. See Leval, *supra* note __, at 1113-14 (discussing *New Era Pubs. Int'l v. Henry Holt & Co.*, 873 F.2d 576 (2d Cir. 1989)).

³⁷² Tom Stoppard, *Rosencrantz and Guildenstern are Dead* (19__).

³⁷³ Recent efforts to "resurrect" copyright in public domain works, see 17 U.S.C. § 104A, combined with the ever-lengthening term of copyright protection, see H.R. 933, and the growth of non-copyright means of protecting literary works, see H.R. __; *ProCD v. Zeidenberg*, __ F.3d __ (7th Cir. 1996), suggest that we cannot guarantee that it will stay there.

³⁷⁴ See Nadan, *supra* note __, at 1653.

³⁷⁵ See *supra* note __.

allowing the game cartridge to operate on the plaintiff's game system.³⁷⁶ Where all that is copied in the final product is the "key" code, the defendant's final product seems likely to qualify as a "radical improvement."³⁷⁷ The value of the defendant's independently-created computer game comes from their own software, not from the functional key code that they copied from the plaintiffs.³⁷⁸

The scope of the radical improver doctrine in copyright as I have envisioned it seems significantly broader than the reverse doctrine of equivalents in patent law.³⁷⁹ There are two reasons for this apparent discrepancy. First, it is much harder to get a patent than it is to "get" a copyright. Indeed, copyright protection is automatic for many works that meet fairly minimal standards. Since under the model I put forward in Part V the value of an improvement is theoretically to be measured against the value of the original work, it is reasonable to assume that works may be "radical improvements" more easily in copyright than in patent law, just as original works are more easily protectable in patent than in copyright law. Second, while a patent is infringed only if all the claim elements are present in the accused device, a copyrighted work can be infringed by the copying of even a quantitatively small part of the work.³⁸⁰ In deciding whether an improvement is radical in copyright law, one does not compare it to the whole of the original work, but merely to the portion of that work which has been copied. Thus,

³⁷⁶ See, e.g., *Sega of America v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992); *Atari Games Corp. v. Nintendo of America*, 975 F.2d 832 (Fed. Cir. 1992).

³⁷⁷ Intermediate copying to obtain the key code is a different issue. It was this issue that was actually treated by the courts in *Sega* and *Atari*.

³⁷⁸ While copying the key code does add value to the defendant's program, the value comes not from the plaintiff's copyrighted work, but from compatibility with the plaintiff's game system, which the defendant has not copied. See *DSC v. DGI*, ___ F.3d ___ (5th Cir. 1996) (holding that the defense of copyright misuse barred the plaintiff's attempt to control access to its microprocessor cards by asserting that efforts at compatibility violated the copyright laws).

³⁷⁹ See *supra* notes ___-___ and accompanying text (noting the small number of cases in which the reverse doctrine of equivalents has been applied).

³⁸⁰ See, e.g., Goldstein, *supra* note ___, at ___.

we might define Stoppard's play as a "radical improvement" not over *Hamlet* taken as a whole, but merely over those small elements of *Hamlet*'s plot which are included in *Rosencrantz and Guildenstern are Dead*.³⁸¹

VII. Conclusion

Intellectual property law represents a "delicate balance" between the rights of intellectual property owners and the rights of users, among them the next generation of owners.³⁸² That balance does not reflect merely a legislative compromise between interest groups.³⁸³ Rather, it can be justified in economic terms by the need to ensure not only the creation of entirely new works of intellectual property, but also the creation of improvements to existing works. Patent law has a number of doctrines which balance the rights of original inventors with those of improvers, including the blocking patents rule and the reverse doctrine of equivalents. Surprisingly, copyright has no such doctrines, relying instead on a rule that gives original creators property rights over improvements made by others in most circumstances.

The copyright rule cannot be explained on efficiency grounds, for the patent approach is more efficient than the copyright approach. This is true largely because copyright law assumes that strong, unified property rights will lead to efficient licensing, while patent doctrine accomodates the imperfections that exist in the market for licensing improvers. Nor can the copyright rule be explained by other substantive differences between the two laws. I recommend

³⁸¹ Further, the term "improvement" should not be read to imply a value judgment about the relative merit of the two copyrighted works, but simply to refer to the new material produced by the "improver." Thus, a court need not conclude that Stoppard's play is more important than Shakespeare's in order to excuse Stoppard's copying. It need only find that Stoppard has transformed the copied portion of Shakespeare's work in such a major way that the value of Stoppard's play comes primarily from his original contributions, and not from Shakespeare's.

³⁸² *Fogarty v. Fantasy, Inc.*, 114 S. Ct. 1023, 1029-30 (1994); *Stewart v. Abend*, 495 U.S. 207, 228 (1990).

³⁸³ Indeed, interest group theory suggests a rather more robust *imbalance*, since intellectual property owners have far more political power and organizing ability than users. See generally Jessica Litman, *Copyright Legislation and Technological Change*, __ **Or. L. Rev.** __ (1989).

some changes to copyright law which are fairly easily accomplished, and which would bring copyright law in line with a more realistic model of intellectual property licensing.

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