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STANDARDS AS INTELLECTUAL PROPERTY: AN ECONOMIC APPROACH

David Friedman*

*The Congress shall have Power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries*¹

I. INTRODUCTION

Over the past two decades, courts have tried to define the protection provided by copyright law to computer programs. One issue often implicit and occasionally explicit in such cases is what protection, if any, ought to be provided to standards, a kind of intellectual property that does not fit neatly into the existing classifications. This Article first attempts to explore the nature of intellectual property and intellectual property law, then considers how standards fit into this analysis. As will become clear, the objective at this point is not to produce clear answers to the question of what the legal rules ought to be, but rather to show how such answers might be produced and on what facts they would depend.

The U.S. Constitution establishes two classes of intellectual property: "Writings" and "Discoveries."² To protect them, Congress and the courts have produced two bodies of law, copyright law for "writings" and patent law for "discoveries" or inventions. When the provisions of Section 8 were embodied in the first copyright law, "writings" meant written works, such as novels. As new forms of intellectual property have become important, courts have placed them into one of the two existing categories,³ provided them with special protection of their own,⁴ or left them unprotected.

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1. U.S. CONST. art. I, § 8.

2. *Id.*

3. Examples include films, audio recordings, and photographs, all of which are now covered by copyright law, and the engineered bacteria that were the subject of *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), which the court concluded were patentable subject matter.

4. Examples include the Semiconductor Chip Protection Act, 17 U.S.C. § 911 (1988 & Supp. IV 1992), the 1930 Plant Patent Act, 35 U.S.C. § 161 (1988) (protecting asexually repro-

One approach to understanding how intellectual property law has accommodated novel classes of intellectual creations is to ask whether the novelties can reasonably be described as new kinds of writings or inventions. This approach cannot explain the development of copyright law for computer programs. It is clear, under current law, system software in machine language form, code used to enable one part of a computer to control another, is copyrightable. It is equally clear that such software is not a writing, nor analogous to a writing. System software is more nearly analogous to a machine part, such as an elaborate cam.⁵

A better approach to explaining the development of intellectual property law is to start by asking why writings are protected by copyright law. The Constitution does not specify how writings and discoveries are to be protected; it does not even suggest that they should be protected in different ways by different bodies of law. If we understand the features of writings that make the legal protection provided by copyright law appropriate to that sort of intellectual property, we can then determine whether those features are shared by some new class of intellectual property such as computer programs. If the same features are shared, a good argument exists for categorizing the new sort of property as "writings" and protecting it with copyright law, even if it is a machine part or a plant variety.

This Article attempts to analyze standards under this approach. Section II first discusses the general economic arguments for and against protection of intellectual property; it then shows why each argument applies with different force to different sorts of intellectual property.⁶ Section II concludes that it is logical to protect certain types of intellectual property with something similar to copyright law, to pro-

duced plants), and the 1970 Plant Variety Protection Act, 7 U.S.C. § 2402 (1988) (protecting sexually reproduced plants).

5. The analogy to a cam was made by Copyright Commissioner (and author) John Hersey in his dissenting opinion in the final report of the National Commission on New Technological Uses of Copyrighted Works (CONTU). NATIONAL COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS. FINAL REPORT (1978), *reprinted in* 5 COPYRIGHT, CONGRESS AND TECHNOLOGY: THE PUBLIC RECORD 60 (Nicholas Henry ed. 1980) [hereinafter CONTU]. Judge Flaum in *Data Cash Systems, Inc. v. JS&A Group, Inc.*, 480 F. Supp. 1063, 1065 (N.D. Ill. 1979), *aff'd*, 628 F.2d 1038 (7th Cir. 1980), described a machine language program on a ROM as "a mechanical tool or machine part." *Id.* A pre-computer case reaching a similar result (for a roll controlling a player piano) is *White-Smith Music Publishing Co. v. Apollo Co.*, 209 U.S. 1 (1908). *White-Smith* was cited in some of the early computer copyright cases before the 1976 Copyright Act and its 1980 amendment made it clear that computer programs, in both source and machine code form, were copyrightable.

6. Strictly speaking, an intellectual creation is not intellectual property unless it is protected. Intellectual creations that are left unprotected might more properly be described as "potential intellectual property." For simplicity, throughout this Article, I will use "intellectual property" to refer to both protected and unprotected forms.

tect other types of intellectual property with something similar to patent law, and to leave other types of intellectual property entirely unprotected. Section III argues that computer programs, in both source and object code form, are appropriately protected against literal copying by a body of law similar to copyright law.

Section IV introduces standards, a class of intellectual property that has not been recognized in the law as a separate and distinct category, but has been at issue in many legal disputes over software.⁷ Section V shows that whether standards ought to be protected, and if so in what way, depends on factual questions whose answers are not entirely clear. Section VI briefly summarizes how computer law has treated standards. Section VII considers the implications of the analysis for designing legal rules to apply to standards.

II. THE ECONOMICS OF INTELLECTUAL PROPERTY

We live in a society made up of many millions of people, each with his own knowledge, desires, and resources. Any such society faces a coordination problem: how to get people to coordinate their efforts in order to achieve diverse objectives. While many solutions to that problem are conceivable, there seems to be only one solution that works reasonably well for complicated societies: a decentralized system based on the institutions of private property and trade.

In such a system, things belong to people and can be transferred by them to other people. An exchange that transfers something to someone who values it more than the previous owner produces a net benefit, which may be shared between the parties to the exchange. The system thus tends to move resources to those who most value them, producing an efficient allocation of goods and services. The logic and limitations of this process make up the branch of economics called price theory.⁸ In order for a private property system to work, it is necessary to define, enforce, and exchange property rights in the things being allocated. If doing so is sufficiently difficult, the private property

7. The issue of standards has been discussed at some length in the economics literature, largely under the rubric of "Network Externalities." See Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424-40 (1985). The spring 1994 issue of the *Journal of Economic Perspectives*, which should be available at about the same time as the article you are reading, will contain a symposium on the subject of standards. One of the articles, by S. J. Liebowitz and Stephen E. Margolis, discusses the issue of ownership of standards.

8. See, e.g., David D. Friedman, *Price Theory: An Intermediate Text* (2d ed. 1990).

solution to the coordination problem may work so poorly that other solutions become preferable.⁹

One source of such difficulties is illustrated by *Houston v. United States Gypsum Co.*,¹⁰ the case of the floating island. One party to the case, the Houstons, owned Stack Island in the Mississippi River.¹¹ The other party, U.S. Gypsum, owned a tract of land on the east bank of the river, along with "any islands located between the above described lands [and] the Louisiana-Mississippi state line."¹² At the time the titles were granted, one party's island was upstream from the stretch of river described in the other party's deed.¹³ Over time, however, Stack Island experienced erosion at the upstream end and deposition at the downstream end. The result was to move the island south into the stretch of river whose islands were included in U.S. Gypsum's property, giving two parties legitimate claims to the same piece of real estate.¹⁴

If floating islands were the norm rather than the exception in the world of real property, or if we lived in a world of shifting streams where my front yard of yesterday was a river today and your back yard tomorrow, it would be much harder to use the institutions of private property and trade to control the use of land. In the world of intellectual property, floating islands are the norm. Drawing clear boundaries around an idea is a task that is rarely easy and often impossible. That makes it difficult for parties to know whether their intended act infringes someone else's property rights. When that act has occurred, it makes it difficult for a court to resolve the resulting dispute. The problem is further complicated by the fact that trespass on intellectual property is often more difficult to observe than trespass on real property.

A second source of difficulties in making a system of private property work concerns the creation of property rights. In the context of real property, this issue shows up in the literature on inefficient homesteading.¹⁵ As the frontier moved west, a tract of land initially beyond the frontier went from not worth cultivating to just breaking-even to

9. For a fascinating exploration of this topic in the very different context of primitive societies, see Martin Bailey, *Approximate Optimality of Aboriginal Property Rights*, 35 J.L. & ECON. 183 (1992).

10. 652 F.2d 467 (5th Cir. 1981).

11. *Id.* at 469.

12. *Id.* at 470.

13. *Id.* at 469-70.

14. *Id.* at 470. The court finessed the problem by deciding in favor of Houston on grounds of adverse possession. *Id.* at 475.

15. Peter J. Hill & Terry L. Anderson, *Privatizing the Commons: An Improvement?*, 50 S. ECON. J. 438 (1983); see also Peter J. Hill & Terry L. Anderson, *The Evolution of Property Rights: A Study of the American West*, 28 J.L. & ECON. 163 (1975).

producing a positive income. If property rights to land were acquired by settlement, as they were under the Homesteading Act, individuals had an incentive to settle prematurely. By bearing costs in the early years of settlement, when the land was not yet worth cultivating, the settlers received the right to the flow of future income from ownership of the land. A settler who waited to settle land until it was actually worth farming would arrive to find all of the good land already taken. If all settlers were identical and information about land values was perfect, the land would be settled as soon as the present value of settling it became positive. Under these circumstances, the effect of the Homesteading Act would have been to dissipate, in costs of premature settlement, the entire land value of a large portion of the United States.

In the context of intellectual property, a similar problem appears in the form of patent races. The social value of a particular invention may be large, with the result that the inventor who secures the patent can expect a large income from licensing fees. The social value of having the invention made this week instead of next week is much less. Since the patent goes to the first inventor,¹⁶ however, the difference between inventing this week and inventing next week may be the entire value of the patent. Thus patent law may provide an incentive for an inefficiently early invention.

At first glance, it seems strange to view an incentive to create intellectual property as a possible disadvantage of intellectual property law. A private property system's allocation of ownership of produced goods, such as automobiles or wheat, to their producer is usually considered a desirable feature of such a system, since it gives the producer an appropriate incentive to produce the goods. Patents and copyrights are commonly defended as, among other things, devices to give creators a reward for their creation and thus an incentive to create.

The difference between the cases of homesteading and patent races on the one hand and automobiles (and as we will see, protection for literary works against literal copying) on the other is that the former cases do, and the latter do not, involve establishing a private property claim to something that already exists and is already valuable. The builder of an automobile or the grower of wheat uses only private property as an input and pays its owners for it.¹⁷ The homesteader, however, takes out of the common pool land that already exists and is al-

16. In most countries, the patent goes to the first inventor to file. In the United States, the patent goes to the first to invent, determined in a somewhat complicated fashion, although the first to file has substantial advantages in any subsequent litigation. The distinction is not important for purposes of the present argument. See 35 U.S.C. § 102(g) (1988).

17. In some cases, these forms of production may also use up a common resource, by polluting the atmosphere, say, or drawing down the water table. These situations lead to inefficiencies

ready valuable—land that would command a positive price if it were auctioned. Less obviously, the inventor who patents a particular process takes out of the common pool the ability to invent and practice that process. Other potential inventors are worse off because they are no longer free to do something that they might have done had the inventor not made and patented the invention. In many cases this may be a trivial loss. But the loss is not trivial if someone else was about to make the same invention a week later, as in the case of a patent race. Nor is the loss trivial if the invention is an obvious one, which anyone else could have easily made as soon as use of the invention became worthwhile and which no one else is free to make once it has been patented.¹⁸

A third problem with a system of private property is the cost of transactions. The typical transaction in an economics textbook involves one buyer, one seller, and one good. Imagine, however, the consequences of a legal system which treated the English language as protectable property, with each new word belonging to its first user. A long sentence concerning some rapidly developing field might require the author to first resolve the conflicting claims of a variety of putative first users, then obtain licenses from three or four copyright owners. Writing a book would involve similar negotiations with hundreds or even thousands of parties. One solution to such a problem might be a system of group licensing, such as that currently used for songs. Another would be the system we in fact use: treating the language as a commons. Similar arguments apply whenever a single activity, the building of a machine or writing of a computer program, may infringe diverse rights held by a large number of different claimants.

These arguments suggest three factors relevant to the costs of providing legal protection to some particular sort of intellectual property. The first factor is the ease with which one can define and defend property in that sort of idea. Greater difficulty in determining what is owned and whether someone is trespassing results in higher costs of protection. The second factor is the degree to which someone who creates and claims ownership in that particular sort of intellectual property reduces, by so doing, the options available to other people. The greater the size of such effects, the more likely it is that intellectual property protection will result in expenditures, the consumption of real resources, for the purpose of securing a claim to pre-existing property.¹⁹

familiar in the literature on externalities and analogous to those discussed here for homesteading and patents.

18. Under patent law as it actually exists, obvious inventions are not patentable. 35 U.S.C. § 103 (1988). That restriction can be interpreted as designed to avoid precisely this problem.

19. In the economics literature, this phenomenon is referred to as "rent seeking." See generally Anne Kruger, *The Economics of the Rent Seeking Society*, 64 AMER. ECON. REV. 291

The last factor is the difficulty of the transactions needed in order to use the intellectual property. As these problems become more serious, the gains from defining and enforcing property rights in ideas diminish. Where the problems are sufficiently serious, we are better off with an intellectual commons, a legal regime in which certain classes of ideas are free for all to use, than with intellectual property.

One reason a commons may be a more attractive solution for controlling the use of ideas than it is for controlling the use of land or objects is that, while the number of people who can use a single automobile is limited, the number of people who can use a single idea is not. Thus, one function of private property, resolving conflicts among different people who wish to use the same piece of property at the same time, is unnecessary in the case of intellectual property. From the standpoint of a static analysis, in which goods, including ideas, already exist and need only be allocated, the commons is the ideal institution for allocating ideas. It may not, however, be the ideal institution for producing them.

To this point I have been considering factors relevant to the costs of intellectual property protection. These costs must be balanced against the benefits: the production of more and better intellectual property and better coordination of intellectual property once produced.²⁰ Larger potential benefits lead to a willingness to bear greater costs in order to get them.

The benefits from better incentives to produce something depend in part on the product's supply curve. If we could produce all the wheat anyone wanted at a cost of a penny a bushel, then even a system of property rights that drastically under-rewarded the producer might still produce plenty of wheat.²¹ The relevant supply curve has qualitative as well as quantitative dimensions. The existence of "shareware" word processing programs is evidence that a significant number of such programs would be available even if there were no legal protection for

(1974); see also Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies and Theft*, 5 W. ECON. J. 224 (1967).

20. This latter point is central to the prospect theory of patent law, as developed by Edmund Kitch. See Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 267-71 (1977) [hereinafter Kitch, *The Nature and Function of the Patent System*]. His concern is largely with coordination in the process of producing further intellectual property. *Id.* at 275-80. As we will see, it also provides one argument for protection of property in standards. See generally Edmund Kitch, *The Law and Economics of Rights in Valuable Information*, 9 J. OF LEGAL STUD. 683 (1980) [hereinafter Kitch, *The Law and Economics*].

21. Economists may wish to translate the imprecise verbal argument presented here into more precise statements about the consumer and producer surplus associated with various shapes of supply and demand curves. The inefficiency due to a legal regime in which producers receive only a fraction of the value of what they produce is analogous to excess burden in the conventional analysis of taxation.

computer programs.²² The almost complete absence of "shareware" word processing programs competitive in quality and features with successful commercial programs,²³ however, suggests that the quality supplied, in the absence of legal protection, would be much lower than what is now available.

A characteristic closely related to supply elasticity is ease of copying. If copying a particular sort of work is difficult and expensive, intellectual property protection may be unnecessary.²⁴ If copying is cheap and easy, copies may drive the price that can be charged for the original down so far that even something which can be produced quite inexpensively will not be produced in the absence of legal protection.²⁵

So one factor relevant to the value of intellectual property protection is the shape of the supply curve. Another factor is the need for coordination in production. As Edmund Kitch²⁶ has pointed out, one function of intellectual property is to give the owner both the ability and the incentive to coordinate further developments within his "claim." Where such coordination is important to the production of further intellectual property, intellectual property protection is more valuable than where development can proceed without any formal coordination.²⁷

We have now seen some of the important ways in which the characteristics of different sorts of intellectual property affect the case for or against protection. To what extent do such considerations explain the pattern of intellectual property law as it has in fact developed?

22. Examples include Miniwriter, Flashwriter, and Anarcho in the Macintosh market and Galaxy, Pedit, Ravitz Editor and PCWrite in the MSDos market.

23. PCWrite is the notable exception.

24. Consider a public lecture by a prominent figure or a class taught by a particularly popular teacher. A reproduction, by an actor or a videotape, is a poor substitute for the original, so giving the speaker or teacher a property right in his performance will have only a small effect on the supply of such lectures and classes.

25. Consider the historical example of British writings in the United States at the beginning of this century, when they were not legally protected. Because it was necessary for a pirate publisher to reset the type in order to copy the book, a process both costly and time consuming, a legitimate publisher with access to the manuscript prior to its British publication had a significant advantage over potential pirates. With modern printing technology the pirate could produce a pirated edition rapidly and with lower fixed costs than the original publisher, free riding on the publisher's typesetting as well as the author's expression. Legal protection for printed works is consequently more important now than it was a hundred years ago. The argument applies a fortiori to computer programs, since copying costs are a much lower fraction of selling price for programs than for books.

26. See generally Kitch, *The Nature and Function of the Patent System*, *supra* note 20.

27. Another relevant factor, but one that will not be explored further here, is the availability of substitutes for legal protection, such as secrecy. If denying legal protection to a particular sort of intellectual property results in the producer's substitution of equally effective but more costly alternatives, that is an argument in favor of providing legal protection. See David D. Friedman et al., *Some Economics of Trade Secret Law*, 5 J. OF ECON. PERSPECTIVES 61 (1991).

III. PUTTING THINGS IN THE RIGHT BOXES: EXISTING LAW

Consider the earliest and most fundamental application of copyright law, the protection of literary works against literal copying. Literal copying of a literary work is easy to recognize, so it is easy to defend and enforce the original author's property right. The chance that one novelist will independently reproduce large parts of another novelist's work is essentially zero, so someone who writes and copyrights a novel does not significantly reduce the opportunities available to other writers.²⁸ These arguments suggest that the costs of protection against literal copying of literary works are small.

Whether the benefits of protection against literal copying of literary works is large or small is unclear. The coordination argument only applies to the small fraction of all literary works likely to spawn derivative works. So far as elasticity of supply is concerned, it has been argued occasionally that the reward from copyright is unnecessary, since authors would write, and publishers publish, an adequate supply of literature without it.²⁹ Others have argued the opposite.³⁰ One factor in favor of protection is that literal copying of written works is an easy task, making protection for written works more important than for, say, performances. This is particularly true with modern printing technology, since fixed costs are lower for the copier than for the original publisher.

Since costs of intellectual property protection for literary works are low and benefits may be high, strong protection is desirable. Copyrights are given easily, without any substantial requirements analogous to the requirements of nonobviousness and utility in patent law, and provide a long period of protection.

The case for the protection of inventions is much less clear. Drawing a line around an idea in order to define what does or does not use that idea is much more difficult than recognizing direct copying from a literary work. The patenting of inventions involves a greater limitation of others' activities than does the copyrighting of written works. Patent law should be, and is, much more grudging in permitting the creators of ideas to establish rights to those ideas, and much less generous in the

28. Copyrighting a novel does reduce other writers' opportunities to copy that novel. But writing and copyrighting does not, since they could not have copied the novel if it had not been written. Thus, copyright law does not give an inefficiently high incentive to write. It does give an inefficiently high incentive to copyright works that would have been written even in the absence of copyright.

29. See, e.g., Stephen Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 HARV. L. REV. 281, 292-302 (1970).

30. See generally Barry W. Tyerman, *The Economic Rationale for Copyright Protection for Published Books: A Reply to Professor Breyer*, 18 UCLA L. REV. 1100 (1971).

length of time for which protection is provided, than is copyright law. The same arguments suggest that copyright law should, as it in fact does, exclude from its protection the ideas embedded in literary works.

These arguments suggest that the allocation of new forms of intellectual property to existing legal boxes makes sense in terms of the relation between the characteristics of the new forms and the form of protection appropriate for them. Where copying is easily accomplished and easily recognized and independent invention unlikely, we would expect copyright law or something similar. We would even expect to see copyright law applied to physical machines if the technology existed for the cheap, easy, and recognizable copying of those machines.³¹ Where copying is expensive and hard to recognize and independent invention likely, we would expect to see something like patent protection. Where the factors leading to high cost of property protection are combined with factors leading to low benefits, we would expect to see no protection at all.³²

This pattern explains the application of copyright law to literal copying of computer programs. Machine language system software is not a writing, but it shares with writings the features that make copyright law an appropriate form of protection. Like a writing, it is easily copied. Literal copying is easy to prove. Independent invention is unlikely.³³ Therefore, it is not surprising that software is protected as if it were a writing under present copyright law.

To this point I have considered only literal copying. Ordinary literary works are protected against nonliteral copying as well. The case for such protection is less clear, both because the relevant lines are harder to draw and because broader protection may establish rights that reduce the alternatives available to other writers. Copyright law attempts to prevent that from happening through the doctrine of merger, under which protection is severely restricted when it threatens to block the only way, or one of a small number of possible ways, of expressing a

31. This is not merely a possibility from science fiction. The Florida plug mold statute overthrown in *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 157-68 (1989), was an attempt to provide copyright-like protection against a technology for reproducing physical objects, specifically boat hulls. The Mask Act and the acts providing protection against asexual and sexual reproduction of plants are, in effect, special federal copyright laws applied to physical objects rather than writings. A software pirate who transfers system software from one EPROM to another is, in effect, photocopying a machine, and violating copyright law by doing so.

32. As mentioned earlier, one example of intellectual property for which there is almost no legal protection is the English language; the inventor of a word ordinarily has no control over its use by others. A partial exception is provided by trademark law.

33. Although something close to the original may be independently invented in special circumstances, such as the microcode for a central processing unit. See *NEC Corp. v. Intel Corp.*, No. C-84-20799-WPG, 1989 WL 67434 (N.D. Cal. Feb. 6, 1989). An intermediate case, to be discussed later, is reverse engineering driven by the need for compatibility.

particular idea.³⁴ In the area of computer software, most current legal uncertainty involves nonliteral copying. One of the central issues, and the one that is the chief concern of this Article, is the copying of standards.

IV. WHAT IS A STANDARD?

A producer does something in a particular way, such as making an electric socket and an electric plug with a particular size and shape. Suppose there are many other equally good forms that the plug and socket might easily have taken. Once one form has been chosen, other producers wish to imitate it, not because it is better than what they could do themselves, but because consumers prefer all of their plugs to fit into all of their sockets.

The size and shape of the plug are a standard. The plug itself may not be. It may have many other features which are irrelevant to what plugs fit into what sockets, the material it is made of, for example. In this case, as in many more complicated ones, the standard is not a product but a particular feature of a product.

Consider a word processor that commands a large portion of its market, for example, Microsoft Word in the Macintosh market, or Wordstar and later WordPerfect in the MSDos market. One possible reason for using such a word processor may be that it is a good product. Another is that the user wishes to be able to exchange documents with other people who are using it. A third is that the institution using it wishes to be able to hire secretaries without having to retrain them, and new hires who are familiar with a word processor are likely to be familiar with the dominant one.

The second objective applies to some individuals and institutions but not to others, and satisfying it does not require the use of the dominant product. Most word processors can save documents in a variety of different formats, and programs exist for translating among formats. If I wish to use WriteNow on the Macintosh and send my documents to journals that use Word, I merely save my documents in Word format. The format used for compatibility need not be the format of the dominant product. If I wish to convert my documents from WriteNow on the Macintosh to WordPerfect for Windows, I can do it by saving in Rich Text Format, a standard invented by the producer of neither product but supported by both.

34. The famous case applying this doctrine is *Baker v. Selden*, which held that the copyright on a book describing a new accounting system did not prevent others from printing forms for that system, since the protection of expression could not be used to provide a monopoly on the idea being expressed. 101 U.S. 99, 103 (1880).

Satisfying the third objective without using the dominant product is harder, but for many users the third objective is irrelevant. An author doing his own typing, for example, does not care what word processors other people use, as long as he can exchange documents with them. If an institution does wish to be compatible in this sense with the dominant product, doing so may not require using that product. There is the alternative of using another product designed to be similar enough so that a worker trained on one can easily learn the other.

The standard is not the product but one of the product's features, such as the format it saves in or its user interface. The feature may be, and often is, separable from the product. The particular feature that is a standard may be other things as well, a writing or an invention, for example. It is often useful to talk about standards as if a single thing or feature either is or is not a standard. In fact, a particular feature of a product may be valuable primarily because it is a standard, primarily for reasons unrelated to its being a standard, or in part because it is a standard and in part for other reasons.

A standard is not simply any product with a high market share. Such a product is a standard in the sense in which I am using the term only to the degree it is desirable because it has market share, which is not at all the same thing as having market share because it is desirable. If there is no significant benefit to using the same product as other people, or if the benefit can be obtained in other ways, as in the examples above, then a product may have an arbitrarily high market share without being a standard.

Contrary to what much of the literature seems to assume, the fact that something is a standard is not necessarily an argument against making it protectable intellectual property.³⁵ As we will see in the next section, the special features of standards provide arguments both for and against protection. The fact that something is a standard provides some arguments against giving it protection to which it otherwise would be entitled. But there are also arguments for why something otherwise unprotectable, such as the set of interface features that define an

35. This assumption seems to pervade the recent literature. Thus, for example, Jaap H. Spoor, in an article that provides a clear discussion of the nature of standards, simply takes it for granted that a product's status as a standard, insofar as it is legally relevant, is an argument against protection. Jaap H. Spoor, *Standardization and Exclusivity in Intellectual Property*, in *INFORMATION LAW TOWARDS THE 21ST CENTURY* 369-76 (Willem F. Korthals Altes et al. eds., 1992). Similarly, Arthur R. Miller writes that "[t]he third category of criticism, the 'standardization' argument, contends that the most economically and developmentally efficient use of the technology involves relaxing the copyright law in certain ways, to permit the standardization of computer programs." Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 978, 990 (1993).

"IBM compatible" computer, ought to be protectable as a standard, despite the fact that it does not meet the requirements of protection under either copyright or patent law. Additionally, in some cases one might argue that an item of intellectual property considered as a standard ought to belong to a different claimant than the same item considered as a writing or an invention.³⁶

V. THE ECONOMICS OF STANDARDS

Ought standards to be protectable forms of intellectual property? The arguments offered above suggest that the answer depends on a number of factors. One is whether it is easy to define and protect property rights in standards. For many sorts of standards, for example, size and shape of electrical plugs and sockets, the answer is yes. For other standards, it may be no. Consider the litigation between Apple and Microsoft on whether or not Windows infringes on the look and feel of the Macintosh interface.

A second relevant factor is whether the creation and legal protection of a standard reduce the opportunities available to other creators. This is a more complicated issue in the context of standards than in the context of either writings or inventions. One answer might be that it does not, so long as the number of possible standards is large. A different answer is that even if there are many alternatives that could have been chosen, the fact that one alternative has become a standard may eliminate the opportunity to choose another.

Consider the application of the patent race argument to standards. If standards are very useful and shifting from one standard to another is very difficult, there will be an automatic "first to invent" rule for standards. Whichever standard comes first will be likely to go into general use, blocking the adoption of other and perhaps superior standards. If we give the inventor of a standard legal ownership of it, the inventor will have an incentive to invent and implement a standard early. The inventor will thus obtain a reward based not on the value of getting a standard established a little sooner than it otherwise might have been, but on the full value of having the standard.³⁷

36. Thus, one could argue that the essential features of the Macintosh interface, if protectable as writings or inventions, belong to Xerox, since they were invented at Xerox PARC; but that as standards they belong to Apple, since it was the Macintosh that converted those features from an idea into a standard.

37. A frequently cited example of an inefficient standard is the Qwerty keyboard layout. It is claimed that Qwerty is much inferior to alternative standards, such as the Dvorak keyboard, and owes its dominance entirely to the accident of being first. That claim is persuasively refuted by S. J. Liebowitz and Stephen E. Margolis. See S. J. Liebowitz & Stephen E. Margolis, *The Fable of the Keys*, 33 J. L. & ECON. 1 (1990). The authors argue that the inferiority of the Qwerty keyboard to the competing Dvorak keyboard is a myth, largely created by the inventor of

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A third factor to consider in deciding what protection should be given to standards is whether standards are easily supplied, so easily that the additional incentive provided by legal protection is unnecessary. In many cases the answer may be yes. Some standards, however, such as the Macintosh interface or the BIOS for the IBM PC, are complicated constructions. In such cases, the availability and quality of the standard may depend greatly on the reward provided, or not provided, by intellectual property law.³⁸

Even where inventing a standard is not costly, making it a standard may be. The Lotus menu tree, or some equally good alternative, could perhaps have been designed in a few weeks by an intelligent user familiar with both Visicalc and the capabilities of the new IBM PC. Converting a menu tree from a description on a piece of paper to a standard in worldwide use, however, required massive expenditures to produce and market a product using that standard. Where such expenditures are necessary to make something a standard, and where the existence of standards is valuable, the reward provided by the legal ownership of the standard may provide an important incentive to produce it.³⁹

A fourth consideration in determining the appropriate level of protection of standards is whether it is important that someone own a standard in order to coordinate its future development. For simple standards, the answer is no. For complicated standards, it may be yes. One reason for the Macintosh's ease of use was Apple's policy of defining rules for both the user interface and the machine interface of Macin-

the latter. *Id.* Their evidence suggests that the initial adoption of the Qwerty standard took place in a market with a variety of competing standards, where Qwerty would not have won out had any of the alternatives been clearly better. *Id.* Their arguments also suggest that Qwerty could not have maintained its dominant position against a clearly superior rival, since either firms employing typists or firms selling typewriters based on the new standard would have found it worth bearing the costs of conversion, and the rest of the market would have gradually followed them. *Id.* It is worth noting that August Dvorak held a patent on the keyboard he designed and thus (temporary) ownership over his standard.

38. In considering the cost of producing a standard or getting one adopted, it is important to remember that standards often come embedded in goods, making the standard and the good joint products. A word processor must have both a user interface and a format for saving files, whether or not they are destined to become industry standards. In deciding how much to spend on producing a better interface or format, or one more suited to be adopted as a standard, the producer under a legal regime where standards are protectable will consider both the value of producing a better product and the value of producing a better standard. If standards are not protectable, the producer has less incentive to design a good interface. If the status of a product as a standard (as well as a writing or invention) removes protection it would otherwise have had, the designer may even have an incentive to avoid designing an interface well adapted to becoming a standard.

39. One might argue that the failure of the English language to develop gender neutral pronouns reflects the absence of legal rules, such as property in language, to reward those who invent and popularize linguistic innovations.

tosh software and pressuring software producers to follow them.⁴⁰ That policy was made possible by Apple's control over the Macintosh and its software, enforced not by legal protection of the interface,⁴¹ but by legal protection of the Macintosh ROMs. As long as Apple was the only company that could make Macintosh-compatible computers, it had an incentive to invest resources in maintaining a consistent standard for Macintosh software, thus raising the value of the hardware that ran it. Furthermore, Apple's control over Macintosh hardware provided it with leverage to use in persuading software producers to follow its guidelines, since only by so doing could they guarantee compatibility with the next revision of the ROMs and system software.⁴²

Even if coordination is important, ownership of a standard is not the only possible way to have standards developed. One alternative is to have standards set by government agencies. Another alternative is to have standards designed by committees established by professional associations or groups of manufacturers and voluntarily adopted by firms wishing to produce mutually compatible products. The viability of those alternatives is another consideration relevant to whether standards ought to receive protection.

Opponents of protection for standards have sometimes argued that such protection would force competing firms to adopt inconsistent standards. A central element of a market system, however, is trade for mutual advantage. If a particular standard is much more valuable when widely used, then the owner of the standard has an incentive to license it widely.⁴³ Such contracting has costs, however. If property protection

40. This policy led to the use of the term "interface police" within the Macintosh developer community.

41. An unsuccessful attempt was made to get legal protection of the interface in *Apple Computer, Inc. v. Microsoft Corp.*, 709 F. Supp. 925, 931 (N.D. Cal. 1989).

42. This discussion involves two different sorts of standards. The user interface standard was presumably enforced by a policy of favoring, in various ways, software producers who adhered to it, and by Apple's policy of following it in its own software (with some notable exceptions). The machine interface standard was enforced by announcing that software that did not follow certain rules might not work with future revisions of the hardware and operating system. Control of both standards depended on Apple's monopoly of Macintosh compatible hardware. Such control, however, could have been maintained without such a monopoly if Apple had secure property rights in its interface. The nearest equivalent in the MSDos world was the control exercised to some degree by Microsoft, which had a near-monopoly in system software and could use copyright law to control the use and development of its system software.

43. This point was made by Judge Keeton in *Lotus Dev. Corp. v. Paperback Software Int'l*, 740 F. Supp. 37, 79 (D. Mass. 1990). While the argument seems convincing, it is not clear whether it is consistent with the evidence. Two particularly striking cases are Apple's refusal (with one minor exception) to license its ROMs to other computer manufacturers and Apple's failure to license its entire interface to Microsoft. Windows 3 might have been a much better product if Microsoft had not felt constrained to avoid too much similarity to the Macintosh interface. The failure to license the interface is particularly puzzling considering that the market for MSDos compatible system software is many times larger than the market for Macintosh compatible sys-

provided no benefit and standards required no coordination and were easily produced, it would be even easier to get consistency by treating a standard as common property and allowing anyone to follow it. That is how we treat the English language, probably the most complicated as well as the most widely used standard employed by our society.

These arguments suggest three alternative ways in which the law might treat standards. One alternative is to decide whether standards typically fit into the copyright or the patent box and classify them accordingly as writings, discoveries, or if they fit into neither box, unprotectable. A second alternative would be to construct legal rules designed to distinguish among standards according to which box, if either, they fit into. A third alternative would be to construct a *sui generis* form of protection, as has been done for computer chip masks, plant reproduction, and (unsuccessfully) boat hulls.

VI. THE LEGAL TREATMENT OF STANDARDS IN COMPUTER LAW

A number of early cases in computer law⁴⁴ dealt with protection of standards. In *Apple Computer, Inc. v. Franklin Computer Corp.*,⁴⁵ for example, Judge Sloviter held that Franklin was not entitled to copy Apple software even if doing so was the only practical way of making a computer capable of running software written for the Apple II.⁴⁶ He held that while the doctrine of merger might prevent Apple from copyrighting the only way of accomplishing some task, such as compiling source code into object code, Franklin's claim that there were a limited number of ways of making its operating system capable of running pro-

tem software, implying that there would be large gains available to be divided between the parties to such an agreement. One possible explanation is that Apple and Microsoft were concerned that such an agreement might provoke antitrust action against them.

44. I have not yet made any serious attempt to investigate the status of standards elsewhere in copyright (or patent) law. One point worth noting is that the *scènes a faire* exception to copyright protection, although usually considered an implication of the doctrine that copyright protection of expression cannot be used to protect ideas, might instead be viewed as a doctrine designed to refuse protection to standards. *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738 (9th Cir. 1971).

Consider the description of a southern mansion used in *Gone With the Wind* to represent the antebellum South. It is commonly said that copyright law cannot prevent another author or film producer from using a similar scene, because it is one of a small number of ways of representing that particular idea. One might argue, however, that there are a multitude of ways in which Margaret Mitchell might have represented the idea, and it is only the fact that she chose to represent it in a particular way in a very popular novel, later made into one of the most successful movies ever produced, that established it as the standard representation. If so, the arguments used by Judge Keeton in *Lotus* suggest that such depictions ought to be held to violate her copyright.

45. 714 F.2d 1240 (3d Cir. 1983).

46. *Id.* at 1253-54.

grams designed for the Apple II “has no pertinence to either the idea/expression dichotomy or merger.”⁴⁷

The first case I know of which explicitly raised the issue of standards in the computer context was *Synercom Tech., Inc. v. University Computing Co.*⁴⁸ Synercom Technology (“Synercom”) modified a public domain stress analysis program in order to make it easier to use and spent a considerable amount of money familiarizing customers with its use.⁴⁹ University Computing Company (“UCC”) took a different public domain stress analysis program and modified it to accept input data in the formats invented and popularized by Synercom.⁵⁰ Synercom sued for violation of its copyright on the input formats.⁵¹ In his decision, Judge Higgenbotham analogized the Synercom formats to the H-shift pattern of an automobile stick shift.⁵² He argued that such a standard was properly classified as an idea rather than an expression, and was thus unprotectable under copyright law.⁵³

The most important cases with successful infringement claims are *Lotus Development Corp. v. Paperback Software International*⁵⁴ and *Lotus Development Corp. v. Borland International, Inc.*⁵⁵ The relevant standard was the Lotus menu tree—the way in which the commands the user could give the spreadsheet were organized and represented. Paperback Software’s VP Planner used the same menu tree as Lotus 1-2-3 in order to make it easy for users familiar with Lotus 1-2-3 to switch to VP Planner. Judge Keeton held that copying the menu tree

47. *Id.* at 1253.

48. 462 F. Supp. 1003 (N.D. Tex. 1978). This case was decided before the 1980 amendments to the Copyright Act and about the same time as the release of the CONTU report on which those amendments were based. See CONTU, *supra* note 5. Since Judge Higgenbotham treated the contested formats as material that would be protectable under copyright law save for the problem of merger, it is not clear that his verdict would have been any different had the case been decided a few years later.

49. *Synercom*, 462 F. Supp. at 1006-08.

50. *Id.* at 1009.

51. *Id.* at 1009-14. The case also involved a separate issue of copyright infringement due to UCC’s copying of Synercom manuals. UCC lost on that issue but won on the format issue. *Id.*

52. *Id.* at 1013.

53. *Id.*

54. 740 F. Supp. 37 (Mass. 1990).

55. 831 F. Supp. 223 (Mass. 1993). *Whelan Assoc., Inc. v. Jaslow Dental Labs, Inc.*, 797 F.2d 1222 (3d Cir. 1986), is an important case in which the judge declined to follow Judge Higgenbotham in drawing the line between idea and expression, but what was being copied in that case was not a standard but the internal structure of a program. *Id.* It seems clear from the facts of the case that the reason the Defendant Jaslow copied the claimant Dentalab’s product Dentcom in writing was to save the work of redesigning the program from scratch, not to make it easier for users familiar with the earlier program to use the latter. *Id.* at 1231. Dentcom ran on smaller and less expensive computers than Dentalab, so it was unlikely that a customer already equipped to run Dentalab would consider switching to Dentcom. *Id.* at 1226.

infringed Lotus' copyright in its program.⁵⁶ He argued that, because there were many equally good ways in which the commands might have been organized, Paperback was not protected by the doctrine of merger.⁵⁷ In *Borland*, Judge Keeton ruled that a copy of the Lotus menu tree infringed Lotus' copyright even when it was invisible to the user, embedded in Borland software used to translate Lotus macros.⁵⁸ He thus followed Judge Sloviter rather than Judge Higgenbotham, holding that copyright could be used to prevent a competitor from producing compatible software. As a defense of protection for standards, Judge Keeton's position goes farther than Judge Sloviter's. Whereas Franklin had copied fourteen complete programs from Apple, Paperback and Borland had copied a small part of Lotus' program, and one embodying little effort or creativity,⁵⁹ so they might have been entitled to exemption under the doctrine of fair use.

A recent case ruling against protection of standards is *Sega Enterprises, Ltd. v. Accolade, Inc.*⁶⁰ The issue in this case was whether a company that wished to make computer game cartridges compatible with the Sega game console was entitled to disassemble Sega's code in order to figure out how to do so, and to include a short segment from Sega's compatibility code in their own cartridges.⁶¹ The Ninth Circuit Court of Appeals held that both the disassembly and the copying were permissible under the fair use exception to the copyright code.

What, then, is the current status of protection for standards in the context of software copyright? This question involves three separate issues. The first is whether a standard itself can be copyrighted. *Synercom* appears to answer that it cannot, while the two *Lotus* cases imply a standard can be copyrighted.⁶² The second issue is whether material that must be copied in order to make it practical to follow a standard may be barred from copyright protection by the principle of merger, on the theory that a standard is an idea and copyright law may not be used, even indirectly, to protect ideas. That is the theory re-

56. *Borland*, 831 F. Supp. at 245.

57. *Id.* at 234.

58. *Id.*

59. Borland copied only the structure of the menu tree, expressed by the initial letters used to implement commands, not its entire representation. *Id.* at 226.

60. 977 F.2d 1510 (9th Cir. 1992).

61. *Id.* at 1528. There was also a trademark issue, which is not relevant to the topic of this paper and will therefore not be discussed here.

62. Lotus presumably could not have prevailed in a suit to prevent the publisher of an instruction manual, a textbook on interface design, or a legal casebook from describing its menu tree, since such uses would almost certainly have been permitted under the fair use exception. It was the fact that Paperback was free riding on Lotus's efforts in making Lotus 1-2-3 an industry standard that was the basis for legal protection—the same basis that was rejected in *Synercom*. See *Synercom Tech., Inc. v. University Computing Co.*, 462 F. Supp. 1003 (N.D. Tex. 1978).

jected in *Apple Computer, Inc. v. Franklin Computer Corp.*,⁶³ but arguably accepted in *Sega Enterprises, Ltd. v. Accolade, Inc.*,⁶⁴ at least to the extent that the latter case justified the inclusion of a small piece of Sega's code in the Accolade game cartridges on the theory that it was necessary for compatibility.⁶⁵ Finally, there is the issue of whether copyright law can be used to maintain trade secrecy for a standard. Sega claimed the right to use copyright law to prevent the copying and disassembly of its compatibility code, and thus to maintain as a trade secret the requirements for compatible cartridges. The court rejected this claim,⁶⁶ holding that copying Sega's code for the purpose of disassembling it so as to discover the ideas necessary to produce compatible cartridges was fair use if there was no other way of getting the information.⁶⁷

The Ninth Circuit's language in *Sega* suggests the possibility of a rule more hostile to the protection of property in computer programs than any of these.⁶⁸ "In order to enjoy a lawful monopoly over the idea or function underlying a work, the creator of the work must satisfy the more stringent standards imposed by the patent laws."⁶⁹ This language raises the issue of preemption of trade secret protection by federal copyright law, the copyright equivalent of patent preemption in *Sears, Roebuck & Co. v. Stiffel Co.*,⁷⁰ *Compco Corp. v. Day-Brite Lighting, Inc.*,⁷¹ and *Kewanee Oil Co. v. Bicron Corp.*⁷²

If copyright protection is limited when disassembly is the only way of getting at the unprotected ideas behind the protected expression of a machine language program, as the *Sega* court suggests, what does that imply for situations where even disassembly is inadequate to get at the ideas? In a world where disassembly is legal but where copyright owners still wish to keep the underlying ideas of their programs secret,

63. 714 F.2d 1240 (3d Cir. 1983).

64. 977 F.2d 1510 (9th Cir. 1992).

65. Alternatively, one may read the case as holding that the copying was fair use because such a small amount of material was copied, although it is not clear that it was less than what was copied by Borland from Lotus.

66. An earlier case, *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255 (5th Cir. 1988), produced a similar result but justified the result by a very broad interpretation of the Copyright Act Section 117(1) exception to the right to forbid copying. *Id.*

67. The same result is explicit in Article 1, paragraph 2 and Article 6, paragraph 1 of the Council of the European Communities Directive on the Protection of Computer Programs. See Council Directive of 14 May 1991 on the Legal Protection of Computer Programs, 1991 O.J. (L 122) 112.

68. 977 F.2d 1510 (9th Cir. 1982).

69. *Id.* at 1526 (citing *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 159-64 (1989)).

70. 376 U.S. 225 (1964).

71. 376 U.S. 234 (1964).

72. 416 U.S. 470 (1974).

there may be a market for compilers designed to produce code that is difficult to disassemble. Carried to its logical conclusion, the Ninth Circuit's position could be an argument for requiring copyright registrations of programs to include the complete source code, thus making the ideas freely available to competitors, as is now supposed to happen under the disclosure requirements of patent law.

VII. DO WE NEED A NEW BOX?

The implications of these arguments for what the law ought to be depend on the technology of producing, popularizing, developing, and changing standards. The arguments also depend, as do most conclusions about legal rules, on how good the courts are at recognizing the relevant distinctions. If the best that courts can be expected to do is to distinguish things that are standards from things that are not, then we must decide what legal regime is best for standards in general and accept the fact that whatever regime we choose will be inappropriate for some particular standards. If courts can make finer distinctions between standards that are easy to invent (the Lotus menu tree) and those that are difficult to invent (the Macintosh interface), we may have the option of tailoring protection to the standard being protected.

For standards that are easily produced, meaning both that they are easily devised and that they can come into general use without extensive marketing efforts by their inventors, the correct rule is probably no protection. For standards that are expensive either to devise or to establish or both, the desirability of protection depends on two factors: how easily the inventor can get a return by combining an unprotectable standard with a protectable product, and how difficult it is, if the standard is protectable, to negotiate the licensing agreements required to put it into general use.

If we believe that the circumstances that make protection desirable are common, and that where protection is undesirable it also does little harm, perhaps because it is reasonably easy to switch from one standard to another,⁷³ we should favor copyright protection for standards, accepting the result in *Lotus* and rejecting the result in

73. This is part of the argument made by Liebowitz and Margolis for why the Qwerty standard would not have survived had it been significantly inferior to alternatives such as the Dvorak keyboard. See Liebowitz & Margolis, *supra* note 37. Another argument that they offer is that the choice of the initial standard is the result of a competitive process, in which users attempt to coordinate on the most attractive of several alternative standards. *Id.* In a world where legal protection is available for standards, the fact that the producer of a particular standard asserted proprietary rights to it might be a reason for users to reject it in favor of some public domain alternative. One notable example was the competition between alternative bus designs for MS-Dos computers, with the proprietary design that IBM implemented in some of its PS/2 models losing out to the non-proprietary alternative proposed and implemented by a group of its competitors.

Synercom. Under the opposite assumptions, we should follow the courts that have held, implicitly or explicitly, that standards are not copyrightable.

An alternative approach might be to protect standards under patent law rather than under copyright law. Patent law, unlike copyright law, is designed to limit its protection to innovations that are large enough to be worth protecting.⁷⁴ Patent law protection may be effective for standards that are expensive to devise. Standards that are inexpensive to devise and expensive to establish, however, would be rejected as obvious, and thus unpatentable under present law.

Finally, we might try to devise a new set of legal rules specifically tailored to protect those standards, and only those standards, that deserve protection. Factors such as the cost of inventing a standard and getting it adopted, the ease with which users could move between standards, and perhaps even the willingness of the owner of a standard to license it to others, would then become legally relevant to the degree of protection offered.

VIII. CONCLUSION

In the course of this Article, I have tried to establish two broad propositions. The first is that intellectual property law, both as it exists and as it ought to exist, may be interpreted as an attempt to adapt legal rules to the differing costs and benefits of creating, defending, and exchanging property in different sorts of intellectual creations. The second is that our legal system ought to take account of the special characteristics of standards in determining what sort of protection they should have, since standards are a special sort of intellectual creation. I have not tried to carry the argument to its conclusion: a set of recommendations for how the law ought to treat standards. One reason is that I believe the economics of network externalities require more analysis than has yet been done. Another is that, even if the analysis were complete, the conclusions depend on facts about the market for standards, both in software and in other fields, which I, at least, do not know.

74. This requirement appears in the form of "sufficient invention" or "flood of genius" in the old cases and in the requirement of nonobviousness in the current law. See 35 U.S.C. § 103 (1988).