

# ARTICLES

## Copyright and Software Technology Infringement: Defining Third Party Development Rights

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### INTRODUCTION

This Article examines software copyright in the United States as it applies to value-added use of existing products and technology. While copyright is the primary legal protection for widely distributed computer programs, existing law in this field lacks conceptual clarity. Copyright doctrine was developed for literary and artistic works. It provides uncertain criteria for technology issues. Software copyright cases are characterized by a perceived need to prevent software "piracy" and the cases inadequately consider the limits or underlying rationale of protection. Confusion results when copyright standards are applied to value-added use of technology. In a value-added use, a subsequent developer creates a new product, applying its own expertise to prior work. This common form of technology and scientific development is difficult to accommodate under copyright theory. This Article suggests an analytical approach that deals with such situations.

Software protection issues are often perceived as a unidimensional conflict between pirate and innovator. In this conflict, the obvious objective is to protect the innovator. This view served well when the policy issue was whether computer programs received any legal protection, but the availability of legal protection is now established. Courts must apportion rights between the original developer and third party access. The unidimensional model is inadequate.

Copyright doctrine applied to technology must balance two conflicting themes. The first emphasizes the private nature of information and ideas, while the second emphasizes their public nature. There should be economic incentives for innovation. Our law accomplishes this by granting control over aspects of the use or distribution of a product. On the other hand, the law should encourage dissemination, exchange and use of ideas. This is grounded in historic notions about scientific research and development in which innovation involves an additive process characterized by an interchange

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among scientists. Subsequent developers routinely base their work on aspects of existing technology and theory.

Both themes seek to facilitate innovation, but they conflict in commercial science and technology development. In this Article, we first discuss the development of software protection law in this country. The second portion of the Article describes a framework for balancing interests when the original innovator is in conflict with subsequent, value-added developers. The framework builds on, but is not confined by traditional standards of literary copyright. The competing commercial and scientific interests in technology copyrights are not identical to those in literary contexts, and proceeding as if they were distorts the issues.

## I. COPYRIGHT AND COMMERCIAL INTERESTS

The flexibility and adaptive power of contemporary computer programming facilitates expanded computer use. Early software protections, however, focused on limited distribution products. Copyright became important only when a mass market developed.<sup>1</sup> Copyright law protects "authors" for their "expression" in "works of authorship"<sup>2</sup> giving the author exclusive rights to reproduce and distribute the work and to make derivative works based on the original. These rights are perfected with minimal cost, making copyright well suited for readily reproduced mass market products.

The threshold issue faced by courts and the industry was whether statutory copyright encompasses software technology. Computer programs are operating "instructions" that guide computer operations. A program creates an electromagnetic framework in the machine that determines what processes are implemented by the computer in response to various input. Programs differ in function. One distinction is between application programs and operating programs.<sup>3</sup> "Application" programs include programs to achieve

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1. See, e.g., NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT (1978) [hereinafter NATIONAL COMMISSION]; Davidson, *Protecting Computer Software: A Comprehensive Analysis*, 1983 ARIZ. ST. L.J. 611; Gemignani, *Legal Protection for Computer Software: The View From '79*, 7 RUTGERS J. COMPUTERS TECH. & L. 269 (1980); Keplinger, *Computer Software—Its Nature and Its Protection*, 30 EMORY L.J. 483 (1981); Lawlor, *A Proposal for Strong Protection of Computer Programs Under the Copyright Law*, 20 JURIMETRICS J. 18 (1979); Nimtz, *Development of the Law of Computer Software Protection*, 61 J. PAT. OFF. SOC'Y 3 (1979); Stern, *Another Look at Copyright Protection of Software: Did the 1980 Act Do Anything for the Object Code?*, 3 COMPUTER L.J. 1 (1981); Note, *Software Piracy and the Personal Computer: Is the 1980 Software Copyright Act Effective?*, 4 COMPUTER L.J. 171 (1983); Note, *Copyrighting Object Code*, 4 COMPUTER L.J. 421 (1983); Note, *Copyright Protection of Computer Object Code: Applying Old Legal Tools to New Technologies*, 96 HARV. L. REV. 1723 (1983).

2. 17 U.S.C. § 102(a) (1982).

3. See *Apple Computer, Inc. v. Formula Int'l, Inc.*, 725 F.2d 521 (9th Cir. 1984); *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240 (3d Cir. 1983), cert. dismissed, 464 U.S. 1003 (1984).

particular, task-oriented results such as accounting, database management, and spreadsheet functions. "Operating" programs create the environment in which an application program operates.

The literature often connects copyright policy to technical characteristics found in an ideal cycle of program development. This cycle moves from an idea for solving a task ("algorithm"), to an initial expression or outline ("flow chart"), to programming in a language such as BASIC or FORTRAN ("source code"), and to ultimate compilation in machine form as electromagnetic impulses ("object code") on disk, chip or other device.<sup>4</sup> This suggests a similarity between technology and traditional authorship. One inference is that the technology is "merely" a new form of writing covered by copyright law. While this might be valid policy, computer programs are distinguishable from traditional authorship, especially when a program is in electronic form to operate a machine. As a result, the alternative technical argument is that, while source code is protectible, the machine stage is not a writing and should not be protected.

These analyses do not raise relevant issues. Copyright protection is available to computer programs, but not because of a match between program development and traditional authorship. Copyright protection varies based on form and function, but not because of technical characteristics. Differences in format or function are pertinent only if they invoke different policy considerations.

### A. Commercial Interests and Product Protection

Traditional intellectual property law does not fully comport with the commercial objectives of the software industry. This leads to recurrent expressions of uncertainty about the adequacy of software protection. The lack of congruence requires an elaboration of what interests are advocated by the industry since some are neither precedented, nor desirable as elements of a copyright protection system.

There is a widely supported desire for sanctions against unauthorized commercial reproduction and sale of programs (software "piracy"). This provided the framework for the early litigation on software copyright. "Piracy" is a visible jurisdiction for protection, but the justification incorporates a desire for protection not available to most "technology." Under current law, many technologies can be freely copied after public distribution, so long as no trademark infringement results. The commercial benefits of prohibiting copying are obvious but not available to many products. The policy issue is whether software should receive protection withheld from other technology.

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4. See, e.g., Keplinger, *supra* note 1; Nimitz, *supra* note 1.

Aspects of the industry also urge that software publishers should control non-commercial personal uses by the owner of a copy. Arguments against commercial piracy do not extend to *personal* use, since personal use does not preempt a recognized market. The industry preference defines the market in terms of a single copy for a single machine and hopes to control personal use. This maximizes potential sales, but creates a protection not available even for other copyrighted works. For other works (e.g., books), while unauthorized making of copies is prohibited, the copy owner may loan his copy, permit others to use the book, or modify the book to optimize personal utility. The publisher of a book cannot restrict your right to read the book at home, on vacation or at the office.

A third protection deals with use of the original to create new products. This includes value-added uses where the unauthorized party makes significant modifications that produce a new product. For the first author, works based on the original are a *form of piracy*. The second party benefits from the work of the first without compensating him for it. The second party enters a market at less cost and earlier. The competitive market includes products ranging from mere enhancements through widely extrapolated products based on methods employed in the original. By controlling the right to develop products in this market, the original author may expand the useful commercial life of the original product or leverage the earlier work to capitalize on a demand for new products.

Whenever one work is based on another, the second party benefits from the first either by reduced time and effort in developing the second product or by access to a market created by the original. While there is a clear benefit from the first work, this is less clearly objectionable than piracy and may not justify legal restriction. Unlike the commercial pirate, the second developer contributes to the new product. This process of sequential development may enhance, rather than inhibit innovation. While there is a clear need to reconcile competing interests, the policy objective is not simply or purely to benefit the first author, but to promote innovation. Historically, this has been done by adjusting economic controls given to the first party to leave room for access by third parties. This balanced approach applies to program technology in the absence of countervailing considerations.

There may be relevant policy differences based on different motivations for use. One motivation is to save time and cost by using technology that requires no further testing. This resembles the actions of the pirate, but it defines a basic feature of additive research and development. The second party need not "reinvent the wheel."

Other motivations relate to "compatibility" with existing systems.<sup>5</sup> The copier is concerned about the market for its product where a popular system

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5. See *Whelan Assocs., Inc. v. Jaslow Dental Laboratories, Inc.*, 609 F. Supp. 1307 (E.D. Pa. 1985); *SAS Inst., Inc. v. S & H Computer Sys., Inc.*, 605 F. Supp. 816 (M.D. Tenn.

establishes a de facto standard. The economic objective does not entail substantial new development.

Issues about value-added use encompass control of ideas. Ideas, methods and structures are valuable independent of the product. The policy issue is whether appropriation of an idea can be precluded. Free use of ideas and unpatented methods is characteristic of communal development of technology. It is inherent in scientific models of research. In commercial technology, however, an idea has significant economic value that can be enhanced by restricting it to the original developer.

### B. Intellectual Property

Intellectual property law generally balances the proprietary rights of the first innovator and third party rights. There is a social policy favoring free exchange and use of technology that is committed to the marketplace.<sup>6</sup> This applies not only in copyright law, but also in trade secrecy and patent laws.

Trade secrecy is a common law doctrine that reinforces established expectations of confidentiality.<sup>7</sup> The proprietor of information is entitled to enforce confidentiality restrictions that it established in disclosing information. The protection is limited by several offsetting policies. Most important here, confidentiality enforcement is limited by the right of the purchaser to use information discovered by inspecting a product. This supports the common practice of "reverse engineering" where marketed products are purchased and closely examined by competitors who develop compatible or enhanced technology.<sup>8</sup> For unpatented technology there is competition. The first innovator's advantage is limited to the time necessary for competitors to replicate the new products or methods. The second parties avoid the research and development costs of the first innovator, but the first party retains incentive for innovation because of the advantages inherent in the "head start" period.

While often justified by the property rights of the "owner" of a product, reverse engineering is a direct restraint on trade secrecy. It creates a protected sphere for third party use of ideas and technology. This provides an avenue for industrial innovation through competition based on accumulated, rather than proprietary ideas. If a product is distributed on an open market, protection against use of any secret discoverable through the product is relinquished.

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1985); Synercom Technology, Inc. v. University Computing Co., 462 F. Supp. 1003 (N.D. Tex. 1978).

6. See Davidson, *Preliminary Report, ABA Subcommittee on Software Protection* (July, 1985) (on file at University of Houston School of Law).

7. See generally R. MILGRIM, *TRADE SECRECY* § 2.01 (1984).

8. See Grogan, *Decompilation and Disassembly: Undoing Software Protection*, 1 *COMPUTER LAW*. 1 (February 1984).

There is a similar balance in patent law. Patent is the statutory system most directly oriented to innovation in technology. Patents convey control over technology for a term of years, but are available only if the invention entails substantial innovation that achieves a demonstrable break from prior technology. This threshold precludes protection for many inventions that have substantial commercial significance.<sup>9</sup> Proprietary rights, in effect, are justified only in exceptional cases. Most technology innovations do not meet patent standards. They are dedicated to public use once placed on the market.

The inventor in a patent procedure, in addition, must make a detailed public disclosure. This delineates the invention and creates a public forum for access to ideas. There are restraints on specific uses, but other inventors may use the ideas disclosed. A patent does not control ideas or discovered natural laws, but only inventions that use an idea or discovery.<sup>10</sup>

Copyright was originally developed for much different products, but incorporates similar distinctions. Most significantly, copyright extends only to forms of expression, not ideas or processes.<sup>11</sup> The author controls publication and form of expression, while others may use the ideas. For literary or artistic works, this creates substantial latitude for third parties and the distinction between idea and expression is easy to describe. It creates difficult issues in technology copyright.

### C. Copyright Subject Matter

The issues arise in two ways. One relates to defining when copying *part* of a work violates the original copyright—a question of copyright infringement. This is discussed later. A second relates to copyright subject matter and defines whether a particular work is covered by copyright law at all. If a copyright protection would necessarily result in protection of an idea or process, no copyright is available.

The Copyright Act mandates that copyright not protect ideas or processes.<sup>12</sup> The statutory exclusion that copyright not extend to a “process” allocates the scope between patent law and copyright law. While patents encompass rights in machine and other processes, copyrights do not. This distinction requires a decision about whether the nature of a work is such that protection should be relegated to patent or trade secret laws. A decision against copyrightability on this basis reflects a conclusion that any copyright protection would protect a process that is better handled under industrial property law standards, even if this results in providing no protection.

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9. See R. NIMMER, *THE LAW OF COMPUTER TECHNOLOGY* ch. 2 (1985).

10. See *Diamond v. Diehr*, 450 U.S. 175 (1981); *Parker v. Flook*, 437 U.S. 584 (1978); *Gottschalk v. Benson*, 409 U.S. 63 (1972).

11. See generally 1 M. NIMMER ON COPYRIGHT §§ 2.03[D], 13.03[A] (1985) [hereinafter M. NIMMER].

12. 17 U.S.C. § 102(b) (1982).

There is little useful guidance for this decision in copyright law. Prior to computer programs, the distinction could be easily illustrated. In literary works, writings described a process, but the process actually occurs in a different physical environment. A formula may describe a chemical reaction, but it is distinct from the actual chemical interaction. Copyright protects the written description, but does not permit the author to control use of the process. The historical distinction is between description and physical or mechanical action. A similar distinction is possible for programs not in machine form. Source code describes a computer operation, but is distinguishable from the mechanical operation itself. In machine form, however, the distinction becomes esoteric. An explicit policy judgment is needed. The machine "code" not only describes but implements operations. It is both process and description.

The copyright principle that excludes any protection for ideas, defines scope within copyright rather than between copyright and patent law. The policy is that ideas in copyrighted works should be available for general use. The copyright owner controls reproduction of its expression in a book, but not the idea expressed. Applied to copyrightability, since the issue is whether a work receives any copyright protection, the exclusion should be viewed in narrow terms. Third party uses can be protected through infringement standards, while granting protection to the original work against literal piracy.

The relevant issue is whether protection of "expression" is separable from control over the "idea."<sup>13</sup> Copyright extends to a "work" unless there is a necessary and unavoidable correspondence between protection and the prohibited control. There is a separability analysis. One form involves the "idea-expression identity" doctrine which denies copyright if there is literal identity between the underlying idea and the manner of expression.<sup>14</sup> The statute mandates that copyright not create an idea monopoly. If there is only one way to express an idea, copyright is denied to preserve exchange of ideas. In cases of direct conflict, the statutory balance favors free use of "ideas."

The leading case is *Baker v. Selden*<sup>15</sup> which involved a book that described a system of bookkeeping and included forms integral to the system. The issue was whether the defendant's use of similar forms constituted an infringement. The Court noted:

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13. See generally *Stern Elecs., Inc. v. Kaufman*, 669 F.2d 852 (2d Cir. 1982); *Durham Indus. Inc. v. Tomy Corp.*, 630 F.2d 905 (2d Cir. 1980); *Franklin Mint Corp. v. Nat'l Wildlife Art Exch.*, 575 F.2d 62 (3d Cir. 1978), cert. denied, 439 U.S. 880 (1978); *Sid & Marty Krofft Television Prods. v. McDonald's Corp.*, 562 F.2d 1157, 1164-65 (9th Cir. 1977).

14. See *Baker v. Selden*, 101 U.S. 99 (1879); *Mazer v. Stein*, 347 U.S. 201 (1954), reh'g denied, 347 U.S. 949 (1954); *Morrissey v. Procter & Gamble Co.*, 379 F.2d 675 (1st Cir. 1967); *Continental Casualty Co. v. Beardsley*, 253 F.2d 702 (2d Cir. 1958), cert. denied, 358 U.S. 816 (1958). As applied to computer programs, see *Formula Int'l*, 725 F.2d at 521; *Franklin Computer Corp.*, 714 F.2d at 1240.

15. 101 U.S. at 99.

[W]here the art [a work] teaches cannot be used without employing the methods and diagrams used to illustrate the book, or such as are similar to them, such methods and diagrams are to be considered as necessary incidents to the art, and given therewith to the public. . . . [B]lank account-books are not the subject of copyright . . .<sup>16</sup>

*Baker* has been applied to instructions for games or contests where there may be several ways of describing contest rules, but the available variations are limited.<sup>17</sup> Where more than one form of expression is possible, but the subject is very narrow, admitting only a limited number of forms, "copyright does not extend to the subject matter at all, and plaintiff cannot complain even if his particular expression was deliberately adopted."<sup>18</sup> As the range of available expression narrows, copyright protection gives way to the goal of denying the "author" a monopoly of the underlying process or idea.<sup>19</sup>

A related analysis involves useful objects such as lamps and desks. Copyright does not extend to utilitarian aspects of objects, but only expressive content and form.<sup>20</sup> "[The] design of a useful article . . . shall be [copyrightable] only if, and only to the extent that, such design incorporates [expressive] features that can be identified separately from, and are capable of existing independently of, the utilitarian aspect of the article."<sup>21</sup>

Separability analyses are relevant to whether computer programs are copyrightable, but it is difficult to match the criterion to the policy issue.<sup>22</sup> Issues about software protection deal with a creative industry different from print, video or music media. Decisions about protecting software are connected to protecting machine processes and scientific or technological concepts.<sup>23</sup> Whether we segregate them or not, this basic fact must be acknowledged. Protections for these traditionally are found in patent and trade secrecy laws. The con-

16. *Id.* at 103, 107.

17. *Morrissey*, 379 F.2d at 675.

18. *Id.* at 678-79.

19. See R. NIMMER, *supra* note 9, § 1.02(3); *Mazer*, 347 U.S. at 201; *Baker*, 101 U.S. at 99; *Durham*, 630 F.2d at 905; *Franklin Mint*, 575 F.2d at 62; *Krofft*, 562 F.2d at 1157; *Morrissey*, 379 F.2d at 675; *Continental*, 253 F.2d at 702.

20. Denicola, *Applied Art and Industrial Design: Copyright in Useful Articles*, 67 MINN. L. REV. 707, 730 (1983) (quoting 17 U.S.C. § 101 (1976)).

21. 17 U.S.C. § 101 (1982). See *Mazer*, 347 U.S. at 201; *Gay Toys, Inc. v. Buddy L Corp.*, 703 F.2d 970 (6th Cir. 1983); *Fabrica, Inc. v. El Dorado Corp.*, 697 F.2d 890 (9th Cir. 1983); *Kieselstein-Cord v. Accessories by Pearl, Inc.*, 632 F.2d 989 (2d Cir. 1980). Underlying the decision is a judgment about whether the particular item is a useful article. See *Kieselstein-Cord*, 632 F.2d at 989 (belt buckle is jewelry); *Gay Toys, Inc.*, 703 F.2d at 970 (toy airplane has no intrinsic utilitarian function).

22. See H.R. REP. NO. 1476, 94th Cong., 2d Sess. 55 (1976); see also S. REP. NO. 473, 94th Cong., 1st Sess. 51 (1975). "[If] an article has any intrinsic utilitarian function, it can be denied copyright protection except to the extent that its artistic features can be identified separately and are capable of existing independently as a work of art." *Fabrica*, 697 F.2d at 893.

23. See Denicola, *supra* note 20, at 707; Note, *Toward a Unified Theory of Copyright for Advanced Technology*, 96 HARV. L. REV. 450 (1982).



temporary issues are whether and in what form copyright extends to this environment.

## II. COPYRIGHTABILITY AND COMMERCIAL PIRACY

The most widely supported objective in software protection is to establish legal restraints against software piracy (i.e., unauthorized commercial reproduction and sale). Commercial piracy has direct financial effects on mass market programs because it preempts markets otherwise available to the original developer. There is no productive contribution by the pirate. By appropriating the first work, the pirate favorably competes in price against the author who must recoup prior expenses. This reduces the profit for the original "author" and affects the incentive for research necessary for technology development.

Piracy was the major factor underlying application of copyright law to computer programs. Copyright protection can be perfected with minimal cost and creates exclusive legal rights to reproduce copies of a "work."<sup>24</sup> As a result, copyright methodology matches the commercial objective, and other forms of protection are either inadequate against piracy or entail substantial cost. Early debate about software copyright was inseparable from the simple issue of whether programs should be protected from piracy.<sup>25</sup>

The objection to piracy reflects a desire for protected product uniqueness. The policy issue is whether or not computer programs should receive such protection of uniqueness. Because of the nature of the issue, discussion of copyright protection often involves argument by analogy to industrial processes or by analogy to literature. Industrial property is not protected against piracy absent confidentiality restraint or patent protection. Literary works are protected by copyright.

Argument by analogy is not productive. Computer programs contain characteristics of both technology and authorship. The choice for computer software ultimately turns on direct policy decision, rather than analogy. If the primary policy is to prevent unauthorized commercial copying, this requires copyright protection or a newly legislated alternative.

Legal protection against copying creates understandable commercial benefits, but why should software receive protection not available in other industries? This can be approached in two ways. The most general argument asserts that laws which fail to prohibit literal duplication of technology encompass outdated policy. In a society that relies on technology development, it may be appropriate to protect all technology against duplication.

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24. See generally R. NIMMER, *supra* note 9, § 2.02-.15; Gilbourne, *The Proprietary Rights Pyramid: An Integrated Approach to Copyright and Trade Secret Protection for Software*, 1 *COMPUTER LAW*. 1 (March 1984).

25. Davidson, *supra* note 1.

The weakness in this view is that, in many industries, competitors use identical technology, but there is a competitive marketplace in which technology change is rapid and continuous. Trade secrecy permits the developer a "head start" without constraining other parties once the technology is publicly disclosed. Except for patented innovations, secondary marketers are uninhibited by legal barriers absent a breach of confidence. The emphasis is on maximum freedom of cumulative development. Literal reproduction creates competition based on efficient use of technology. This supports substantial technology growth in many industries. Software technology requires different treatment only if there is a cognizable reason to anticipate that these patterns will not occur for computer program products.

The second approach to the policy issue distinguishes computer programs based on the character of programs.<sup>26</sup> The distinguishing feature is that, while time and effort are needed to create a product, a program can be inexpensively duplicated. The "pirate" appropriates the technology in a manner similar to that for video tapes, records and cassette tape recordings. This contrasts with traditional manufacturing technology where duplication requires constructing or reworking assembly lines or plants and retraining personnel. Duplication of software does not even require that the pirate learn the technology. The copier merely uses a "recording" device. The "recording" does not merely approximate the technology, it recreates it. The ease of copying creates a primary incentive for "piracy" and an imbalance in cost. More important, it reduces "head start" advantages. If the second developer must adapt and invest resources to learn and apply the technology, the cost advantages are reduced; the activities require time. This retains commercial advantage for the original developer. These natural "protections" are lost in reproduction of software. The pirate quickly undercuts price while marketing a product identical to the original shortly after it reaches the market.

Ease of reproduction is characteristic of other products that receive copyright protection. It is a supportable premise that this is one generic role for copyright: copyright precludes literal reproduction of any product that has creative content and that is subject to rapid, inexpensive and comprehensive copying which effectively eliminates otherwise natural advantages of the original innovator in the marketplace. Absent protection, the nature of the product obviates incentive for innovation.

### A. 1976 Copyright Reforms

The legislative development of the Copyright Act supports this conclusion. Computer program protection was unclear. In 1976, Congress enacted a

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26. NATIONAL COMMISSION, *supra* note 1, at 21.

revised Copyright Act, but section 117 of that Act disclaimed any intention to alter program copyright status. This created a moratorium to permit further study. A Commission on New Technological Uses of Copyrighted Works (CONTU) was appointed. The CONTU report supported copyright for programs and led to the Computer Software Copyright Act of 1980 and copy protection at least to most programs.

CONTU argued that, but for section 117, under the 1976 Act, copyright extended to computer programs.<sup>27</sup> CONTU presented several arguments favoring copyright protection. Central to its position was that software was the product of "great intellectual labor" that merited legal protection against easy duplication. Characterizing software as a "new type of writing," copyright protection was essential to maintain incentive for development and dissemination.

The report was less clear about the scope of protection. The majority rejected suggestions that would exclude all programs in machine form, but affirmed that the author's protection should be restricted by traditional concepts of copyright: "Copyright . . . protects the program so long as it remains fixed in a tangible medium of expression but does not protect the electro-mechanical functioning of a machine. . . . Thus, one is always free to make a machine perform any conceivable process . . . but one is not free to take another's program."<sup>28</sup> This analysis side-stepped a central issue. Whether one can make a machine perform the electro-mechanical "process" without appropriation of the program in its machine form is less than apparent and is a focus of judicial controversy.

### *B. Judicial Action Against Piracy*

Despite the support of CONTU and the Congressional response, there was continuing controversy about the copyrightability of computer programs. The appellate cases support a conclusion that computer programs are copyrightable.

Copyrightability relates most immediately to legal barriers against piracy. A decision that a program is not copyrightable permits literal copying. This is appropriate only if all pertinent interests support a complete denial of protection. As a result, analyses that deny copyright to preserve free access to ideas and processes should be narrowly construed. Denial of copyright is proper only if barriers to literal duplication would substantially foreclose an area or field of technical development. The further question of whether copyright bars creation of similar, but not identical works is an infringement issue.

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27. *Id.* at 16. See also S. REP. No. 473, 94th Cong., 1st Sess. 51 (1976).

28. NATIONAL COMMISSION, *supra* note 1, at 20.

Written "source code" is copyrightable.<sup>29</sup> Greater difficulties of analysis are present for programs in machine form (diskette, tape or chip). In this form, programs are electromagnetic configurations described as "object code." Two distinct works might be associated with the machine program. The first is the object code itself. The second is the output of the program in audio, visual or printed form.

Output that is otherwise copyrightable does not lose this status because it is stored in a computer.<sup>30</sup> If a program produces a display of copyrightable images, it is immaterial that the images are produced by electrical functions or by pencil. The method does not alter the product. The computer does not contain the images but only the electromagnetic "instructions" that create them. A work of authorship nevertheless exists if it is capable of reproduction or communication "directly or indirectly with the aid of machine or other device."<sup>31</sup> A song retains copyright protection even as recorded on a disk.

Output is copyrightable even if the user and the programmer both contribute to it. In video games, for example, the program creates a display of images and sequences of action based in part on the input of the user. The visual effects and play can be created by various programs. As a result, it is common to copyright the images, rather than merely the underlying program code. Copyright of the output is attributed to the programmer if the images created by the program have sufficient originality.<sup>32</sup> The sequence of play is copyrightable if substantial portions are determined by the program and repeat despite variations due to the player.<sup>33</sup>

Copyright of output protects against some piracy. If output is copyrighted, reproduction of the program code is a prohibited copy of the output.<sup>34</sup> This treats the object code as a storage media. As with electromagnetic aspects of video tapes, it does not require a conclusion that object code itself is

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29. See *Affiliated Hosp. Prods. Inc. v. Merdel Game Mfg. Co.*, 513 F.2d 1183 (2d Cir. 1975); *Chamberlin v. Uris Sales Corp.*, 150 F.2d 512 (2d Cir. 1945). In these cases, while there may have been other means of expression of the commands, the need to convey pertinent information restricts the range of alternatives in a very spartan, limited environment. *But see Synercom Technology, Inc. v. University Computing Co.*, 462 F. Supp. 1003 (N.D. Tex. 1978); Keplinger, *supra* note 1, at 507.

30. See R. NIMMER, *supra* note 9, § 1.03(4); *Apple Computer, Inc. v. Formula Int'l*, 725 F.2d 521 (9th Cir. 1984); *Midway Mfg. Co. v. Artic Int'l, Inc.*, 704 F.2d 1009 (7th Cir. 1983), *cert. denied*, 464 U.S. 860 (1983); *Stern Elecs., Inc. v. Kaufman*, 669 F.2d 852 (2d Cir. 1982).

31. 17 U.S.C. § 102 (1982). *Cf. White-Smith Music Publishing Co. v. Apollo Co.*, 209 U.S. 1 (1908). See NATIONAL COMMISSION, *supra* note 1, at 21.

32. See *Williams Elecs. v. Artic Int'l, Inc.*, 685 F.2d 870 (3d Cir. 1982); *Stern*, 669 F.2d at 856.

33. See *Williams*, 685 F.2d at 874; *Stern*, 669 F.2d at 856.

34. See *Midway*, 704 F.2d at 1012; *Williams*, 685 F.2d at 874; *Atari, Inc. v. North Am. Philips Consumer Elecs. Corp.*, 672 F.2d 607 (7th Cir. 1982), *cert. denied*, 459 U.S. 880 (1982); *Stern*, 669 F.2d at 855-56; *In re Certain Coin-Operated Audiovisual Games and Components Thereof*, No. 337-TA-105 (Int'l Trade Comm'n 1982), No. 337-TA-87 (Int'l Trade Comm'n 1981).

copyrightable. This is not important in video or sound recordings since the output is the focus of protection. Object code protection has independent importance for computer programs, however, since output copyright leaves gaps in protection that are difficult to justify as a matter of policy.

One gap arises for complex programs that create expressively mundane output (e.g., an accounting form). This output lacks expressive content and is not copyrightable.<sup>35</sup> The form is a basic tool of art that cannot be appropriated by one but must be available for all. Unless object code is copyrightable in such cases, the program is unprotected even though it involves substantial creative effort. This risk exists for database, operating system and spreadsheet programs that are central to microcomputing.<sup>36</sup> This complex and commercially valuable software creates little copyrightable output. Unless object code is copyrightable, there is no barrier to appropriation.

The policy rationale for protecting these programs against piracy is no less compelling than for video games. The technical barriers, however, are substantial. Distinguishing expression, idea and process in such programs is difficult. Also, section 102(a) of the Copyright Act restricts copyright to works fixed in a tangible "medium of expression" from which they can be "perceived, reproduced, or otherwise communicated."<sup>37</sup> This requires human communication, but unlike videotapes, even with a computer, the program generates no copyrightable expression in normal use.<sup>38</sup>

The risk of piracy provides the impetus for protection, but the copyright analysis entails an effort to establish identifiable expression in the program. One manifestation examines if it is possible to reverse a program to produce source code or a listing of object code. A conclusion that such reversal is possible supports a view that the machine program is a "copy" of the source code or a copy of the typical representation of object code.<sup>39</sup> This analysis

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35. For cases supporting the idea that materials lacking expressive content are not copyright, see *Baker v. Selden*, 101 U.S. 99 (1879); *Brown Instrument Co. v. Warner*, 161 F.2d 910 (D.C. Cir. 1947), *cert. denied*, 332 U.S. 801 (1947) (standardized charts); *Taylor Instrument Co. v. Fawley Brost Co.*, 139 F.2d 98 (7th Cir. 1943), *cert. denied*, 321 U.S. 785 (1944) (routine data presentation). See also *Affiliated Hosp. Prods. Inc. v. Merdel Game Mfg. Co.*, 513 F.2d 1183 (2d Cir. 1975); *Cash Dividend Check Corp. v. Davis*, 247 F.2d 488 (9th Cir. 1957); *Chamberlin v. Uris Sales Corp.*, 150 F.2d 512 (2d Cir. 1945); *E.H. Tate Co. v. Jiffy Enters.*, 16 F.R.D. 571 (E.D. Pa. 1954). Cf. *Harcourt, Brace & World, Inc. v. Graphic Controls Corp.*, 329 F. Supp. 517 (S.D.N.Y. 1971) (protection given to answers sheets against literal copying because symbols designating questions or response spaces are expression).

36. See *Formula Int'l*, 725 F.2d at 521; *Franklin Computer Corp.*, 714 F.2d at 1240. See also Stern, *supra* note 1; Note, *Copyright Protection of Computer Object Code: Applying Old Legal Tools to New Technologies*, *supra* note 1; Note, *Copyrighting Object Code*, *supra* note 1.

37. 17 U.S.C. § 102(a) (1982).

38. See Stern, *supra* note 1. Cf. Note, *Copyright Protection of Computer Object Code: Applying Old Legal Tools to New Technologies*, *supra* note 1.

39. See *GCA Corp. v. Chance*, 217 U.S.P.Q. (BNA) 718, 720 (N.D. Cal. 1982) (copy of source code); *Midway Mfg. Co. v. Strohon*, 564 F. Supp. 741 (N.D. Ill. 1983) (copy of object code).

invites debate about whether the typical representation of object code in binary (0's and 1's) or hexadecimal numbers constitutes human communication; but the difficulty is not that source and object code are obscure languages. The "authors" do not intend to communicate the code to third parties by the program.<sup>40</sup>

This debate has little to do with the question of whether protection against piracy should extend to programs that lack expressive output. These programs configure and control a machine to accept, transmit or reproduce information supplied by another source. The program is integral to the machine process, and control of reproducing the program in a machine constitutes some control over duplication of the process.<sup>41</sup> The basic legal question concerns whether this control is available under copyright or whether copyright should be denied to preserve access to the process. Denial of protection avoids a monopoly, but exposes a valuable product to piracy.

The analytical tool in copyright law focuses on the extent to which protection of "expression" can be segregated from prohibited control over an underlying "process" or "idea." The cases make a direct effort to define process (or idea) distinct from coded "expression." An equivalence between program code (expression) and machine process exists if there is one or only a very limited number of ways to "express" a process in object code. If various methods exist, copyright protects the technology. Copyrightability is barred if there are no alternative means to create the process without copying the code.

The statement of this standard does little to determine the degree of available protection. The critical step involves the court's conception of a "process" or "idea." In defining a "process," the court implements a policy choice central to program protection. It does so under limited technical or legal guidance. In one view, "process" refers to electron flow (the physical operations), while expression encompasses that which remains. This is consistent with traditional copyright distinctions, but difficult to apply to computer programs in machines. The machine program determines the "electron flow."

The cases adopt an alternative conception that refers to the "functions" performed. Under this view, program "functions" are equated to unpro-

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40. Stern, *supra* note 1, at 12. In the same manner, it has generally been held that the use of a copyrighted work to create a tangible object through applying designs and the like is not an infringement. See *Tompkins Graphics Inc. v. Zipatone, Inc.*, 222 U.S.P.Q. (BNA) 49 (E.D. Pa. 1983). Cf. *Imperial Homes Corp. v. Lamont*, 458 F.2d 895 (5th Cir. 1972); *WPOW, Inc. v. MRLJ Enters.*, 584 F. Supp. 132 (D.D.C. 1984) (use of engineering drawings to construct a broadcast tower). In many cases, the technical issue of whether use of the drawings to construct a building infringes the copyright is mooted by the fact that the defendant copied the architectural or other plans in the course of the construction work. See *Aitken, Hazen, Hoffman, Miller, P.C. v. Empire Constr. Co.*, 542 F. Supp. 252 (D. Neb. 1982); 1 M. NIMMER, *supra* note 11, § 2.08[D].

41. See H.R. REP. No. 1476, 94th Cong., 2d Sess. 54 (1976); see also S. REP. No. 473, 94th Cong., 1st Sess. 50-51 (1975).

tractible processes. If the primary functions of the program can be replicated by another program that does not infringe the code of the first, copyright of the first program provides no control of a process. If the functions cannot be replicated without infringing the code, copyright is precluded. The difficulty remains notwithstanding this analytical framework. A wide range of judgment exists in defining whether any particular machine activity constitutes a "function" for purposes of this decision. If every detailed action is a "function," non-copyrightability is likely since a second program must reproduce the program code in detail to replicate all actions. In contrast, a concept of "functions" restricted to major activities or general concepts supports copyrightability, since the general concepts can be manifest in numerous ways.

The choice entails a matter of policy, rather than technical definition. The appropriate definition preserves protection unless this substantially disrupts technological development. The reported decisions adopt this view and support copyright of virtually all programs.

The two major cases involve duplications of an operating system for a competing line of computers. The economic incentive for copying was to ensure that the second computer could use software already available for the first.<sup>42</sup> This is important to marketing. Since minor differences in an operating system preclude use of some software, literal copying may be necessary.

In *Apple Computer, Inc. v. Formula International, Inc.*<sup>43</sup> the defendant admitted copying the programs, but argued that "programs . . . designed . . . to be used to control computer operations and [that] do not directly produce the visual image or 'expression' which the computer user discerns"<sup>44</sup> should be excluded from copyright. On appeal, the United States Court of Appeals for the Ninth Circuit expressly rejected the argument that protection for machine programs should be based on whether or not they have expressive output. It also concluded that idea and expression (process) did not merge.<sup>45</sup>

The evidence reported by the district court supports this conclusion only if based on a particular view of a "process." The district court emphasized that Apple's position was that Formula should not be allowed "to market programs which perform the same function in the exact same manner" as Apple's.<sup>46</sup> An operating system provides an environment for application programs. The district court cited testimony that "numerous" ways existed to write operating systems that allow operation of ninety-eight percent of

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42. See Davis, *IBM PC Software and Hardware Compatibility*, 1 *COMPUTER LAW* 11 (July 1984); Chertok, *Compatibility: Fair Use or Derivative Work*, 2 *Computer L. Serv. Rep.* 1004 (1984).

43. 562 F. Supp. 775 (C.D. Cal. 1983), *aff'd* 725 F.2d 521 (9th Cir. 1984).

44. *Formula Int'l*, 562 F. Supp. at 780.

45. *Formula Int'l*, 725 F.2d at 525.

46. *Formula Int'l*, 562 F. Supp. at 782.

47. *Id.*

the application programs available for Apple computers.<sup>47</sup> The Ninth Circuit assumed that these operating systems created the same "process" as the Apple programs.<sup>48</sup> For application programs within the two percent, however, the alternative operating process is not the same or even an acceptable alternative.

The Ninth Circuit did not discuss the degree of similarity required to conclude that different programs create the same process. If the "process" is not defined by the application programs that can be accommodated, what alternative definition exists? If less than 100% similarity is acceptable, copyright controls at least one combination of machine activities. The copyright ban on protecting a process arguably requires that a third party be able to create a 100% compatible system. The court's conception, however, permits limited control in order to protect the underlying program against piracy.

Formula's purpose for using Apple's programs was to access a market defined by compatibility. Compatibility allows a second manufacturer to benefit from the base of existing software for a popular machine, and copying permits competition with reduced development cost. The issue in *Formula* was whether copyright should bar such competition.<sup>49</sup> The court answered in the affirmative. There was a choice between differing conceptions of a marketplace. Formula sought to deny copyright protection to Apple in order to create a market for Apple competitors. In protecting Apple, the court preserved the copyright at the cost of this particular competitive framework.

The second appellate decision is *Apple Computer, Inc. v. Franklin Computer Corp.*<sup>50</sup> *Franklin* involved the same programs and a similar fact setting as in *Formula*. The district court, in *Franklin*, denied a preliminary injunction. The United States Court of Appeals for the Third Circuit reversed and remanded, rejecting the argument that there is a per se merger of idea and expression in an operating system program.

The Third Circuit defined the issue as whether "other programs can be written or created which perform the same function as an Apple operating system program."<sup>51</sup> If other programs can be written, the particular operating system program represents expression, separable from the process. A case-by-case analysis is required. Exclusion depends on the interpretation of the underlying idea and proof of the extent to which the functions of the program can be performed by other programs. Since the case was remanded for factual findings, the court only briefly discussed the test.

The court rejected Franklin's emphasis on the fact that only a limited number of ways existed to program machine code such that the computer could operate *all* Apple-compatible applications software.

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48. *Formula Int'l*, 725 F.2d at 524-25.

49. See Davis, *supra* note 42; Chertok, *supra* note 42.

50. 714 F.2d at 1240.

51. *Id.* at 1253.



This claim has no pertinence to either the idea/expression dichotomy or merger. . . . The idea of one of the operating system programs is, for example, how to translate source code into object code. If other methods of expressing that idea are not foreclosed . . . then there is no merger. Franklin may wish to achieve total compatibility . . . but that is a commercial and competitive objective which does not enter into the somewhat metaphysical issue of whether particular ideas and expressions have merged.<sup>52</sup>

The Third Circuit emphasized a broad concept of the "idea" of an operating system and equated the unprotected "process" with that idea. It rejected the view that one measure of whether the "process" can be duplicated is whether all application programs for one system can be operated by another.<sup>53</sup>

A court's manner of defining "idea" or "process" expresses commercially significant legal policy. The definition does not flow from some inherent concept of "process." An interpretation requiring proof that others retain an ability to replicate 100% of the program's functions implements the mandate against protecting a process, but exposes a valuable product to wholesale appropriation. Both appellate courts adopted a different standard, protecting the original developer against comprehensive, literal duplication of its product. The decisions protect valuable programs independent of output, but impede comprehensive third party access to markets created by popular products to the extent access requires exact recreation of the first program.<sup>54</sup>

### III. INFRINGEMENT AND VALUE-ADDED USE

The policy decision that extends copyright to software technology as a protection against piracy provides little guidance for cases of value-added use. Value-added use is not equivalent to piracy. The pirate merely duplicates the program for commercial gain. This may create economic benefits, forcing competition based on production and distribution efficiency, but piracy does not directly contribute to innovation. In contrast, the person who creatively enhances the original or uses aspects to develop a new product participates in technology development in a manner that is important in a comprehensive approach to promoting innovation. Copyright law precludes some forms of value-added use, but many value-added developments should be free of copyright restraints. Determining whether a particular activity infringes the original or represents protected development requires a balancing that discriminates between protecting the first author and maintaining flexibility for secondary development.

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52. *Id.*

53. *Id.* at 1252-53.

54. Antitrust considerations impact the extent to which the original author/innovator can maintain an exclusion from compatible markets. See R. NIMMER, *supra* note 9, § 5.04.

The clear commercial incentives for the original developer orient to preventing competition, controlling value-added use of its technology. Substantial market advantages associated with the original program technology can be exploited through related products. This encompasses use of program code, but incorporates control of ideas, design and structures of the original work. Idea content may contain more value than the code, but free use of ideas is central to sequential and additive development of technology.

Value-added use occurs whenever a second party employs the initial work as a basis or model, but engages in nontrivial modifications to create a new product. From the perspective of the original author, the second party appears to benefit illicitly from the ideas and work of the first. On the other hand, there are substantial reasons to define some value-added use as beyond the control of the proprietor of the original program. A model encouraging innovation through multiparty involvement and dissemination of ideas requires rights of access and use, permitting diverse innovators to use the insights of others.

#### A. *Substantial Similarity and Infringement*

Under traditional copyright standards, this balancing occurs in the context of deciding whether a second work is an infringing "copy" of the first. Assuming that the second party had access to the work, the primary issues are whether there is "substantial similarity" in the two and whether the similarity is based on protected expression or unprotected ideas.

Copyright gives an author exclusive rights to reproduce and distribute copies of a work.<sup>55</sup> Copyright does not preclude independent creations. An action for infringement therefore requires distinguishing copies from independently created works. Unless there is literal duplication, copying is generally established indirectly based on proof that: 1) the defendant had access to the original work, and 2) there is *substantial similarity* between the two works sufficient to support a conclusion that the defendant copied the original.<sup>56</sup>

Copyright also grants the exclusive right to prepare derivative works "based on" the original. A "derivative work" qualifies for separate copyright protection as to new expressive material.<sup>57</sup> This extends to less than all works that in colloquial terms "derive" from an original. Copyright protection of derivative works is construed in conjunction with section 102(b) which limits copyright to expression. A "derivative work" incorporates the expression of the original, and a subsequent program is a derivative work only to "the extent that the [second program] incorporates some or all of [the original]

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55. 17 U.S.C. § 106 (1982).

56. See 3 M. NIMMER, *supra* note 11, § 13.01.

57. 17 U.S.C. § 103(b) (1982); see also 1 M. NIMMER, *supra* note 11, § 3.04.

copyrighted programs.”<sup>58</sup> In absence of “substantial similarity” of expression, the second work is not derived from the original in a copyright sense. Because infringement commonly involves distribution of copies, questions about whether the right to control derivative works is violated most often are subsumed in questions about whether there is sufficient similarity to constitute an infringing copy.

Substantial similarity involves factual judgments, controlled by underlying policy judgments. The statutory mandate that copyright does not extend to ideas or processes has a major effect. Within the standard of “substantial similarity,” two premises emerge. First, there is no right to duplicate substantial portions of the expression of a copyrighted work without authorization. Second, subsequent parties *can* copy and use the “ideas” from a work or reproduce the “process” without permission.

Under copyright and other fields of industrial property law, the author’s protection is subordinate to the objective of maintaining free ideas. Idea and process copying is a privileged, protected act. As a result, in any “substantial similarity” case, the court must distinguish similarity due to copied idea and similarity of copied expression.<sup>59</sup> Copyright precludes only the latter. Two works that focus on the same subject and pursue similar ideas will appear similar, but an infringement occurs only if the similarity results from copied expression, divorced of a privileged similarity in ideas. Similarity traceable to similar ideas is not an infringement even if the second author *copied* the idea.

This can be viewed as a technical issue in which the pertinent inquiry defines which portions of a work are ideas and which are expression. The judgments can be variously described, but are inherently unstable. All aspects of a work entwine idea *and* expression. What constitutes expression and what constitutes an idea for *purposes of infringement* reflects a judgment about the work and about whether protection should be granted against a specific subsequent product. There are different conceptions for different types of copyrighted works.<sup>60</sup>

In defining the unprotected idea in an infringement case, a court makes a decision about the degree of protection for the original author and the degree of freedom for subsequent authors. This can be addressed directly. The first author is increasingly protected if the idea is defined in broad or

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58. *Freedman v. Select Information Sys., Inc.*, 221 U.S.P.Q. (BNA) 848, 850 (N.D. Cal. 1983).

59. *See Sid & Marty Krofft Television Prods., Inc. v. McDonald’s Corp.*, 562 F.2d 1157, 1164 (9th Cir. 1977) (“[I]here . . . must be substantial similarity not only of the general ideas but of the expressions of those ideas as well.”); *Atari, Inc. v. North Am. Philips Consumer Elecs. Corp.*, 672 F.2d 607 (7th Cir. 1982), *cert. denied*, 459 U.S. 880 (1982).

60. *See Landsberg v. Scrabble Crossword Game Players, Inc.*, 221 U.S.P.Q. (BNA) 1140 (9th Cir. 1983); *Marty Krofft*, 562 F.2d at 1167-68; *cf. Mazer v. Stein*, 347 U.S. 201 (1954); *North American*, 672 F.2d at 607; *Dow Jones & Co. v. Board of Trade*, 217 U.S.P.Q. (BNA) 901 (S.D.N.Y. 1982).

general terms. Given a broad definition, most of the work represents "expression" of a *general* idea. As the protection for the author grows, however, the freedom for second authors decreases. The converse is equally true.<sup>61</sup> As the "idea" is defined in more specific terms, the freedom for a secondary user is expanded. The detail of the work becomes identified as the *unprotected* idea. The decision must explicitly recognize the factors that weigh toward or against protection of the first author. These differ for different forms of authorship.

The issues and values balanced here are materially different from those in defining an "idea" or "process" for purposes of copyrightability. Copyrightability determines whether the work receives *any* protection against even literal reproduction. "Substantial similarity" questions arise only if basic protection is established. Defining the "idea" in substantial similarity terms relates to particular conflicts between two works that are not identical. It is the primary methodology that sets the boundaries of protection for third party developers.

### 1. Fiction Works

"Substantial similarity" is frequently litigated in fiction and other artistic works. Copyright precludes appropriation of those portions of a work that most contribute to its commercial or artistic value and uniqueness. Substantial similarity combines quantity and quality, but no precise percentages define how much of a work can be appropriated. Appropriation of a small, but significant portion is infringement.

Fiction and artistic works involve creatively diverse expression and substantial variety. Creatively important aspects consequently often can be protected without substantially limiting options for subsequent authors. The desirability of uncontrolled third party use and development in fiction is not well-established and may be unnecessary beyond very general ideas. The main copyright objective for fiction works defines the first author's rights to encompass broadly subsequent works based on the original (e.g., movie adaptations, sequels, derivative toys).

For fiction works, substantial similarity cases focus on the degree of similarity and not whether the alleged infringer made a creative contribution.<sup>62</sup> Similarity is examined in reference to whether an "ordinary observer" would regard the two works as similar because the second work captures

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61. See, e.g., *Mattel, Inc. v. Azrak-Hamway Int'l, Inc.*, 724 F.2d 357, 360 (2d Cir. 1983) (per curiam) (similarity of dolls due to similar ideas where idea defined as "superhuman muscleman crouching in . . . a traditional fighting pose"); *Innovative Concepts in Entertainment, Inc. v. Entertainment Enters. Ltd.*, 576 F. Supp. 457 (E.D.N.Y. 1983) (infringement of hockey player figures and game board's configuration of "snow").

62. See 3 M. NIMMER, *supra* note 11, § 13.03[B].

the unique expression or aesthetic appeal of the first.<sup>63</sup> This standard orients to the commercial market. Phrased solely in terms of the reaction of the audience, the approach has been criticized.<sup>64</sup> Recent cases retain the general standard, but formulate various analyses that differentiate between ordinary audience reactions and permitted copying of an idea.<sup>65</sup> While the law may be uncertain, the basic tension is apparent. It blends audience reaction and doctrinal examination. If a work does not appear to the audience to be substantially similar to another, there is no appropriation. Even if there is apparent similarity, however, it is essential to determine whether the similarity is caused by copying protected or unprotectible elements of the first work.

A related theme involves *scenes a faire*. These are common or standard expressions that can be expected to appear in works of a particular type. Given similar ideas, structure or purpose, certain expressions or images are so common as to be insufficient to support an action for infringement. To the extent that an alleged similarity involves *scenes a faire*, the similarity is generic and inadequate for infringement.<sup>66</sup> It often is suggested that these expressions are not copyrightable. Some duplication is inherent and not copying.<sup>67</sup> Stock phrases, standard lines and common characters are central to the development of the pertinent art. Limiting their use would impede, rather than promote creative work. These standard items accordingly are, in effect, public domain available for all authors.

In fiction works, duplication of some of the language or images of work involves difficult legal questions. Even greater difficulty arises if there is no duplication of actual language, but the plot or characters are similar. In fiction, non-literal reproduction may be actionable. As the range of commercial derivatives of fiction works expands, expressive "similarity" must be defined broadly to go beyond verbatim copying. A movie based on a novel duplicates little of the language in the book, but a copyright doctrine that allows a third party to freely appropriate the theme in a movie would reduce the commercial incentive for book publishing.

A finding of "substantial similarity" in the absence of literal copying must be preceded by a close analysis to distinguish ideas and expression. A decision that there is substantial similarity requires a conclusion that aspects of the plot, structure and character are expression, rather than unprotected ideas. The traditional approach involves a variable line drawing described in the following terms:

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63. See *Durham Indus., Inc. v. Tomy Corp.*, 630 F.2d 905, 912 (2d Cir. 1980); *Franklin Mint Corp. v. National Wildlife Art Exch.*, 575 F.2d 62, 64 (3d Cir. 1978), *cert. denied*, 439 U.S. 880 (1978).

64. See 3 M. NIMMER, *supra* note 11, § 13.03[D].

65. See *North American*, 672 F.2d at 607; *Krofft*, 562 F.2d at 1157.

66. See, e.g., *Williams Elecs., Inc. v. Bally Mfg. Corp.*, 568 F. Supp. 1274 (N.D. Ill. 1983); *Atari, Inc. v. Amusement World, Inc.*, 547 F. Supp. 222 (D. Md. 1981); *Midway Mfg. v. Dirkschneider*, 543 F. Supp. 466 (D. Neb. 1981).

67. See 1 M. NIMMER, *supra* note 11, § 2.18[A-D].

Upon any work, and especially upon a play, a great number of patterns of increasing generality will fit equally well, as more and more of the incident is left out. The last may perhaps be no more than the most general statement of what the play is about . . . but there is a point in this series of abstractions where they are no longer protected, since otherwise the playwright could prevent the use of his "ideas," to which, apart from their expression, his property is never extended.<sup>68</sup>

This places a premium on the decision-maker's judgment. In an open-ended framework, the analysis must be guided by a clear reference to the purpose of the law being applied. While nonliteral copying might be outside the purview of copyright, this would reduce the economic incentives for creativity that copyright intends to promote. The law should enhance those incentives, while not unduly inhibiting other authors. In many fiction works, creativity in elements of character, structure and plot establish the major commercial value that should be protected. Copyright protection, furthermore, often will not impede subsequent authors because an infinite number of variations in plot and character are available.

While nonliteral similarity supports an action for infringement,<sup>69</sup> the analysis carefully identifies and limits protection to the portion of the original that is sufficiently central to justify protection. The appropriate line differs depending on the type of work and the range of alternatives available. A plot in which a secret agent undertakes a quest against sophisticated and powerful enemies and encounters a beautiful woman is not protected. The characters "James Bond," "M," and "Q" are protected.

## 2. Technical and Factual Works

The analytical balance focuses on the importance of the duplicated material to the original work and the effect on subsequent authors expressing their thoughts on the same subject. In fiction works, this leads to expansive protection for the original author. The balance becomes increasingly acute, however, in cases of more structured expression and functional objectives. In this setting, the goals and analytical tools of copyright merge toward substantially reduced protection.

Relevant distinctions exist between fiction and technical or factual works. In fiction works, wide variations in writing style, characterization, chronology and plot are important. These support substantially distinct works based on identical concepts. Artistic conventions governing expressive choice are not restrictive. Factual and technical works, in contrast, develop in a structured environment. A factual history of World War II has a limited choice of

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68. *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (quoting *Holmes v. Hurst*, 174 U.S. 82, 86 (1894)).

69. *See Landsberg v. Scrabble Crossword Game Players Inc.*, 221 U.S.P.Q. (BNA) 1140 (9th Cir. 1983).

major characters, events, chronology and outcome. The restraints increase as the scope constricts. A technical book describing the theory of relativity must use particular formulae, interpretations, derivations, orders of analysis and objectives. Mathematical proofs or descriptions of the theory constrain choices even further. The limitations are more pronounced if the writer does not contest prevailing wisdom but desires to author a traditional work.

Structured environments necessarily affect analysis of what similarity is sufficient for infringement. The existing "history" or structured "objective" limits the expressive framework. In an infringement case, the issue is *not* that the structured environment leaves *no* room for expressive variations. That extreme case, if it exists, creates an issue of copyrightability. The structured environment instead requires greater care in defining the unique and protected facets of the first work so as not to foreclose or deter subsequent authors who must engage in expression confined by the same limited structure.

It is possible to grant the first author protection for organization or "plot" of a history work since this is an important feature of the work. Such protection, however, would severely and undesirably restrict others who write on the same subject. In balancing these effects, traditional doctrine denies copyright protection for "facts."<sup>70</sup> Factual material and historical chronology are unprotected, available tools of the trade even if one party first discovered the pertinent fact. This is often explained in terms of a conclusion that there can be no "authorship" in facts, but this statement substitutes form for substance. "Facts" and "history" are unprotected because protection would severely restrict subsequent authorship in a manner disproportionate to the benefit for the first author.

Similar analyses apply to technical works. These works deal with established "facts," defined objectives and a shared, acceptable methodology. There are few ways to express the theory of relativity in mathematical terms, and accepted methods must be used for a formal "proof" of the theory. Neither can be copyrighted. Both have value to the first author, but copyright protection of the "expression" would severely restrict future authorship on the subject. Numerous generic conventions and symbols in technical writing similarly are not protected. In architectural drawings, for example, it would be harmful to copyright either the use of 90° angles to describe room corners, or the use of conventional depictions of the window or door. These are central to the first work, but they are not unique. Given the limited variations available, barring "copying" of the symbols would hinder, rather than promote creativity.<sup>71</sup>

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70. 17 U.S.C. § 101 (1982); 1 M. NIMMER, *supra* note 11, § 2.11[A]; Gorman, *Copyright Protection for the Collection and Representation of Facts*, 76 HARV. L. REV. 1569 (1963).

71. See *Tompkins Graphics, Inc. v. Zipatone, Inc.*, 222 U.S.P.Q. (BNA) 49 (E.D. Pa. 1983).

This does not suggest that there is no copyright protection for factual or technical works or that unauthorized copying is permitted.<sup>72</sup> Rather, due to the nature of the work, copyright draws the line of protection further toward prohibiting only literal copying of an entire work. This ensures freedom to use ideas, facts and common symbols, except in the same complex combination as used by the first author. One authority describes this as requiring proof of copying of "copyrightable elements."<sup>73</sup> Infringement occurs only if those elements are copies that contain protected (protectible) expression. Significant and substantial similarity may exist without such appropriation, but does not support a claim of infringement.

The comparison of fiction and technical works documents a basic theme. Expansive protection for fiction works protects the author and is proper because it does not substantially restrict subsequent authors. In technical works, decisions that extend protection beyond literal copying may affect subsequent authorship. The underlying purpose of copyright remains constant, but the application is different.

[T]hat a work is copyrighted says very little about the scope of its protection . . . . As a work embodies more in the way of particularized expression, it . . . receives broader copyright protection. . . . [The] "strongest" works [are those] in which fairly complex or fanciful artistic expressions predominate over relatively simplistic themes and which are almost entirely products of the author's creativity rather than concomitants of those themes.<sup>74</sup>

### B. Computer Program Infringement

"Value-added" use of a computer program occurs when the second author does more than literally duplicate the first program, making more than trivial changes in it. The fact that the second party engaged in independently creative work requires an analysis of infringement that balances the rights of the parties and the interests that each represents. Copyrightable aspects of some programs resemble fiction works and properly fall within an analogous analytical structure. In other contexts, the character of the program and the technology requires an analysis and outcome more analogous to technical works.

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72. See *Affiliated Hosp. Prods. Inc. v. Merdel Game Mfg. Co.*, 513 F.2d 1183, 1188 (2d Cir. 1975); *Decorative Aides Corp. v. Staple Sewing Aides Corp.*, 497 F. Supp. 154 (S.D.N.Y. 1980), *aff'd*, 657 F.2d 262 (2d Cir. 1981); *cf. Morrissey v. Procter & Gamble Co.*, 379 F.2d 675 (1st Cir. 1967).

73. 1 M. NIMMER, *supra* note 11, § 2.18[A-D].

74. *North American*, 672 F.2d at 616-17.



## 1. Model of Analysis

It is important to clearly identify the competing interests. The copyright proprietor desires to maintain and maximize statutory rights to control use of the original work and preparation of derivative works. This personal objective is supported by social policies to establish economic incentives for creative work. Two preliminary premises arise. First, the strength of the copyright claim increases to the extent that the alleged infringement incorporates aspects of the work that define its commercial, scientific or creative value. Second, the strength of the copyright claim increases to the extent that the conflicting work directly affects identified and realistically important markets for the work.

The aspects of a program that are most valuable differ for a video game than for a statistical analysis program. In one case, aesthetic impact is critical, while in the other speed and reliability of operations are important. Describing a feature as commercially significant, of course, does not necessarily mean that it is protected against all subsequent use. Protection might unduly impinge other interests and to that extent, should be limited.

There is variance in market protections. Protection for the original author should increase if protection relates to avoiding harm to existing markets, while it should be reduced if the alleged infringement pertains to markets that the first developer is unlikely to enter. A desire to establish "compatibility" or to replicate all aspects of an original has a strong effect on the original market. Compatibility is an effect to exploit markets created by the first program, supplanting the original. In contrast, market effects of adapting a program to a computer that cannot be accessed by the original is less clear, but does affect a market that the original developer is likely to pursue. Creating a totally new program with new functions or features has a low impact even if some aspects or methods of the first program are reproduced.

The second party's position strengthens to the extent that foreclosing its actions creates de facto control over replicating operations of a system. This flows from the statutory requirement that copyright not extend to processes, and distinguishes copyright from patent law. The analysis is not equivalent to the "process-expression" identity analysis, however, since it does not stop with the conclusion that there are alternative methods of producing the same operations. The infringement issues examine the degree of preemption. One author can describe an historical event in many ways, but there is no copyright protection for the historical fact.

The second party's position also strengthens to the extent that protecting the copyright owner creates artificial barriers to subsequent work in the field. This also entails a preemption analysis. Protection of a copyright claim should be structured to reduce its potential to distort future work on the same subject. Elements of a work may be construed as idea content of the program or unprotectible, generic methods if protecting them would signif-

icantly distort future work. In this regard, limiting copyright protection so as to permit unknowing, independent development alone is inadequate. Absent patent protection, subsequent technology developers have a right to use aspects of new techniques and ideas central to their science. Especially in a technical field, the risk of copyright liability creates a chilling effect, inducing developers to avoid examining earlier work. Subsequent workers need not operate in ignorance of the work of others, and copyright should be structured not to induce them to do so. New technology develops with knowledge of prior work.

As this suggests, the copyright holder's interest is offset by policies to maintain free use and access to aspects of a work that are or become central to the field of technology.<sup>75</sup> This reduces protection in direct proportion to the increasing, general importance of methods, styles of treatments, but this results from an important distinction between copyright and patent protection. Patent, with its high entry threshold, protects basic methods. A second author should be free to selectively use portions of the original that are central to the field. Many program subroutines are or become "tools of trade." A programmer who develops an effective method of doing a calculation does not obtain control over this method.

Einstein's discovery of the relationship between energy and matter did not create a copyright of the formula, even though the discovery was creatively significant and valuable. Limits are justified to avoid substantially restricting future scientific work. The analysis is not that no other ways exist to express

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75. Substantial similarity incorporates policy considerations that protect third party rights. The rights of the copyright proprietor, in addition, are subject to the doctrine of fair use, an equitable doctrine recognized in § 107 of the Copyright Act. Notwithstanding the copyright, the "fair use" of a copyrighted work is not an infringement. Section 107 contains a non-exclusive list of factors considered in fair use. These include: (1) the purpose and character of the use including whether the use is for commercial or nonprofit purposes; (2) the nature of the copyrighted work; (3) the amount or proportion of the original work that is used; and (4) the effect of the use on the "potential market for or value of the copyrighted work." The statute does not specify the relative weight or importance of these or other factors. A leading treatise suggests that the primary factor is the effect of the use on the potential market for the original work and whether the alleged fair use and the original work have a similar function. See 3 M. NIMMER, *supra* note 11, § 13.03[B]. This approach emphasizes the impact on the author of the original work. Others emphasize that fair use should be restricted to "productive" uses that do not substantially affect the market available for the original author. See *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417 (1984) (Blackmun, J., dissenting). This second half of the balance focuses on what the user does with the copyrighted work and protects conduct that provides a social benefit. A productive use entails use of the original to build another creative work, including a criticism or review. A convergence of productive use and minimal impact on the original author creates a clear case of fair use. The law relating to fair use was recently restated in *Sony*. *Sony* involved alleged contributory infringement of motion picture and television copyrights through distribution of video cassette recorder systems (VCR). The majority emphasized that the copying was for non-profit, private purposes. For noncommercial use, there is no infringement unless there is proof of a particular harm or that, if the practice became widespread, it would adversely affect the market for the copyrighted work. Such harm can be presumed if the use is a commercial use.

the operation. The focus concerns the degree of distortion that protecting the first author would impose on future work. In many cases, the "secondary" works make equal or greater impact and entail significant creativity. Loss or inhibition of this field of development reflects a major social loss not always offset by commensurate gains in terms of "first" developer work.

The second party's interests do not justify comprehensive, literal copying, but rather productive or developmental use. As a result, an additional factor pertains to the degree of direct copying. If the original was totally copied, this refutes a claim that the infringer used only important aspects of the technology and developed its own product. It increases the likelihood that unique parts of the original were duplicated and that there is a large market effect.

These are not absolutes. A "degree of effect" analysis applies. The issues are: (1) how will denying protection affect the program's marketability and uniqueness, and (2) will a decision to protect the first author preempt and distort future work in the field?

## 2. Audiovisual Copies

Audiovisual displays and other output potentially are copyrightable. Most copyright cases involving program output deal with video games. In the earliest cases, the infringement included copying all pertinent sights and sounds. Later cases involved modifications of the original, creating games that were similar but not identical. In these cases, substantial similarity standards are analogous to those for fiction works. They preclude copying of commercially significant and unique elements of the game to the extent that this can be done without impeding subsequent, conceptually similar games.

In *Atari, Inc. v. North American Philips Consumer Electronics Corp.*,<sup>76</sup> Atari obtained a preliminary injunction against the game "K. C. Munchkin" which was allegedly copied from Atari's "PAC-MAN." Both games were "maze-chase" games in which the player moves a character through a maze pursued by other video characters. In both games a gobbler goes "through the maze consuming dots and avoiding capture by the [ghost] monsters; by gobbling a power capsule, the player can reverse the roles [of the gobbler and ghosts]; and the ultimate goal is to accumulate the most points by gobbling dots and monsters."<sup>77</sup> The color, structure and appearance of the mazes, the configuration of escape tunnels for the gobbler, and the color of the characters differed. The ghost characters, however, had significant similarities, and the gobblers shared a distinctive V-shaped mouth.

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76. 672 F.2d at 607.

77. *Id.* at 611.

The United States Court of Appeals for the Seventh Circuit concluded that there was sufficient similarity to grant an injunction. The Seventh Circuit applied an "ordinary observer" test to the question of improper copying. This approach involved a "dissection" of the works to exclude similarities based on ideas and "incidents, characters or setting which are as a practical matter indispensable, or at least standard, in the treatment of a given topic."<sup>78</sup> Based on this approach, the Seventh Circuit characterized the "ideal" of PAC-MAN as a maze chase game in which various aspects of the game were *scenes a faire* protected only against identical reproduction if at all. There was, however, an infringement in a substantial appropriation of the PAC-MAN characters.

The expression of the central figures as a "gobbler" and the pursuit figures as "ghost monsters" distinguishes PAC-MAN from conceptually similar video games. . . . PAC-MAN'S particular artistic interpretation of the game was designed to . . . appeal to a nonviolent player personality. The game as such, however, does not dictate the use of a "gobbler" and "ghost monsters."

. . . .

North American not only adopted the same basic characters but also portrayed them in a manner which made K.C. Munehkin appear substantially similar to PAC-MAN.<sup>79</sup>

Given "substantial similarity" in the characters, the Seventh Circuit concluded that other specific differences in the games were immaterial. The "ordinary observer test" focuses on overall impression, rather than technical difference. This is especially true for a video game because users are generally indiscriminating about subtle differences. The infringing game copies the "total concept and feel" of the original work.

In contrast, in *Atari v. Amusement World Inc.*,<sup>80</sup> the Maryland district court concluded that there were insufficient similarities in the games of "Meteors" and "Asteroids." Both games involved a central figure, portrayed as a spaceship, which destroyed floating rocks by firing projectiles at the rocks. There were differences in the design and color of the rocks. The court concluded that the defendant had copied the idea for "Meteors" from "Asteroids," but that the similarity was due to the copied idea, rather than expression. "[The similarities are] inevitable, given the requirements of the idea of a game involving a spaceship combating space rocks and given the technical demands of the medium of a video game."<sup>81</sup> Discounting similarities

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78. *Id.* at 616 (quoting *Alexander v. Haley*, 460 F. Supp. 40, 45 (S.D.N.Y. 1978)). In *Alexander*, the court used this formula to identify aspects of a literary work that did not warrant copyright protection. The *North American* court explained that this formula could also be used to identify aspects of games which should not be protected. *North American*, 672 F.2d at 616.

79. *North American*, 672 F.2d at 617-18.

80. 547 F. Supp. at 222.

81. *Id.* at 229 (emphasis added).

based on the idea of the game, the court concluded that the differences (e.g., color and design) were significant and contradicted a finding of substantially similar expression.

These results reflect the level of abstraction used in defining the *idea* of the game.<sup>82</sup> The court in *Amusement World* could have characterized the idea as a game involving the destruction of threatening objects by a central figure. Under this characterization, the choice of similar objects (spaceships and rocks) might be an infringement. The *North American* court, in contrast, could have defined that *idea* as involving ghost figures and a gobbler in a maze. Under that view, the characters are unprotected. These recharacterizations would alter the outcome in both cases since they redefine the protectible expression.

The cases illustrate the elasticity of the idea-expression distinction applied to computer programs resembling fiction works. The results are not arbitrary or inconsistent. In defining an appropriate level of abstraction for the idea of a work, the court balances protection of the original author against resulting restraints on subsequent authors. One aspect is to identify commercially or artistically central elements of the first work and to determine what effect protecting these would have on subsequent works. In PAC-MAN, the gobbler character was central and had become well known and widely recognized. A level of abstraction that did not protect this character would in effect allow the game to be appropriated. Even if the character is protected, however, there is a wide latitude for subsequent works. These can include ghosts and gobblers since both figures can be drawn in numerous ways. The "Asteroids" rocks, in contrast, were less significant to that game than the concept of a space encounter with objects to be destroyed. Protecting the rock designs would restrict subsequent works since there are limited ways to draw a two-dimensional rock. Protecting the concept of a space encounter would respond to the commercially valuable content, but would be even more restrictive of future works.

### 3. Source and Object Code Similarity

Source and object code are copyrightable, but the structured and limited language of program code makes distinctions between idea and expression difficult. The functional purpose of the program and a shared technical objective of speed and efficiency of performance restrict "expressive" options. While some code creates expressive output, other code directs machine performance of specific functions. This code is not chosen for aesthetic value. Given agreement about function, there is an accepted goal to create code that optimizes performance. These characteristics increase the risk that copyright protection of the first work will adversely affect development of subsequent works.

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82. See also *Williams Elecs.*, 568 F. Supp. at 1274; *Dirkschneider*, 543 F. Supp. at 466.

The infringement issue is not whether this environment justifies denial of all protection. Rather, as with factual and technical works, the nature of the art limits the scope of protection that-is consistent with appropriate policy. Programmers may use different methods or sequential operations to achieve intended results. An emphasis on this, however, avoids the policy issue if the purported conclusion is that subsequent programmers should not be free to use an identical sequence or method. There is a need to protect the original but to avoid preempting other applications of technology. If there are similarities in two programs, the analysis of whether the similarities are sufficient for infringement requires consideration of competing interests relating to both the original developer and the ability of third parties to engage in technology development based at least in part on ideas and innovations in prior work.

An infringement based on substantially similar code was found in *Midway Mfg. Co. v. Strohon*.<sup>83</sup> *Strohon* dealt with the video game PAC-MAN. The infringing work was a modification and speed up kit. The insertion of the kit according to instructions speeds the movement of the characters in the maze game, but also eliminated the PAC-MAN characters, themselves, replacing them with other figures. Compliance with less than all of the instructions would enhance speed, while retaining the original characters. At least some purchasers of the kit used it in this latter manner.

The lawsuit was against the distributor of the kit. The United States District Court for the Northern District of Illinois found that there was no infringement of the audiovisual copyright since the "intended" modifications in the kit removed the PAC-MAN characters and thus did not reproduce the protected display. The distributor was not liable for uses that retained the audiovisual display.<sup>84</sup>

The court nevertheless held that the object code of the PAC-MAN game was copyrightable and was infringed by the code in the modification kits.

[Eighty-nine percent] of the 16,000 bytes [were] identically reproduced. . . . 13,382 contain actual sequencing instructions, as distinct from data that appears directly on the screen . . . . Midway's experts identified three long strings of identical locations.

. . . .

The degree of similarity . . . is substantial. [T]here is virtually an infinite number of ways to write . . . program instructions that will produce the . . . game sequencing. . . . It is thus not at all necessary that the assembly code or object code phases of a computer program that would operate a maze chase game track the PAC-MAN program.<sup>85</sup>

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83. 564 F. Supp. 741 (N.D. Ill. 1983).

84. *Id.* at 748-49.

85. *Id.* at 752-53 (footnotes omitted).

The court's analysis was incomplete. The court assumed that all of the object code was protected so long as other programs could be written to operate a maze game. This confuses copyrightability analysis with an analysis of whether copyrightable elements were infringed. The court's approach adopts a very general concept of an "idea" and concludes that the entire code and sequence of instructions is expression. This implicit assumption was reached without analysis. There was no examination of the extent of similarity inherent in any chase game or of the relationship between the code and the unprotected elements of the visual game. The court made no effort to identify what code, if any, might be standard in the trade.

Despite the deficiencies, the decision is correct. The modification kits clearly were oriented to compete in a market consistent with probable future development of PAC-MAN. This becomes especially clear if one focuses on the apparent intent that the kit be used to speed up PAC-MAN without replacing copyrighted characters. In any event, the kit exploited the PAC-MAN program base. The developers did little innovative work on the basic PAC-MAN program since there was an over eighty percent similarity in code. There was no proof that describing this level of appropriation as infringement limits development of other games or that the copied code was central to video game development.

The omitted analyses are essential to resolve close cases in a manner that adequately protects third party developers. An infringement exists only if similarity in code is divorced of standard phrases or repeated ideas in the second program. Separating ideas and expression entails a policy choice defining the degree of protection justified for a particular work. If artistic expression in the program (text, visual images) is not at issue, only the most proximate copying and virtually complete similarity should be actionable. An eighty percent reproduction meets this criteria.

#### *D. Structure and Sequence: Computerization*

Even with inadequate similarity in code, infringement can exist in the reproduction of program sequence or structure. In copyright, this requires a conclusion that the sequence or structure of the program constitutes protected expression independent of a particular code. Sequence and structure are important aspects of a program that may contribute to performance, speed and capability. Protecting structure, rather than aesthetic appeal or code, however, risks substantial restraints on subsequent design and development. It grants the copyright proprietor some control over methods or processes of machine operation. Control in this form can be justified, but the justification must be closely examined in each case.

This issue arises in transformations of manual or mechanical methods and procedures into computer environments. Insofar as technology rather than games are involved, the transformation process entails adapting methods

and organization from a manual or other statement of procedure into commands for a computer. In one view, this represents mere translation from one language to another (English into "computer"), even though the process actually entails quite different activities since a computer operates in ways that are distinct from those suitable for humans.<sup>86</sup> An alternative conception regards the transformation as analogous to adapting a fiction novel into a motion picture. The copyright proprietor claims control of both activities.

As is often true in dealing with computer law issues, easy analogies distort significant distinctions. In this case, there are differences between converting methods and systems, rather than characters and plots. Copyright does not protect methods of calculation, processes of analysis or other procedures, but only extends to expression. The plot of a novel identifiably transformed to a motion picture or the characters list in a play represents a taking of protected expression from the original author. By contrast, converting an operations manual or system of computation to a computer transfers the method and process. A judgment must be made about when this unprotectible element of a technology can be protected by the original "author." Because of the statutory mandate, the judgment cannot grant de facto control over the process or method to the original author in the guise of protecting against adaptive infringement of copyright.

The earliest case dealing with sequence and structure was *Synercom Technology, Inc. v. University Computing Co.*<sup>87</sup> In *Synercom*, the defendants marketed a structural analysis program with an input format innovated by Synercom. The Synercom format involved manual organization of data prior to entry in a computer. Forms and procedures were published. Since Synercom's computer analysis program was a commercial success, defendants designed their analysis program to accept input identical to that used in the Synercom product. This was done with a preprocessor computer program. The FORTRAN statements in the preprocessor program were "derived directly and precisely from the copyrighted manual card formats."<sup>88</sup> Synercom argued that this was an infringing translation of its copyrighted work.

The United States District Court for the Northern District of Texas characterized the issue as whether the "sequence and ordering" copied by defendant was protected expression or unprotected idea. It held that the sequence was an unprotectible idea, analogizing it to an automobile manufacturer's selection of a figure-H format for manual transmissions. "The pattern . . . may be expressed in several different ways . . . [b]ut the copyright protects copying of the particular expressions . . . and does not prohibit another

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86. See, e.g., *E. F. Johnson Co. v. Uniden Corp. of Am.*, 623 F. Supp. 1485 (D. Minn. 1985); *Whelan Assoc., Inc. v. Jaslow Dental Laboratory, Inc.*, 609 F. Supp. 1307 (E.D. Pa. 1985).

87. 462 F. Supp. 1003 (N.D. Tex. 1978).

88. *Id.* at 1012.



manufacturer from marketing a car using the same pattern.”<sup>89</sup> The allegations of infringement were an effort to control reproduction of a process for entering data into a program.

The court’s alternative holding was that, if the sequence was expression, the format was not copyrightable. There was then an identity between idea and expression.

Here if order and sequence is the expression, the skilled effort is not separable, for the form, arrangement, and combination is itself the intellectual conception involved. It would follow that only to the extent the expressions involve stylistic creativity *above and beyond* the bare expression of sequence and arrangement, should they be protected. . . . The “idea or principle” behind the forms . . . and the “method or system” involved in them, would be no more or less than the formats.<sup>90</sup>

The court’s conception of the idea in the data formats encompassed the entire format.

In *Synercom*, the particular input format was not the only method available for entering data into a structural analysis program. The defendants elected to seek “compatibility” with Synercom since it was a market leader. If denied the right to do so, their market entry would have been impeded even though the processing program *core* of their product was not similar to the Synercom program. The decision embodies a judgment that this effect is not justified where the second author did not merely copy the first work, but authored a new work in a different technological environment as part of a much larger activity. This policy choice permits a new program in direct competition with the original. Protecting the Synercom format, however, would preempt a process for data entry and might distort future development. Based on the court’s conclusion, the format can be freely replicated in any subsequent work.

*Synercom* involved a substantially new work. The preprocessor designed to accommodate particular data entry procedures represented a small part of the larger program. The defendant creatively designed its own product and translated the plaintiff’s manual operations into a computer environment. The circumstances yielded a strong case for protecting the second developer’s use. The scope of reproduction was limited to a particular feature of the original and did not involve mere literal copying, but adaptive work of some creativity. While market competition resulted, the products nevertheless were distinguishable based on the larger, uncopied analysis programs to which the data entry process attached. The original author did not contemplate development of a new analysis program such as the one used by defendant.

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89. *Id.* at 1013.

90. *Id.* at 1014 (emphasis added).

Translation from manual to computer contexts is an economically significant activity. Decisions about such translation define the scope of the original copyright in arguable "traditional" works and, equally important, the range of material available for the program developers to engage in technologically and commercially significant development. The adaptive environment resembles transforming a fiction book into a motion picture, but the direct involvement of technology and methods significantly alters the analysis. In cases dealing with such technology, the computer developer directly transforms the forms of organization, the calculation and the performed operations to a structure and schemata consistent with computer operations. Granting the first author protection of these is not equivalent to protecting the plot developed by a novelist since there is not only a statutory bar against protecting processes, but the practical fact that protection distorts future development of technology. Creation of an original work describing a method of calculus does not give the author control of that method in all environments. Even patent protection cannot extend to mathematical formulae and operations as such.<sup>91</sup>

The issues about protection close as the degree of detailed translation increases, although even when there is literally exact reproduction of an initial procedure, the second party's rights remain strong. *Williams v. Arndt*<sup>92</sup> demonstrates the risks in accepting the premise that the first author's protection extends to computer applications of methods. In *Arndt*, the Massachusetts district court misplaced the analysis, protecting procedures, methods and results in the name of protected expression.

*Arndt* involved a system for commodities trading developed and marketed by plaintiff. The system was described in manuals that the court held to be copyrightable and protected. The manuals outline a detailed, step-by-step set of procedures in commodities investment decisions. Defendant created software that achieved the same analyses and produced similar results, but benefited from the speed of the computer and the fact that automatic calculations can more rapidly control trading decisions.

The defendant argued that the source code of the alleged infringing program was a "new and different expression of the idea of a market trading system." The court rejected this "novel" argument, treating the copyrighted manuals as a detailed flow chart used by the infringing programmer. The court's analysis accepted, without close scrutiny, the analogy between computer adaptation and translation from a foreign language. It assumed that the programmer's role was analogous to the medieval scribe, merely transcribing the work of another.

[A] source code is not an entirely new, unique expression of ideas.

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91. *Id.* at 1012.

92. 626 F. Supp. 571 (D. Mass. 1985).

The computer programmer writes in computer language the commands necessary to implement the direction provided in the narrative. The computer language can be compared to any foreign language. . . . To a skilled programmer, the conversion of known input . . . the mathematical expressions needed and the methods of transferring those expressions into computer language is necessarily a mere clerical function.<sup>93</sup>

It is probably correct to emphasize that, without more, transformation of expression into source code does not create a distinct, new work any more than translation into French creates a new book. This leaves unaddressed the difficult issue of defining what constitutes expression and deciding whether that was taken. In this regard, the court clearly confused processing capability and outcomes of calculations with protected expression. At most, the original copyright protects expression, but cannot give the author control of analyses that create particular outcomes. Yet the court implied that this was exactly the character of the alleged infringement. It observed that one objectionable feature of the "translation" was that it enabled an experienced trader to more rapidly reach a decision than did the manual procedure. Similarly, while "the skilled programmer can provide flexibility, neatness, and clarity in arranging the order of the system, the programmer . . . does not express creativity, imagination, independent thought and uniqueness."<sup>94</sup>

If order and clarity of arrangement are not the expression, what is? The court makes abundantly clear that the outcome and underlying analysis system was protected. In this regard it is clearly wrong.

[The] source code contained similarities which generated identical signals in the vast majority of comparisons. Here, Arndt merely translated Williams [sic] work from English into computer language. . . .

. . . .

The most graphic evidence of substantial similarity was the comparison of the FTM with both programs Arndt had offered . . . . Picking a commodity—live cattle . . . James Stack went through a step-by-step process of both systems . . . . The FTM result was essentially the same as the result reached by running the Trend Counter Trend system. . . .<sup>95</sup>

What the court describes as the most striking example of substantial similarity is, in fact, no evidence of actionable similarity at all. Copyright does not deal with or protect analytical results, nor should it. The first author of a new theory or computation system does not obtain control over the results of the system even under patent law.

The *Arndt* result is supportable, if at all, only because of the detailed character of the copyrighted manuals and the defendant's literal and comprehensive reproduction of the operations they describe. Even then, the preoccupation with the creation of comparable "results" in output indicates

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93. *Id.* at 577.

94. *Id.* at 578.

95. *Id.* at 579.

that the court failed to focus on the protectible portion of the manual, if any such existed. Sequence and structure of a complex program can be protected expression to the extent that literal copying occurs, but care must be exercised to avoid protecting analytical methods that create desired results.

The clear risk entails foreclosure of technically and economically significant activity in the name of protected expression. Courts must clearly and explicitly balance competing rights. To avoid improperly foreclosing important activity, at least three conditions should coexist before protection to the first author applies in cases where no identifiable character, story line or item of literary fiction value is taken. These are: (1) there must be comprehensive transcription of a complex and lengthy product and not merely selective taking of portions of the technology; (2) the result must be directly competitive with the original in a market into which the first author is likely to enter; and (3) the transcription must represent the majority or essential core of the original and the new product creating direct and pervasive competition based on the first author's work. These conditions were not met in *Synercom* and the court properly rejected the copyright claim against the input format. In *Arndt*, the apparent facts more closely support the outcome, but the court's analysis deals inadequately with analysis of expression to assess the outcome.

### *E. Structure and Sequence: Adapting Programs*

The three transcription factors balance the rights of the original author and the value-added developer. Their application is demonstrated in a related form of computer program adaptation work. *Synercom* and *Arndt* deal with computerization of manual processes. Other cases deal with new programs based on existing software. This kind of secondary development entails either of two distinct formats. In one, the second developer examines the first program, adapting some methods and techniques, but adding additional and different personalized functions and coding. This creates a new program with distinctive expressive and performance characteristics. The second common process attempts to recreate and reproduce the original program and operations, adapting them to a new computer language or hardware environment.

Both methodologies create valuable products and entail complex creative work. The two differ in the extent and character of reliance on the original work and in the manner in which the new product impacts markets for the old. The developer who selectively uses proven approaches and aspects of the first, while adding significant and nontrivial personal value, merits greater protection than the literal transcriptionist.

Assessing the copyright status of either approach and the many interstitial variations that occur requires consideration of what elements of a program are protected and what elements are not. Copyright does not protect what the program does, how it conducts particular operations, or what analytical

outcomes the calculations create. Copyright protects expressions. Expression in a program includes the source and object code. Extending beyond that, the original programmer arguably should control some adaptive works even though literal reproduction of code does not occur. The mere fact that each type of adaptive computer work uses new and divergent coding does not insulate the second developer. Protection not based on code similarity, however, cannot be transported to protection of calculations, methods or outcomes. The protectible features of the complex program beyond its particular code are the organization, sequence and other "expressive" structural characteristics. At some level, at least, close and comprehensive replication of the sequence and structure of a complex program can be barred without substantially deterring future development work since it is seldom essential to use a large, complex system in its entirety in order to develop new products and technologies.

The cases deal with transcriptions whose effect is to transport an entire, complex program to a new hardware environment. The translation substantially replicates the original, with no modifications to improve or alter performance. The decisions protect the structure and sequence of the complex original program, if there is evidence of literal and comprehensive replication.

In *Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc.*,<sup>96</sup> the first program ("Dentalab") was developed by the predecessor of Whelan working with the defendant. The dispute focused on defendant's subsequent program for the IBM PC which was developed by modifying the code of the original. It substantially duplicated the video display and operating functions of the original and was sold under the name "DENTLAB."

The two programs did not contain similar code, because they were written in different programming language adapted for a different computer. As the court acknowledged, even if literal reproduction is desired, it is inefficient and may be impossible to simply transcribe code from one language to another. The process instead "requires a study of the manner in which the information flows from one function to another. Once this is understood, one may copy this exact manner of operation for use in a computer that responds to commands written in a different source code language."<sup>97</sup> The infringement claim focused on similarity in sequence and operation.

In *Whelan*, the claims of the original author were factually strong. The defendant desired a literal copy of the first program in a new environment, duplicating the operations of the original, rather than developing a different and distinct program. To users, the products appear identical. Visual and interactive similarity was enhanced by a marketing strategy using a similar name and suggesting that the new product *was* the original adapted to a

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96. 609 F. Supp. at 1307. See Davis, *supra* note 42; Chertok, *supra* note 42.

97. *Whelan*, 609 F. Supp. at 1321.

less expensive environment. The market for the new program was substantial. The original author had actually developed its own product based on its original program for this same market.

The defendant's activities did not clearly present socially valuable, value-added use unless translation itself is separately valuable. The defendant attempted to capitalize on the reputation of the original, rather than construct a new product. It made no attempt to make substantive changes in the original. There was no proof or allegation that ability to replicate the *entire structure* of the complex first program was essential to continued development in the field.

The United States District Court for the Eastern District of Pennsylvania found an infringement of the original program based on a decision that the method of operation was the copyrighted expression: "The 'expression of the idea' in a software computer program is the manner in which the program operates, controls and regulates the computer in receiving, assembling, calculating, retaining, correlating, and producing useful information either on a screen, print-out or by audio communication."<sup>98</sup>

The court's view of protected expression reflects a broad conception of the idea of the program. The idea apparently consisted simply of the notion of a computer program for "operating a dental laboratory." In a fiction novel, the equivalent defines the idea of *War and Peace* as a "novel about society." The definition creates expansive protection of the original author and is unnecessary to the result.

Divorced of the strong factual case for the original author, the court's description of the protected expression as the manner in which the machine "operates," "calculates" and "receives" data defines the process itself. The error is like that in *Arndt*. On balance, however, the result is best interpreted as a judgment that the strength of the original author's claims outweighed constraints against protecting machine processes.

A similar, but better focused analysis occurred in *SAS Institute Inc. v. S & H Computer Systems, Inc.*<sup>99</sup> *SAS* involved an infringement of a multi-

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98. *Id.* at 1320.

As this Article went to press, in an opinion consistent with the analysis recommended here, the Third Circuit affirmed the *Whelan* decision. *Whelan Assocs. Inc. v. Jaslow Dental Laboratory, Inc.*, 797 F.2d 1222 (3rd Cir. 1986). The court expressly acknowledged that the distinction between expression and idea involves practical line drawing to balance incentives for the author and flexibility for third party development. Expression consists of any aspect of a program not essential to its purpose or function. Here, the purpose was to aid in efficient operation of the dental lab. The organization and structure of the program was expression because there are many ways to organize a program for this function. In treating organization as expression, the court emphasized the "comprehensiveness and complexity" of the file structure. *Id.* at 1243. A less complex organization might not constitute expression. A finding of infringement was supportable because of the virtual identity of five important subroutines or sequences from the first work. The Third Circuit avoided any indication that expression entails the way a program "operates" or "controls" the computer. *Id.* at 1235-40.

99. 605 F. Supp. 816 (M.D. Tenn. 1985).

faceted statistics program widely used in the social sciences. At the time of the alleged infringement, the program was available only for IBM computers, although SAS had begun development on versions to operate on Digital "VAX" and other computers.

The infringement involved unauthorized development by S & H of a statistical package for operation on a VAX computer where it was viewed and modified by programmers developing the surrogate. The resulting "new" program was not identical to SAS, but closely followed the complex organization and structure of the SAS program and contained some identical code.

The factual circumstances strongly favored the original developer. The second product affected a market that SAS was preparing to enter. The translation replicated all significant statistical analyses and data formats in SAS. It encompassed aspects that made SAS unique and contributed to its market value. S & H made no significant effort to *improve* the original or *modify* it beyond the changes necessitated by the new machine. S & H simply reproduced, insofar as possible, all attributes and characteristics of SAS.

The United States District Court for the Middle District of Tennessee correctly concluded that the S & H program was an infringing copy of the SAS program. The infringement involved *both* substantial similarity in code and substantial similarity in structure and organization. The court found at least forty-four documented instances of literal duplication of code. It concluded that additional literal duplications were erased after the dispute arose. Erasures and modifications did not "represent any effort to improve the S & H product, but rather represent an effort to mask and disguise evidence of copying."<sup>100</sup> The S & H product incorporated undocumented and incomplete options identical to options in the SAS program, but which served no purpose in either program. The similar code did not reflect similarity of idea, but of expression.

S & H presented no evidence that the functional abilities, ideas, methods, and processes of SAS could be expressed in only very limited ways. On the contrary, the Court finds that to the extent that similarities between SAS and the S & H product have existed, they represent unnecessary, intentional duplication of expression.<sup>101</sup>

The court's standard incorporates the idea-expression identity test, but the reference to unnecessary and intentional duplication creates a potentially useful focus. Copying occurs when the second programmer *chooses* to duplicate, rather than create in a context where a realistic choice exists. Repetitive choices to duplicate contradict claimed new product development.

The court found actionable similarity in structure and organization. S & H alleged that it adopted the SAS structure and then independently developed

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100. *Id.* at 823.

101. *Id.* at 825.

code. The trial court concluded that this procedure was not actually followed, but even if it had been, duplication of a complex organization created substantial similarity of expression. The detailed organization and structure of the SAS program was protected expression.

The SAS court relied on *Meredith Corp. v. Harper & Row, Publishers, Inc.*<sup>102</sup> *Meredith* involved an infringement of a textbook where the second author used a detailed outline of the original and created text within the outline. The United States District Court for the Southern District of New York in *Meredith* concluded:

I find . . . an extensive taking of the structure and topical sequence . . . in addition to the eleven percent admittedly plagiarized. . . . [While] the Meredith text contains *some* independent ideas . . . *some* independent research, *some* additional topics and *some* different structure, the topic selection and arrangement of the Meredith book are in substantial part the result of copying . . . not attributable to independent effort by Meredith or the necessary result of limited possibilities for organizing and presenting the material to be covered.<sup>103</sup>

The analysis was proper in this case. Defining organization and structure as expression, rather than as unprotected idea, is appropriate if the order and organization of material are essential attributes of the unique value of the first work. This was true in *Meredith*. In a textbook, organization and order of presentation are significant, perhaps more important than textual expression. This importance defines the first author's interest in protecting the structure. In complex computer programs such as SAS, the structure may be less obviously relevant to a user, but is important to the work.

A conclusion that structure is expression is appropriate only if the duplicated structure encompasses the detail and entirety of the organization of a *complex* work. The organization infringed is not general structure, but the cumulated series of specific decisions made in organizing a complex mass of material. This is an important limitation essential to preserving flexibility for subsequent authors. The level of specificity at which structure becomes expression varies, but cannot be set at a general level without significantly inhibiting subsequent work. A complex structure duplicated to a significant degree of detail represents infringement. As the court in *SAS* noted, a complex program presents a "virtually endless series of decisions as to how to carry out the assigned task."<sup>104</sup> Duplication of some structural elements and organizational features is neither surprising, nor actionable. Comprehensive duplication of virtually the entire organization, including unnecessary detail, infringes the complex structure.

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102. 378 F. Supp. 686 (S.D.N.Y. 1974), *aff'd*, 500 F.2d 1221 (2d Cir. 1974).

103. *Meredith Corp. v. Harper & Row, Publishers, Inc.*, 413 F. Supp. 385, 386 (S.D.N.Y. 1975) (emphasis in original).

104. *SAS*, 605 F. Supp. at 825.



The duplication of structure must not be based on independent effort or necessity arising from the subject matter and alternatives for effectively organizing information. This defines the strength of the third party's claim. *SAS* is characteristic of the extreme case of copying as contrasted to necessary use. A market leader is selected as a "model" for the new work. Within the detailed outline of the original, some new text and some research is added. Slight name and reference changes may conceal the scope of duplication. The overall process transparently seeks to reproduce the original with minimal modifications.

These considerations were important in *SAS* and weighed toward a conclusion that infringement occurred. The combination of verbatim copying and unnecessary design choices that duplicate the original program created a similar result in *E.F. Johnson Co. v. Uniden Corp. of America*.<sup>105</sup> In *Uniden*, defendant reverse-engineered software central to a two-way, land based mobile radio transmission system. Uniden developed its new system by disassembling the competing Johnson software, reproducing it in readable form and studying flow charts of the program and hardware service manuals. The Uniden product used a Hitachi microprocessor, while the Johnson product used an Intel microprocessor. The microchips have different performance requirements and capabilities.

As in *SAS*, the Minnesota district court found an infringement involving both literal recreation of the original program and in numerous design choices orienting the "new" program to be organized identically to the original. As in other cases, these "development" choices were intended to reduce independent design costs and create a compatible system.

The court found substantial similarity under both the ordinary observer test and what it described as the iterative approach.<sup>106</sup> The court acknowledged that transferring a program to another language and hardware environment is not comparable to translating a book, but entails greater analysis and adaptation of underlying organization. In addition, "disassembled versions of the same program would not exhibit line-for-line correlation . . . . For these reasons . . . line-by-line comparison [is] unconvincing."<sup>107</sup> There nevertheless was substantial verbatim copying, including the reproduction of unnecessary code from the Johnson software. This reflects duplication rather

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105. 623 F. Supp. 1485 (D. Minn. 1985).

106. The approach requires proof that the original was "used" in preparing the copy and "that the defendant's work is an iterative reproduction, that is, one produced by iterative or exact duplication of substantial portions of the copyrighted work." Note, *Copyright Infringement of Computer Programs: A Modification of the Substantial Similarity Test*, 68 MINN. L. REV. 1264, 1294-1300 (1984). The court implies that this approach shifts from the ordinary observer's impressions of total concept and feel "to an analysis of the 'quantitative and qualitative evidence of similarities' as gauged by the court's evaluation of expert testimony. The fiction of the lay observer is thus abandoned in favor of an analysis of similarities and differences." *Uniden*, 623 F. Supp. at 1493.

107. *Uniden*, 623 F. Supp. at 1498.

than independent development. Thirty-eight or forty-four identifiable sub-routines of the original product were duplicated by Uniden. Many of the duplications were unnecessary.

The case deals with design choices which affect coding similarity. Uniden throughout chose designs identical to Johnson choices. In one situation, the choice involved duplicating a data item or "word" described as "Barker code" which both sending and receiving units must identify for communication to be established. "[I]n order to make its radios compatible . . . Uniden was required to and did copy this aspect of the EFJ program."<sup>108</sup> Although the court concluded that compatibility does not justify comprehensive duplication of the original,<sup>109</sup> it held that the central role of this seven digit numerical word in the technology permitted duplication even though Johnson did not merely use a word from published journals, but adapted known forms to its own program.<sup>110</sup> Like *scenes a faire*, this specific aspect of the program was too limited and central to the technology to be separately protected.

Cumulation of other design choices nevertheless created infringement. Uniden "decided" to use the same processing rate used by Johnson to sample incoming data and establish synchronization and detection in communications. This choice was made even though the original speed was based on limitations of the Intel chip not found in the Hitachi. The higher speed possible in the Hitachi also was preferable to eliminate error. The essence of the infringement, however, was not any particular choice, but the cumulation of unnecessary replication. The terms and technology are esoteric, but the court's discussion suggests the theme:

[A]n LTR-compatible software program could have been written without verbatim duplication. . . . The H-matrix. . . for example, can be configured in any of 32 different ways. . . . [E]xact duplication . . . was not the "only and essential" means of achieving compatibility. The Barker word was of necessity identical in both codes, but [duplication] of Barker word correlation techniques and sampling rates was not. . . . [W]hile both plaintiff and defendant employed the "shifting correlator" scheme of Barker word detection, other ways of achieving the same task are recognized in the industry. . . . In addition, rather than duplicate EFJ's inverse H-matrix, the defendant could have accomplished the same task by inverting the check sum. . . . [D]efendant did not deny that more than one possible configuration of the sample error table could have been created. . . ."<sup>111</sup>

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108. *Id.* at 1493-94.

109. The court relied on the two *Apple* decisions discussed earlier, *see supra* text accompanying notes 43-50, but properly did not examine the case as if there were no right to create a compatible system. In this case, "comprehensive" copying was not essential to compatibility.

110. *Uniden*, 623 F. Supp. at 1491.

111. *Id.* at 1502-03.

In these and other respects, the recurrent decision was to duplicate, rather than create. The design choices were not required by compatibility needs, and other compatible programs existed without infringement. The cumulative effect of numerous, equally acceptable design and structural options creates a situation precluding repetitive work in the field. Other developers remain free to compete and produce similar functional programs or systems, but "may not do so by pirating plaintiff's mobile radio programs, if an alternative is available."<sup>112</sup> The readily available alternatives involve systems where a significant portion of the design choices reflect independent expression, rather than copying.

Analyses involving transportation to different hardware and language environments require sensitivity to when the actions of the second party should be protected, rather than precluded. The court deals in not only uncharted waters but a field defined by complex technology and necessary, permissible overlap and duplication. Given the protected objective of creating similar processes in the new environment, the code and structure of two programs will necessarily be similar. Accepted styles, necessary operations and known subroutines contribute to similarity that cannot be described as actionable without severely impinging future technology development. In the new hardware, new language setting, these similarities nevertheless may be the only available benchmarks of comparison between the programs.

As a result, courts should be cautious in attributing any similarity to the illicit copying, rather than to permitted similarity of function and objectives even if the alleged infringer knew the code of the original. The risk is that a failure to exercise caution will grant the first author an effective monopoly over processes and methods, a result prohibited by the Copyright Act.

In *Q-Co Industries, Inc. v. Hoffman*,<sup>113</sup> the United States District Court for the Southern District of New York found a lack of infringement in two programs designed to permit use of personal computers as prompters for television. The case also involved trade secrecy questions since the source of information about the original program entailed the fact that the second developer was initially associated with the first company.

The new program created prompter capability for an IBM computer, whereas the original was used in Atari computers. Because the IBM lacks graphics hardware present in the Atari, the IBM programming was significantly more complex and lengthy. Despite the use of different languages, the court nevertheless noted a similarity between the two. It concluded that this was not infringement even though the program was prepared in a format similar to that found in the *SAS* case. The similarities were of ideas, rather than expression.

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112. *Id.* at 1504.

113. 625 F. Supp. 608 (S.D.N.Y. 1985).

Notwithstanding these facts, there is no testimony establishing any unique expression based on the existence of the VPS-500 modules, since the same modules would be an inherent part of any prompting program. Their order and organization can be more closely analogized to the concept of wheels for the car rather than the intricacies of a particular suspension system. Moreover, in contrast to . . . *SAS Institute*, [where] the defendant had "slavishly copied" plaintiff's work, such copying is impossible here, given the differences between the hardware for the Atari and IBM computers.<sup>114</sup>

*Hoffman* suggests the effect of subtle distinctions in replication and the absence of "slavish" duplication resulting in reproduction of not only necessary organization, but unnecessary features. *Hoffman*, more importantly, reflects the need to protect the third party in addition to protecting the "original" author. Even where there is knowledge of the original work and similarity in design results, a case for infringement requires detailed repetition of the original in the face of abundant, unexercised options.

In *Whelan*, *SAS*, and *Uniden*, there is a clear policy choice allocating control of software translations to new computer environments. The defendants engaged in no new development except as that applies to translation itself. The conclusion was that a translation, while technically difficult and valuable, is not protected. The second party cannot literally trace the original. The original author controls commercial translations of its program.

Adaptation to a new environment seeks to implement in full detail the original work and incorporate its unique elements. The adapted environment ordinarily represents a realistic potential market for the original author. The second author does not add to the program. Use of the entire structure of a complex program is not essential to continued development of the art. This same result, however, does not apply if the translation involves substantial developmental work or where only portions of the original are translated and added to in the new environment. Merely general or generic similarity also is not prevented.

#### F. User Modifications

The foregoing discussion focused on value-added development of products for commercial markets. Issues about the rights of a third party to modify or enhance a program also arise where the changes are made by a person in lawful possession of the program, but with no intention to market the enhanced product. Modifications for personal use occur in various forms. In one, the user of the copy makes relatively minor changes that facilitate use in a particular computer. This is common in microcomputers because of the uncertain and incomplete compatibility of mass market programs in

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114. *Id.* at 616 (footnotes omitted).

the numerous hardware systems that are currently available. In other cases, the user's changes are intended to enhance the utility of the program *to it*, such as by increasing speed or the ability to interface with another program. In many programs, the capability to make modifications is provided in the program.

Issues of value-added use occur when the user intends no distribution. Modifications without remarketing affect the copyright owner's economic interests only if the modifications reduce the user's incentive to purchase additional products from the author. Absent this effect, the personal modifications should be treated as privileged development work or as a fair use. Interests in third party innovation outweigh concerns about the copyright owner's market in most cases.

For ordinary works, the copyright proprietor cannot control *use* of a copy if no unauthorized reproduction occurs.<sup>115</sup> The owner of a book may underline, cut and paste, and loan the book without liability. For computer programs, owner modifications are dealt with in section 117 of the Copyright Act. Section 117 gives the copy owner the right to make an additional copy of the program as an essential step in the utilization of the program in a computer and to prepare a copy for "archival purposes." The copies must be destroyed if the owner's possession of the program becomes no longer lawful. Section 117 also gives the copy owner a right to make an adaptation of the program if the adaptation is "essential" to use of the program in a computer. The modified program cannot be transferred without permission of the copyright proprietor. It must be destroyed if the copy owner's possession ceases to be lawful.

The Copyright Act does not provide similar rights for lessees and licensees. Even for owners, the right to make an adaptation is limited to "essential" steps for use of the program in a computer. This phrase includes adjustments designed to optimize *personal* use of the program. The focus should be on essential adaptations, with reference being made to the owner's intended use, rather than to a limited notion of the absolute necessity that merely enables the owner to load and operate the program.

While section 117 refers to modifications "essential" to use in a computer, the language was adopted from recommendations in the CONTU report that suggested broader applicability:

[A] right to make those changes necessary to enable the use for which it was both sold and purchased should be provided. The conversion of a program from one higher-level language to another to facilitate use would fall within this right, as would the right to add features to the program that were not present at the time of rightful acquisition. These

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115. 1 M. NIMMER, *supra* note 11, § 2.18[A]. Cf. *S & H Computer Sys. v. SAS Inst. Inc.* 568 F. Supp. 416 (M.D. Tenn. 1983).

rights . . . could only be exercised so long as they did not harm the interests of the copyright proprietor.<sup>116</sup>

Most personal modifications do not adversely affect the original author in any manner accommodated in copyright law. Even if the user "owns" the copy, however, the right to modify that copy exists only insofar as it does not harm the copyright proprietor. This refers to effects on the commercial market for the work.

A confluence of market effect and license, rather than ownership, limits modification of commercial video game programs. In video games used in arcades, the user is licensed to display the program for a fee to the public. For most games, initial popularity decreases as players become accustomed to the game. In such context, the user may desire to modify the program to alter its difficulty. The objective is to increase revenues and extend the useful life of the copy as a revenue-generating asset. Such licensee modifications may infringe the copyright interests of the first author.

The issue was discussed in *Midway Manufacturing Co. v. Artic International, Inc.*<sup>117</sup> The licensed user inserted a "speed-up" kit to modify a successful game. The United States Court of Appeals for the Seventh Circuit concluded that this constituted an infringing derivative work.<sup>118</sup> The Seventh Circuit recognized that the Copyright Act does not clarify that a licensee is barred from modifying a copy for its own use. The court, however, concluded that the economics of the context required this result since, *while* the modification substantially increased revenues for the user, in the absence of such modifications, the copyright holder would be able to control creation of modified programs at a profit to it. This established a substantial commercial effect that outweighed any general interest in providing the user an opportunity for enhancement work. The copyright holder is "entitled to monopolize" the preparation of derivative works by licensees where the modification affects a potential commercial market.<sup>119</sup>

The result should be different where the copy owner's modifications are oriented to personal use unrelated to public display or distribution. While section 117 limits even these modifications to "essential" adaptations, "essential" must be interpreted in light of the interests involved. Latitude in making enhancements should be permitted on a private basis so long as these do not substantially affect the copyright owner. Private modifications are analogous to underlining pages of a book, annotating or folding a copy to enhance its usefulness. If the copyright proprietor has a right to control

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116. NATIONAL COMMISSION, *supra* note 1, at 13.

117. 704 F.2d 1009 (7th Cir. 1983), *cert. denied*, 464 U.S. 823 (1983).

118. *Cf. Strohon*, 564 F. Supp. at 741 (modifications sufficiently altered output to avoid infringement, but modification kit itself violated object code copyright).

119. *Artic*, 704 F.2d at 1014.

these modifications, it obtains a right to control use of the program, a right that is not conveyed in the Copyright Act.<sup>120</sup>

User modifications for personal, noncommercial use will most often constitute a protected act, rather than an infringement. If the user owns the copy of the program, the modifications are supported under section 117. Even if the user does not "own" the copy, personal adaptations may be implicitly authorized in the license (sale) agreement as an authorization to the user to optimize use of the program. In addition, modifications for personal use represent a clear application of fair use in respect to computer software.<sup>121</sup>

The fact that the modification is a protected act, however, does not shield persons who distribute commercial products designed to enable such modifications. In practice, user modifications are often accomplished with commercial kits manufactured by a third party. While the kits relate to user rights, the commercial distribution materially alters the analysis. In many cases, the kits directly affect markets into which entry by the original author is a significant potential.

Third party products may directly infringe the copyright. In such cases, although intended to assist an authorized user to extend the performance of a program, no question of derivative works or authorized adaptations need be considered. Reproduction and distribution of the product is an infringement. This was one conclusion in *Midway Manufacturing Co. v. Strohon*<sup>122</sup> where the United States District Court for the Northern District of Illinois found an infringing substantial similarity in the machine code of the enhancement kit. *Hubco Data Products Corp. v. Management Assistance Inc.*<sup>123</sup> reached a similar result. In *Hubco*, Management Assistance (MAI) distributed operating systems that had various levels of performance controlled relative to the price for the license. The performance variations were artificially created by features in distributed copies of the program. The defendant (Hubco) developed a manual system to print the program code and identify and remove the restraints. It also developed a computer program that performed the same steps. The Idaho district court concluded that both manual and computer forms of the enhancement process infringed the copyrighted program. Each process produced a copy of the program as a step in identifying and removing restrictions.<sup>124</sup>

A commercial product intended to modify a copyrighted work receives no special protection. This is attributable to the significant commercial impact that the modification kit may have on the original market for the program.

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120. See 1 M. NIMMER, *supra* note 11, § 2-18[A]; *SAS*, 568 F. Supp. 416 (license restriction concerning use).

121. 17 U.S.C. § 107 (1982).

122. 564 F. Supp. at 741.

123. 219 U.S.P.Q. (BNA) 450 (D. Idaho 1983). See also *Grogan*, *supra* note 8.

124. *Hubco*, 219 U.S.P.Q. (BNA) at 456.

In *Hubco*, the enhancement kit eliminated a market in which the author of the original program was currently competing through the licensing of scaled up programs. Decisions finding a direct infringement do not foreclose modification by the owner or licensee or, even, by third party procedures that can be done without directly infringing the copyright.

The rights of distributors of modification kits also are affected by the doctrine of contributory infringement. The essence of the doctrine is that an individual who distributes a product used for illicit purposes by another may have indirect liability if the actions of the buyer of the product constitute an infringement. Contributory infringement law was recently redefined by the United States Supreme Court in *Sony Corp. of America v. Universal City Studios, Inc.*<sup>125</sup> *Sony* is a landmark case dealing with the copyright implications of the manufacture and distribution of video cassette recorder (VCR) systems.

The Supreme Court established relatively stringent standards to establish liability for the actions of third parties based on their use of a marketed product. Lower court decisions had emphasized that liability existed if the most conspicuous, intended use of the marketed product involved a copyright infringement. The Supreme Court held that "the sale of copying equipment, like the sale of other articles of commerce, does not constitute contributory infringement if the product is widely used for legitimate, unobjectionable purposes. Indeed, it need merely be capable of substantial noninfringing uses."<sup>126</sup> As to VCR equipment, the Court concluded that substantial non-infringing uses existed, including the protected fair use copying for personal use in the form of shifting the time when the program could be viewed at home.

After *Sony*, contributory infringement cannot be based on the fact that *one* application of the defendant's product facilitates copyright infringement or that some or many users of the product use it that way. The balance between the copyright proprietor and the third party manufacturer is struck at a level that is more protective of the third party. Copyright infringement claims extend to the third party only if there is no substantial, noninfringing use for the product.<sup>127</sup>

### CONCLUSION

Copyright law pertaining to computer software protection developed in the context of a rapidly expanding industry and a perceived need to protect against widespread piracy and unauthorized duplication of software products. The character of computer programs and, especially, the ease with which

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125. 464 U.S. 417 (1984).

126. *Id.* at 442.

127. *See Artic*, 704 F.2d at 1009; *Strohon*, 564 F. Supp. at 741.



the technology can be reproduced, renders this industry particularly susceptible to commercial piracy. Piracy permits the copiers to duplicate the product in full and to undercut cost-price constraints applicable to the original innovator. This reduces the existing commercial incentives for software development and innovation.

These considerations justify a policy that differs from our approach to other forms of technology. In other technologies, intellectual property doctrine holds that unpatented technology can be copied if this does not involve breach of confidentiality. Patent protection is available for only a few innovations. Most new products and technologies consequently enter the marketplace without substantial protection against duplication. More protection is justified for software.

Under current law, protection against literal duplication of software is available under copyright. This protection is available without a need to document that the product is a significant innovation and applies whether or not the program is in machine form or dedicated merely to the internal operation of a computer.

The rationale that supports protection against commercial piracy does not necessarily support extraordinary protection against other uses of the original technology. The nature of the imitations and the character of the differences in use must be clearly acknowledged. Use involves value-added adaptation and development work. Third party's actions, therefore, may involve socially desirable activity whose continuation should be accommodated along with protection of the original author.

The ability of third parties to work with, add to and change existing technology in the development of their own product is inherent in traditional law regarding technology development in this country. Unlike software piracy, there is no compelling rationale to treat software as immune to such subsequent development work more than any other technology. Additive development and shared or common use of basic technology tools is central to innovation.

Within the field of copyright law, issues of balancing third party and original author's rights are channeled through infringement standards. The primary issue is an analysis of substantial similarity between the first work and the second work. The author controls the right to make copies of its work, but copyright does not extend to control over ideas or processes. Conceptions of "idea" and "process" vary and are a direct product of policy choices. In infringement issues, unlike with copyrightability, these exclusions must be incorporated to preserve flexibility for secondary and cumulative development.

Copyright standards for fiction and artistic works are applicable to many computer programs. For other programs, however, they are overly expansive and imbalanced. Computer code is technical and structured. The protection issues are more analogous to those for factual or other technical works.

This Article has suggested that the interests of both the original developer and of the second, value-added user are important and protectible. The original author's protections are enhanced insofar as the alleged infringement encompasses important aspects of the original work and directly impacts markets into which the developer is likely to enter. The position of the second party is heightened to the extent that its use is selective and developmental. The original author's claim weakens to the extent that it would distort technology, development and control methods, operation and processes, rather than merely code idiosyncratic to the program. This balancing does not create certainty in analysis of software infringement, but certainty may be impossible to achieve. The balancing does provide for decision based on relevant, not distorted or misdescribed factors. It provides a vehicle to expressly recognize and protect third party rights.