University of Minnesota Law School
Scholarship Repository

Minnesota Law Review

1989

Infringement of the Exclusive Right to Prepare Dreivative Works: Reducing Uncertainty

Michael Wurzer

Follow this and additional works at: https://scholarship.law.umn.edu/mlr

Part of the Law Commons

Infringement of the Exclusive Right to Prepare Derivative Works: Reducing Uncertainty

The Copyright Act of 1976 grants to all copyright holders an exclusive right to prepare derivative works.[1] Some courts require that a derivative work prepared by a person other than the copyright holder be "substantially similar" to the preexisting work in order to find infringement of the copyright holder's right.[2] The "substantial similarity" requirement does not serve the purposes of copyright law because it is too vague and provides copyright owners no predictability regarding the scope of protection,[3] especially in cases involving computer software. Courts therefore need to reevaluate the use of the substantial

---

1. The relevant portion of the exclusive rights section of the Copyright Act of 1976 states:

"Subject to sections 107 through 118, the owner of copyright under this title has the exclusive rights to do and to authorize any of the following: (1) to reproduce the copyrighted work in copies or phonorecords; (2) to prepare derivative works based upon the copyrighted work; . . . ." Copyright Act of 1976, Pub. L. No. 94-553, § 101, 90 Stat. 2541, 2546 (codified at 17 U.S.C. § 106 (1982). The above rights are referred to as the § 106(1) and § 106(2) rights, respectively.

A derivative work is defined as "a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgement, condensation, *or any other form in which a work may be recast, transformed or adapted.*" 17 U.S.C. § 101 (1982) (emphasis added). The Copyright Act of 1909, ch. 320, 35 Stat. 1075, did not contain the emphasized language; therefore, only specific works such as books and music were protected by the right to prepare derivative works. *See* Note, *Derivative Works and the Protection of Ideas*, 14 GA. L. REV. 794, 798 n.29 (1980).

The term *work* is the general term to describe copyrightable subject matter, and will be used hereinafter with respect to all the copyright acts even though the term did not arise until the 1909 Act. *See infra* notes 18-20 and accompany text. The term *author* also will be used synonymously with *copyright holder.*

2. *See, e.g.*, Vault Corp. v. Quaid Software, Ltd., 847 F.2d 255, 267-68 (5th Cir. 1988) (refusing to find infringement of § 106(2) without a showing of substantial similarity); Litchfield v. Spielberg, 736 F.2d 1352, 1357 (9th Cir. 1984) (holding that substantial similarity is required to prove infringement of both § 106(1) and § 106(2)), *cert. denied*, 470 U.S. 1052 (1985).

A respected authority follows this interpretation and states that § 106(2) is "superfluous" because it will not be infringed unless the exclusive right of reproduction is infringed. 2 M. NIMMER & D. NIMMER, NIMMER ON COPYRIGHT § 8.09[A] (1988) [hereinafter NIMMER].

3. *See infra* notes 5-9 and accompanying text.

similarity test for infringement of the exclusive right to pre-
pare derivative works.[4]

This Note proposes a test for infringement of the exclusive
right to prepare derivative works that will reduce the present
uncertainty. Part I traces the legislative and judicial back-
ground of the exclusive right to prepare derivative works in the
context of changing technology. Part II analyzes the traditional
"substantial similarity" test for infringement as applied to a
computer software author's exclusive right to prepare deriva-
tive works, and shows how the test fails to serve the purposes
of copyright law because of its uncertainty. Part III proposes a
test for infringement of the exclusive right to prepare deriva-
tive works that incorporates a market analysis. The Note con-
cludes that copying of minimal portions of the source code of a
copyrighted computer program should be an infringement of
the exclusive right to prepare derivative works.

I. A BRIEF HISTORY OF THE EXCLUSIVE RIGHT TO PREPARE DERIVATIVE WORKS

A. TECHNOLOGICAL AND LEGISLATIVE CHANGES IN COPYRIGHT

The Constitution gives Congress authority to pass laws that
"promote the Progress of Science and useful Arts."[5] Copyright
laws serve that purpose by granting authors certain exclusive
rights that provide incentive to create new works while afford-
ing the public access to the resulting creativity.[6] Congress and
the judiciary have struggled to define the nature and extent of

---

4. The exclusive right to prepare derivative works has drawn attention
from other commentators. *See* Brown, *The Widening Gyre: Are Derivative
Works Getting Out of Hand?*, 3 CARDOZO ARTS & ENT. L.J. 1, 8-10 (1984) (pro-
posing limitations on exclusive right to prepare derivative works); Goldstein,
Derivative Rights and Derivative Works in Copyright, 30 J. COPYRIGHT SOC'Y
U.S.A. 209, 227 (1983) (discussing difference between exclusive right to prepare
derivative works and exclusive right of reproduction).
5. U.S. CONST. art. I, § 8, cl. 8. This clause is the basis for copyright law
and for patent law. Patent and copyright once were thought to be mutually
exclusive, but this theory is eroding as new technology proliferates. *See* Samu-
elson, *Creating a New Kind of Intellectual Property: Applying the Lessons of
the Chip Law to the Computer Programs Act*, 70 MINN. L. REV. 471, 529 (1985)
(noting that protection afforded semiconductor chips breaks down this
exclusivity).
6. *See* Harper & Row Publishers v. Nation Enter., 471 U.S. 539, 545-46
(1985) (noting copyright law purposes of increasing public knowledge and giv-
ing original contributors a "fair return for their labors"); *see also* Abrams, *The
Historic Foundation of American Copyright Law: Exploding the Myth of
Common Law Copyright*, 29 WAYNE L. REV. 1119, 1185 (1983) (stating "the un-
derlying purpose and philosophy of the Copyright Clause is to benefit the pub-

these exclusive rights in order to insure the optimum benefit to society.[7] The least understood of these exclusive rights is the right to prepare derivative works,[8] otherwise known as the right to prepare adaptations.[9]

The first copyright act did not give authors an exclusive right to prepare derivative works, but rather, only granted authors the exclusive right to copy and sell maps, books, and charts.[10] Authors soon found that this law failed adequately to protect their creative efforts because others were free to make derivative works, such as translations, of any copyrighted work.[11] Congress responded to the authors' concerns by enacting the Copyright Act of 1870.[12] This Act included exclusive rights to dramatize and translate works of authorship,[13] and extended the scope of copyrightable subject matter to include plays, music compositions, paintings, and sculptures.[14] Con-

---

lic by providing an economic incentive to authors in the form of limited monopoly control over the commercial exploitation of their works").

7. Under current law, an author has the exclusive right to reproduce, adapt, distribute, perform, and display the copyrighted work. 17 U.S.C. § 106 (1982).

8. *Compare* Brown, *supra* note 4, at 3 (arguing that extension of derivative works protection has gone too far) *with* Goldstein, *supra* note 4, at 227 (arguing that exclusive right to prepare derivative works should protect more than exclusive right of reproduction).

9. "Adaptations" is a carryover from previous statutes, and is preferred by some commentators. 2 NIMMER, *supra* note 2, § 8.09 (calling adaptation right the right to make derivative works). Hereinafter, the terms *adaptation* and *derivative work* will be used interchangeably.

10. Act of May 31, 1790, ch. 15, §§ 1-2, 1 Stat. 124, 124-25. The main concern of copyright at that time was protecting the physical article, because the copyright was thought to be in the physical object, not in the author. *See* Note, *supra* note 1, at 796. No right of adaptation existed because there could be no infringement absent exact copying of the book, and adaptations, by definition, require some addition or change to the existing work. *Id.*

11. *See, e.g.*, Stowe v. Thomas, 23 F. Cas. 201, 205 (C.C.E.D. Pa. 1853) (No. 13,514) (holding that translation of *Uncle Tom's Cabin* into German is not copyright infringement); Story v. Holcombe, 23 F. Cas. 171, 175 (C.C.D. Ohio 1847) (No. 13,497) (finding abridgment of copyrighted work is not infringement).

12. Act of July 8, 1870, ch. 230, § 86, 16 Stat. 198, 212.

13. The Act stated that "authors may reserve the right to dramatize or to translate their own works." *Id.* It is curious that Congress did not include a right of abridgment, given the holding in *Story*. Congress did not define abridgments as derivative works until the 1909 Act. *See infra* notes 18-19 and accompanying text.

14. Act of July 8, 1870, ch. 230, § 86, 16 Stat. 198, 212. This extension of the scope of copyrightable subject matter is important when considering the exclusive right to prepare derivative works. As the subject matter of copyright changes, so will the scope of protection, as evidenced by the major amendments to the copyright law. *See infra* notes 18-22 and accompanying text. The

gress concluded that the benefit society received by extending authors a monopoly over dramatizations and translations of their works outweighed the costs of restricting access to the copyrighted works.[15]

The question of the proper incentive for authors in light of the need for public access arose again as technological advances strained the 1870 Act.[16] For example, the invention of the motion picture and player piano created opportunities to prepare derivative works of books and songs that the 1870 Act had not contemplated.[17] Congress responded with the Copyright Act of 1909,[18] which contained broad language allowing copyright law to adapt to new technologies that created new ways to use literary works. The Act stated that one could not copy a literary work "or make any other version thereof."[19] The Act covered any new technology that allows adaptation of a literary work into a new medium.[20]

---

subject matter of copyright affects the exclusive right to prepare derivative works because a new copyrightable work also may be an infringing derivative work. *See* Oman, *1976 Copyright Act Revision Revisited,* 34 J. COPYRIGHT SOC'Y U.S.A. 29, 30 (1980) (noting that Congress had to revise copyright law to "accommodate such new technological wonders as motion pictures and sound recordings"); *infra* notes 16-17 and accompanying text.

15. The 1970 Act demonstrates how Congress reacts to changes in technology by amending the exclusive right to prepare derivative works. This process is necessary to preserve the incentive of authors. *See infra* note 16.

16. Technological innovation is a problem that will always affect copyright law. *See* Sony Corp. v. Universal Studios, 414 U.S. 417, 430 (1983) (stating that change in copyright law is stimulated by new technology). It has been stated that "'[i]n no branch of the law other than copyright has the incidence of new technologies revealed so many gaps and deficiencies for which the remedy can only be regulation and supervision [by the legislature].'" Lahore, *Reprography Reproduction,* in INFORMATION TECHNOLOGY: THE CHALLENGE TO COPYRIGHT (J. Lahore ed. 1984) (quoting *Comment on the Review of Audiovisual Copyright Law in Australia,* 56 AUSTL. L.J. 621, 622 (1982)); *see also* Ladd, *Securing the Future of Copyright: A Humanist Endeavor,* 9 COLUM. J.L. & ARTS 413, 414 (1985) (stating that legislative action is response to technological change).

17. *See, e.g.,* Kallem Co. v. Harper Bros., 222 U.S. 55, 62 (1911) (discussing adaptation of movie); White Smith Music Publishing Co. v. Apollo Co., 209 U.S. 1, 18 (1908) (finding no infringement of musical composition by player-piano music roll); *see also* B. KAPLAN, AN UNHURRIED VIEW OF COPYRIGHT 34-39 (1967) (discussing Supreme Court's struggles to answer problems posed by motion picture and player-piano music roll).

18. Copyright Act of 1909, ch. 320, 35 Stat. 1075.

19. *Id.*

20. *Id.* § 1(b), 35 Stat. 1075. The Act specifically covered translations, dramatizations, conversions into novels, adaptations for musicals, and designs for works of art. *Id.* The invention of television is an example of how this broad exclusive right to prepare derivative works functions. *See* Bradbury v. Colum-

The next major revision in copyright law, the Copyright Act of 1976, again expanded both the scope of copyrightable subject matter and the set of exclusive rights an author obtained upon copyrighting a work.[21] Whereas the 1909 Act granted only authors of literary works the exclusive right to prepare derivative works, the 1976 Act extended that broadly defined right to authors of *all* works.[22] Thus, the exclusive right to prepare derivative works applies to technologically oriented works, such as computer software, as well as to literary works. Extending to authors of technological works a monopoly over derivative works, however, poses a difficult balancing problem. Because technological progress requires inventors to use existing technology as "stepping stones" to new innovation, copyright in a technological context must carefully balance the need to encourage creative output by granting authors exclusive right to their creations against the need to ensure the exploitation of that new technology.[23] Any protection given to technological works must take into consideration the height-

---

bia Broadcasting System, 287 F.2d 478, 484 (9th Cir.) (discussing process of adapting literary work to television), *cert. dismissed*, 368 U.S. 801 (1961).

21. Copyright Act of 1976, Pub. L. No. 94-553, 90 Stat. 2541 (codified at 17 U.S.C. §§ 101-810 (1982 & Supp. V 1987). The Copyright Act of 1976 is the culmination of an extensive revision process that began in the early 1960s. *See generally* A. KAMINSTEIN, LEGISLATIVE HISTORY PROJECT: A COMPENDIUM AND ANALYTICAL INDEX OF MATERIALS LEADING TO THE COPYRIGHT ACT OF 1976 xxxv-xlvii (1985) (listing calender of events leading to Copyright Act of 1976). The 1976 Act was the origin of much of the current terminology, such as *derivative work.* Copyright Act of 1976, § 101, 90 Stat. at 2542 (codified at 17 U.S.C. § 101 (1982)).

> Derivative work is:
> a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a "derivative work".

17 U.S.C. § 101 (1982).

22. The statute gives examples of derivative works such as translations and motion picture versions. *Id.* These examples, however, refer to traditional works such as books, plays, and songs. What constitutes a derivative work of new works such as computer programs, which is covered by the language "or any other form in which a work may be recast, transformed, or adapted" is unclear and must rely on some interpretation of the statutory terms *based upon. Id.*; *see infra* note 25 and accompanying text.

23. *See* Note, *Copyright Infringement of Computer Programs: A Modification of the Substantial Similarity Test*, 68 MINN. L. REV. 1264, 1292-94 (1984) (arguing that software protection needs to be reevaluated because of special need for using programs as "stepping stones" in progress).

ened potential for inhibiting the innovation process.[24]

Congress placed the burden of defining this balance on the courts by broadly defining a derivative work as any work "based upon" a preexisting work.[25] The courts have attempted to interpret *based upon* in a manner that preserves the incentive for authors and, at the same time, promotes the innovative process.[26]

B. ALTERNATE DEFINITIONS OF THE EXCLUSIVE RIGHT TO PREPARE DERIVATIVE WORKS

Since passage of the 1976 Act, two different applications of the exclusive right to prepare derivative works have emerged from the courts.[27] One application of this exclusive right con-

---

24. *See* R. Nimmer & P. Krauthaus, *Copyright and Software Technology Infringement: Defining Third Party Development Rights*, 62 IND. L.J. 13, 38-39 (1986) (issuing caveat against extending too much protection to software because of possible chilling effect on developers from examining earlier work).

25. 17 U.S.C. § 101 (1982). The closest thing to a definition of *based upon* is provided in the House Report, which states "to constitute a violation of section 106(2) . . . the infringing work must incorporate a portion of the copyrighted work in some form . . . ." H.R. REP. No. 1476, 94th Cong., 2d Sess. 62, *reprinted in* 1976 U.S. CODE. CONG. & ADMIN. NEWS 5659, 5675.

26. *See* Conley & Bryan, *A Unifying Theory for the Litigation of Computer Software Copyright Cases*, 63 N.C.L. REV. 563, 572 (1985) (discussing problems courts have had in interpreting exclusive right to prepare derivative works); *supra* notes 6-9 and accompanying text.

A source of the courts' inconsistent interpretations is the difficulty of adapting copyright law to new technology. The Copyright Act of 1976 mandated that courts grant protection when technological advance made it necessary. *See* HOUSE COMM. ON JUDICIARY, 89TH CONG., 1ST SESS., COPYRIGHT LAW REVISION: PART 6, at 13-14 (1976) [hereinafter LEGISLATIVE HISTORY] (stating that basic approach of bill was to create broad rights to be adapted to new technological advances); *see also* Ladd, *supra* note 16, at 416 (stating that 1976 Act was drafted in broad language to avoid constant amendments). Computer software is an example of new technology that Congress needed to address in the 1976 Act. *See, e.g.*, Data Cash Systems v. JS&A Group, 480 F. Supp. 1063, 1067 (N.D. Ill. 1979) (citing need for definitive legislative solutions to computer uses of copyrighted works), *aff'd*, 628 F.2d 1038 (7th Cir. 1980); Synercom Technology, Inc. v. University Computing Co., 462 F. Supp. 1003, 1005 (N.D. Tex. 1978) (involving statistical analysis computer programs).

27. These two interpretations are basically illustrated by the positions taken by Professors Brown and Goldstein. Professor Brown advocates restricting the exclusive right to prepare derivative works. *See* Brown, *supra* note 4, at 10. Professor Goldstein advocates interpreting the exclusive right to prepare derivative works to protect markets beyond that of the original work. *See* Goldstein, *supra* note 4, at 227. Goldstein does not, however, seem to go as far as the court in *Midway Mfg. Co. v. Artic Int'l*, 704 F.2d 1009 (7th Cir.) (discussed *infra* notes 30-37 and accompanying text), *cert. denied*, 464 U.S. 823 (1983), because Goldstein still follows a "substantial similarity" analysis. Goldstein, *supra* note 4, at 231; *infra* notes 38-45 and accompanying text. This Note

centrates on the economic effect of the alleged infringing deriv-
ative work.[28] The other application equates the term *based
upon* with the traditional substantial similarity test.[29]

Midway Mfg. Co. v. Artic International, Inc.[30] applied the
market-based definition of the exclusive right to prepare deriv-
ative works. One copyrighted work in *Midway* was the video
game "Galaxian."[31] The alleged infringing work was a speeded-
up version of "Galaxian" produced by defendant's circuit
board.[32] The *Midway* court found that the speeded-up version
of "Galaxian" infringed Midway's exclusive right to prepare de-
rivative works.[33] It held that the exclusive right to prepare de-
rivative works grants authors a limited monopoly in all
markets related to the work that generate a significant de-
mand.[34] The court illustrated this point by contrasting the
speeded-up video game, which generated a large demand, with
a speeded-up phonograph, which will not generate a large de-

---

adopts an analysis of the exclusive right to prepare derivative works that is
similar to *Midway*.

28. *See Midway*, 704 F.2d at 1013-14 (finding infringement of § 106(2) by
electronic circuit board that speeded up copyrighted video game). Other courts
also have stressed the demand generated by the copyrighted work. *See, e.g.*,
Atari, Inc. v. North Am. Philips Consumer Elecs. Corp., 672 F.2d 607, 618 n.12
(7th Cir.) (stating that derivative right may be more valuable than original
work), *cert. denied*, 459 U.S. 880 (1982); Williams v. Arndt, 626 F. Supp. 571,
579 (D. Mass. 1985) (finding computer program infringed copyright in book
upon which it was based); *see also* Goldstein, *supra* note 4, at 227 (discussing
investment effects of derivative works). Other courts have indicated that the
exclusive right to prepare derivative works differs from the exclusive right of
reproduction. *See* Lone Ranger Television, Inc. v. Program Radio Corp., 740
F.2d 718, 720-21 (9th Cir. 1984) (interpreting 1909 Act as prohibiting remixing
of Lone Ranger scripts for radio play without discussing substantial similar-
ity); SAS Inst. v. S & H Computer Systems, 605 F. Supp. 816, 830 (M.D. Tenn.
1985) (finding that "based upon" is broader than "substantially similar").

29. *See, e.g.*, Vault Corp. v. Quaid Software, Ltd., 847 F.2d 255, 267-68 (5th
Cir. 1988) (equating "based upon" with "substantial similarity"); Litchfield v.
Spielberg, 736 F.2d 1352, 1357 (9th Cir. 1984) (refusing to find that movie *E.T.*
infringed play absent substantial similarity), *cert. denied*, 470 U.S. 1052 (1985);
Reyher v. Children's Television Workshop, 533 F.2d 87, 90 (2d. Cir.) (finding
that work is not derivative unless it has been copied substantially from an-
other work), *cert. denied*, 429 U.S. 980 (1976); *see also* 6 NIMMER, *supra* note 2,
§ 8.09[A] (requiring substantial similarity to infringe § 106(2)). The courts that
require "substantial similarity" do not discuss the economic impact that the
non-similar work will have on the original work. *See Vault*, 847 F.2d at 267-68;
Litchfield, 736 F.2d at 1354-56; *Reyher*, 533 F.2d at 90.

30. 704 F.2d 1009 (7th Cir.), *cert. denied*, 464 U.S. 823 (1983).

31. *Id.* at 1010.

32. *Id.*

33. *Id.* at 1013-14.

34. *Id.*

mand.[35] A speeded-up phonograph would not be a derivative work because the author would have little incentive to produce it due to the small demand.[36] Thus, one definition of a derivative work focuses on its economic impact on the market of the preexisting work.[37]

Other courts declined to examine the economic impact of the derivative work, and instead focused on whether the works are "substantially similar."[38] Works are "substantially similar" when an ordinary observer finds that the alleged infringing work incorporates an "illicit" or "unlawful" amount of the pre-existing work's expression.[39] Traditionally, the jury performed this examination from the standpoint of an "ordinary observer" by comparing the two works and making a subjective determi-

---

35. *Id.* at 1013.

36. *Id.*

37. *Id.* The analysis of *Midway* has been dubbed "offensive derivative work" theory. Conley & Bryan, *supra* note 26, at 611 n.342. Plaintiffs in *Midway* have been the only ones to succeed in getting a court to give a broad reading to § 106(2). *Cf.* Worlds of Wonder, Inc. v. Veritel Learning Systems, 658 F. Supp. 351, 355 (N.D. Tex. 1986) (following *Midway* but finding substantial similarity as well). Other cases have found infringement, but have involved subject matter that is more traditional. *See* Lone Ranger Television, Inc. v. Program Radio Corp., 740 F.2d 718, 720-21 (9th Cir. 1984) (involving re-mixing of scripts); Radji v. Khakbaz, 607 F. Supp. 1296, 1298 (D.D.C. 1985) (involving translation of book). The biggest deterrent has been the requirement of substantial similarity. Litigants are probably hesitant to raise the "offensive derivative work" issue because of the possibility of creating the perception of a weak case.

38. *See supra* note 29.

39. An attorney can prove copying either through direct evidence of copying, which is very rare, or circumstantially by proving that the defendant had access to plaintiff's work and that the works are substantially similar. Sid & Marty Krofft Television Prods. v. McDonald's Corp., 562 F.2d 1157, 1162 (9th Cir. 1977). Access is not necessary if there is striking similarity. The substantial similarity test is really a bifurcated test that first determines, with the aid of expert testimony, whether the defendant copied the idea of the work. *Id.* at 1163-65. The court allows expert testimony, or extrinsic examination, at this stage because an ordinary observer initially may not see the similarities. The second, or intrinsic, step of the test is whether an ordinary observer would find that the expression of the work was copied. *Id.* The intrinsic part of the test is designed to inject a subjective element into the substantial similarity analysis. Traditionally, courts have limited expert testimony in determining substantial similarity to preclude plaintiffs from dissecting the works to find irrelevant similarities. In the computer software context, however, expert testimony has proven to be very useful. *See infra* note 43 and accompanying text.

The bifurcated test has been rejected in the computer software context by *Whelan Assocs. v. Jaslow Dental Laboratory*, 797 F.2d 1222, 1232-33 (3d Cir. 1986), *cert. denied*, 479 U.S. 1031 (1987), because of the complexities of computer software. The substantial similarity test outlined here follows the *Whelan* example.

nation of whether the works are substantially similar.[40] For books, music, and other traditional copyright works, this method works well, but in the case of computer software, the "ordinary observer" is unable to make such a comparison because of the technical nature of software.[41] Derivative works exacerbate this problem because a derivative computer program may be in a different computer language from the original.[42] Thus, expert testimony is generally admitted to aid the jury in determining substantial similarity.[43] Because substantial similarity is a qualitative as well as a quantitative test,[44] the expert points out whether the parts that are "copied" are important or crucial parts of the program. The jury then examines this evidence from the standpoint of the ordinary observer to determine whether the work is an infringement.[45]

The substantial similarity test is complicated further by the rule that there must be "substantial similarity" to both the "idea" and the "expression" of the copyrighted work.[46] This

---

40. *See Whelan*, 797 F.2d at 1232-33 (discussing the "ordinary observer" test as applied to computer software).

41. *Id.; see also* Note, *Copyright Infringement of Computer Programs: A Modification of the Substantial Similarity Test*, 68 MINN. L. REV. 1264, 1285-88 (1984) (arguing that expert testimony should control determination of infringement in computer software cases).

42. Some courts have compared a computer program in a different language to a foreign language translation of a book. Williams v. Arndt, 626 F. Supp. 571, 576 (D. Mass. 1985). The *Williams* court thought they were analogous because both processes were simply mechanical, involving neither creativity nor originality. *Id.* It is questionable whether this analogy applies, because the skill and expertise involved in writing a computer program is much greater than the court intimated. *See Whelan*, 797 F.2d at 1230 (discussing discretion and skill programmer must use in designing program). The programming process is not a simple retyping of the original program, but rather involves a distillation of the program into a general problem to be solved and then breaking that problem down into statements understandable by the computer. *Id.; see also id.* at 1229 n.14 (citing sources that generally discuss process of computer programming).

43. *See, e.g., Whelan*, 797 F.2d at 1228-31 (discussing expert testimony); Atari, Inc. v. Consumer Elec. Corp., 672 F.2d 607, 618 n.12 (7th Cir.) (stating that by not allowing expert testimony to elucidate differences in works, courts may deprive authors of their derivative works right), *cert. denied*, 459 U.S. 880 (1982); SAS Inst. v. S & H Computer Sys., 605 F. Supp. 816, 818 (M.D. Tenn. 1985) (appointing expert to aid court in analyzing software case); *see also* Conley & Bryan, *supra* note 26, at 581-84 (discussing substantial similarity test for infringement as applied to software cases).

44. *Whelan*, 797 F.2d at 1245.

45. *See supra* note 40.

46. *See, e.g.*, Sid & Marty Krofft Television Prods. v. McDonald's Corp., 562 F.2d 1157, 1164 (9th Cir. 1977). The Copyright Act of 1976 codified the rule against protecting ideas in § 102, which states: "In no case does copyright pro-

doctrine, sometimes referred to as the idea/expression dichot-
omy, is one of the most difficult doctrines for courts to under-
stand and apply consistently.[47] Perhaps the difficulty in
defining the terms *idea* and *expression* stems from the fact that
the idea/expression dichotomy is simply a reflection of the un-
derlying rationale of copyright law.[48] Generally, copyright law
grants an author a limited monopoly over the expression of the
work in return for the author's contribution of the idea of the
work to the public domain.[49] The monopoly over the expres-
sion provides the author with an incentive to create original
works, and at the same time allows others to use the idea as a
stimulus to create new works without danger of infringement.
Thus, defining idea and expression entails the difficult policy
judgment of balancing incentive to authors against the need to
allow society to build on the work.[50]

Judge Learned Hand made one of the first attempts at
clarifying the idea/expression dichotomy with his now infa-
mous "abstractions test."[51] The abstractions test defines the
boundary between idea and expression as lying at a level of ab-
straction where the specific details of the work are lost, and the
general description of the work—the idea—remains.[52] Even

---

tection for an original work of authorship extend to any idea, process, system,
method of operation, concept, principle, or discovery, regardless of the form in
which it is described, explained, illustrated, or embodied in such work." Copy-
right Act of 1976, § 101, 90 Stat. 2545 (codified at 17 U.S.C. § 102(b) (1982)).

47. *See, e.g., Whelan*, 797 F.2d at 1234-35 (discussing idea/expression di-
chotomy and its inherent difficulties); *Krofft*, 562 F.2d 1157, 1163-65 (same);
Nichols v. Universal Pictures Corp., 45 F.2d 119, 121 (2d Cir. 1930) (same), *cert
denied*, 282 U.S. 902 (1931); *see also* Conley & Bryan, *supra* note 26, at 572
(stating that defining idea/expression dichotomy has been one of most difficult
problems in copyright law).

48. One of the first uses of the idea/expression dichotomy to effectuate
the policy of copyright laws occurred in *Baker v. Selden*, 101 U.S. 99, 102-03
(1879).

49. *See, e.g., Whelan*, 797 F.2d at 1234-35 (stating that purpose of copyright
law is to create most efficient balance between protection and dissemination);
see also Hazen, *Contract Principles as a Guide for Protecting Intellectual
Property Rights in Computer Software: The Limits of Copyright Protection,
the Evolving Concept of Derivative Works, and the Proper Limits of Licensing
Arrangements*, 20 U. DAVIS L. REV. 105, 113 (1986) (stating that
idea/expression dichotomy reflects balance between incentive to authors and
access to public).

50. The difficulty of this policy judgment is reflected by the many amend-
ments the copyright law has undergone since its creation. *See supra* notes 10-
24 and accompanying text.

51. *See* Nichols v. Universal Pictures Corp., 45 F.2d 119, 121 (2d Cir. 1930),
cert. denied, 282 U.S. 902 (1931).

52. *Id.*

Judge Hand recognized the vagueness of the abstractions test, and stated that distinguishing idea from expression is necessarily an ad hoc determination.[53]

As stated earlier, the idea/expression dichotomy is an inherent part of the substantial similarity test. One can appropriate the idea of a copyrighted work with impunity; copyright infringement exists only when one appropriates the expression of the work.[54] Because the idea/expression inquiry is so vague, however, an "ordinary observer," even with expert testimony, will have difficulty knowing precisely what similarity constitutes infringement.[55] When technological subject matter and derivative works further complicate the problem, even the most sophisticated observers may become confused.[56] This inherent vagueness in the substantial similarity test results in a wide disparity of protection for computer software, especially in cases involving derivative works.[57]

The most recent case involving computer software and a claim of infringement of the exclusive right to prepare derivative works is *Vault Corp. v. Quaid Software, Ltd.*[58] In *Vault,*

---

53. Peter Pan Fabrics, Inc. v. Martin Weiner Corp., 274 F.2d 487, 489 (2d Cir. 1960).

54. *See supra* note 46.

55. *See* Note, *supra* note 1, at 799-800 (pointing out that idea/expression dichotomy is often just label for result rather than aid in decision process).

56. This conclusion is supported by the result in *Whelan*, which has been criticized for its application of the idea/expression dichotomy to find infringement. *See, e.g.*, Samuelson, *supra* note 5, at 526 n.257 (arguing that *Whelan* extends too much protection).

57. *Compare Whelan*, 797 F.2d at 1238-40 (finding that overall structure and organization of computer program is protectable expression) *and* SAS Inst. v. S & H Computer Sys., 605 F. Supp. 816, 829-31 (S.D.N.Y. 1985) (finding that structure of computer program is protectable expression) *with* Synercom Technology, Inc. v. University Computing Co., 462 F. Supp. 1003, 1013-16 (N.D. Tex. 1978) (refusing to protect general data structure) *and* Q-Co Indus. v. Hoffman, 625 F. Supp. 608, 616 (S.D.N.Y. 1985) (refusing to follow *SAS*).

58. 847 F.2d 255 (5th Cir. 1988). Vault did not make the traditional claim of infringement of the exclusive right of reproduction, 17 U.S.C. § 106(1) (1982), but rather concentrated on the exclusive right to prepare derivative works, *id.* § 106(2). Copying claims are by far the most common copyright claims, especially in a historical context. Prior to the passage of the Copyright Act of 1976 and the corresponding change in the scope of the exclusive right to prepare derivative works, very few plaintiffs alleged violation of the exclusive right to prepare derivative works. *See supra* notes 27-29 and accompanying text. Often this was a result of error by the plaintiff in failing to include § 106(2) in the complaint. *See, e.g., Whelan*, 797 F.2d at 1228 (finding infringement of computer program in another language, but not using right to prepare derivative works); New York Times Co. v. Roxbury Data Interface, Inc., 434 F. Supp. 217, 221-26 (D.N.J. 1977) (discussing derivative nature of alleged infringing index, but not raising § 106(2)).

the plaintiff designed a computer program that "protected" other computer programs from software pirates.[59] Sellers of software copied Vault's program onto a floppy diskette along with an application program, such as a word processor or spread sheet.[60] Vault's program precluded users from making more than one copy of the application program.[61] Users want to make multiple copies of the programs they buy and a high demand therefore existed for a program that could "unlock" diskettes protected by Vault's program.[62] Quaid Software, the defendant, designed just such a program.[63]

In designing its program, Quaid Software incorporated thirty characters of Vault's copyrighted source code into the "unlocking" program.[64] Vault argued that those thirty characters were essential to the operation of the program and therefore constituted a qualitative "substantial similarity."[65] The *Vault* court rejected this argument and found that because the two programs served different functions, the qualitative similarities were irrelevant.[66] The court concluded that there is no infringement of the exclusive right to prepare derivative works unless the alleged derivative work is substantially similar to the original.[67]

The *Vault* court relied on the substantial similarity test, probably because of its wide acceptance in cases involving claims of copying or infringement of the exclusive right of reproduction.[68] The analysis in *Vault* ignores the fact that deriv-

---

59. *Vault*, 847 F.2d at 256.
60. *Id.*
61. *Id.*
62. *Id.*
63. *Id.* at 257.
64. *Id.*
65. *Id.* at 267.
66. *Id.* at 268.
67. *Id.*
68. *Id.* at 267-68; *see supra* note 2. The *Vault* court relied without analysis on the Ninth Circuit's decision in *Litchfield v. Spielberg*, 736 F.2d 1352 (9th Cir. 1984), *cert. denied*, 470 U.S. 1052 (1985), to find support for its holding. *Vault*, 847 F.2d at 267. The *Litchfield* court found that the movie *E.T. — The Extraterrestrial* (Universal City Studios 1982) was not an infringing derivative work of plaintiff's copyrighted play, because the two were not substantially similar. *Litchfield*, 736 F.2d at 1357. *Litchfield* is the first case to directly hold that the substantial similarity test applies to the exclusive right to prepare derivative works. Nonetheless, the court did not deem it necessary to analyze whether its nullification of the exclusive right to prepare derivative works strikes the proper balance between incentive to authors and public access. The *Litchfield* court simply concluded that the amended exclusive right to prepare derivative works was not intended to dramatically expand copyright protec-

ative works necessarily differ in form from the original and, therefore, strict application of the substantial similarity test may not be appropriate in derivative works cases.[69]

Q-Co Industries. v. Hoffman[70] provides another example of the difficulty in deciding derivative works cases involving computer software by applying the substantial similarity test.[71] In *Q-Co*, the plaintiff wrote a computer program that converted an Atari computer into a teleprompter for television and theatrical productions.[72] The defendant used the plaintiff's program to produce a competing program that ran on an IBM professional computer.[73] Because the programs were written for different hardware, they were very dissimilar.[74]

The *Q-Co* court recognized that derivative works are inherently dissimilar, and found that regardless of these dissimilarities, the defendant's program still could be an infringing derivative work.[75] The court stated that because a derivative work includes a "modification which, as a whole, represents an original work of authorship," the alleged infringing work can

---

tion. *Id.* This conclusion was persuasive to the court in *Berkic v. Creighton*, 761 F.2d 1289, 1292-94 (9th Cir.) (following *Litchfield* without discussion), *cert. denied*, 474 U.S. 826 (1985).

By following *Litchfield*, the *Vault* court nullified the exclusive right to prepare derivative works for technological works as well as works of fine art. Given the differences between technological works and works of fine art, this conclusion is questionable. *See* Conley & Bryan, *supra* note 26, at 610 n.338 (questioning *Litchfield's* rationale). The substantial similarity test therefore has been incorporated into the exclusive right to prepare derivative works without analyzing the impact of this test on authors' incentives or the public's access to the work.

69. *See* B. KAPLAN, *supra* note 17, at 34-39 (stating that derivative works are dissimilar from original work); Goldstein, *supra* note 4, at 231-32 (arguing that courts need to take into consideration differences that necessarily exist between original work and derivative work). This is the same problem confronted in every case involving derivative works, because the alleged infringing work is necessarily different from the preexisting work. *See, e.g.*, Atari, Inc. v. North Am. Consumer Elec. Corp., 672 F. 2d 607, 619-20 (7th Cir.) (finding infringement of video game audiovisual display), *cert. denied*, 459 U.S. 880 (1982); Original Appalachian Artworks, Inc., v. Topps Chewing Gum, Inc., 642 F. Supp. 1031, 1036 (N.D. Ga. 1986) (finding infringement of dolls by bubble gum cards); Williams v. Arndt, 626 F. Supp. 571, 579 (D. Mass. 1985) (finding infringement of copyrighted book by computer program); SAS Inst. v. S & H Computer Sys., 605 F. Supp. 816, 830-31 (M.D. Tenn. 1985) (finding infringement of structure of program).

70. 625 F. Supp. 608 (S.D.N.Y. 1985).

71. *Id.* at 615-16.

72. *Id.* at 610-13.

73. *Id.*

74. *Id.* at 613.

75. *Id.* at 615; *see supra* note 69 and accompanying text.

differ in many respects from the preexisting work.[76] Thus, the court recognized that in a derivative work case, the works are necessarily dissimilar.[77]

The court next confronted the complexities of the idea/expression dichotomy and, on this basis, refused to find substantial similarity, concluding that the defendant had appropriated only the idea of the program.[78] The court found similarities in the general structure and organization of the two programs, but concluded that the structure and organization of the program were "ideas" and therefore could be freely appropriated.[79] The court came to this conclusion despite the decisions of other courts that the general organization and structure of a program is protectable expression.[80] Thus, *Q-Co* demonstrates the inconsistency that the idea/expression dichotomy creates in the application of the substantial similarity test to derivative works cases involving computer software.[81]

The courts in *Vault* and *Q-Co* refused to recognize the differences between a claim of infringement of the exclusive right to prepare derivative works and a claim of infringement of the exclusive right of reproduction.[82] A derivative work by its nature is dissimilar to the original work and, therefore, using "substantial similarity" as the basis of the test for infringement of the exclusive right to prepare derivative works creates uncertainty.[83] The delineation of expression from idea that the substantial similarity test requires enhances this uncertainty, especially in the context of sophisticated computer programs. As discussed above, the *Midway* court used an analysis of the

---

76. *Id.*

77. *Id.* This inherent dissimilarity stems from the dual function of a derivative work. Derivative works raise issues of copyrightability as well as infringement. For example, a derivative works case can arise when a work is based upon work in the public domain. The question that arises is whether there are enough dissimilarities between the works to meet the originality requirement of the copyright law. *See* Gracen v. Bradford Exch., 698 F.2d 300, 304-05 (7th Cir. 1983) (stating that requirement of originality, if interpreted too liberally in derivative works context, would inhibit creation of derivative works); *see also* Brown, *supra* note 4, at 4-6 (discussing *Gracen* and its ominous implications for expansion of copyright law through exclusive right to prepare derivative works).

78. *Q-Co*, 625 F. Supp. at 615-16.

79. *Id.*

80. *Id.*

81. *See supra* note 57 and accompanying text. This wide disparity is a result of the ambiguity of the idea/expression dichotomy.

82. *See supra* note 1.

83. *See supra* note 69.

economic impact of the infringing derivative work on the market of the original work in order to determine infringement.[84] The following section analyzes and discusses the reasons why a test based on market analysis is more consistent with the purposes of copyright law.

II. THE UNCERTAINTY CREATED BY USING A TRADITIONAL SUBSTANTIAL SIMILARITY ANALYSIS AS A TEST FOR INFRINGEMENT OF THE EXCLUSIVE RIGHT TO PREPARE DERIVATIVE WORKS

The proper starting point for any analysis of copyright law is the purpose of copyright: to advance the progress of science and the useful arts by granting authors a limited monopoly in their works.[85] The traditional substantial similarity test of infringement, as applied to derivative works, fails to promote this purpose because its vagueness prevents authors from predicting the extent of protection copyright law offers.[86] This unpredictability causes a decline in the number of copyrighted works, thwarting the purpose of copyright law.[87] Using market analysis to define the idea/expression dichotomy and adjusting the

---

84. *See supra* notes 30-37 and accompanying text.

85. U.S. CONST. art. I., § 8, cl. 8; *see* Goldstein, *supra* note 4, at 217 (admonishing that analysis of copyright issues must be based in purpose of copyright); *see also* Abrams, *supra* note 6, at 1120 (stating that United States copyright system is based on balance between incentive to authors and public access); Hurt & Schuchman, *The Economic Rationale of Copyright*, 56:2 AM. ECON. REV. 421, 423 (1966) (noting that other copyright systems justify protection based on moral rights of author).

86. For a discussion of the traditional substantial similarity test, see *supra* notes 38-45 and accompanying text; *see also* Note, *Toward a Unified Theory of Copyright Infringement for an Advanced Technological Era*, 96 HARV. L. REV. 450, 464 (1982) (arguing that substantiality of copying is not proper inquiry when there is commercial interaction between words).

87. *See* Conley & Bryan, *supra* note 26, at 608-12 (suggesting that substantial similarity should not be sole determinant of infringement, and proposing examination of economic impact); Goldstein, *supra* note 4, at 227 (arguing that derivative rights affect level of investment in original works). Other commentators have discussed the problems of not providing adequate copyright protection. *See, e.g.*, Goldstein, *The Private Consumption of Public Goods: A Comment on* Williams & Wilkins Co. v. U.S., 21 BULL. COPYRIGHT SOC'Y U.S.A. 204, 209 (1973) (stating that extensive photocopying may reduce subscriptions to journals and result in authors investing their resources elsewhere); Hurt & Schuchman, *supra* note 85, at 430-31 (discussing welfare effect of copyright and concluding that some literary works will not be produced without proper copyright protection); Liebowitz, *Copying and Indirect Appropriability: Photocopying of Journals*, 93 J. POL. ECON. 945, 948-49 (1985) (stating that inability of copyright owners to prevent copying will eliminate appropriability of work).

substantial similarity test to take account of the inherent dis-similarities of derivative works can reduce this uncertainty.[88]

A. THE UNCERTAINTY CREATED BY THE SUBSTANTIAL SIMILARITY TEST REDUCES AUTHORS' INCENTIVES AND INHIBITS INNOVATION

An author produces a work to gain the rewards of the creative process that copyright law generally protects.[89] Authors of software are no different, but Congress only recently extended copyright law to protect an author's investment in developing computer software.[90] One of the protections Congress grants

---

88. *See infra* notes 153-57 and accompanying text. There is other support for the proposition that the substantial similarity test is not functioning properly, and that some other analysis may be proper. Some courts deal with derivative works cases by attempting to redefine the idea/expression dichotomy. *See, e.g.,* Whelan Assocs. v. Jaslow Dental Laboratory, 797 F.2d 1222, 1224-27 (3d Cir. 1986) (involving two computer programs written in different language and for different computers, but not addressing derivative works issue), *cert. denied,* 479 U.S. 1131 (1987); Williams v. Arndt, 626 F. Supp. 571, 581 (D. Mass. 1985) (finding that computer program based upon copyrighted book was infringement of exclusive right to prepare derivative works); Q-Co Indus. v. Hoffman, 625 F. Supp. 608, 615-16 (S.D.N.Y. 1985) (distingiushing *SAS*); SAS Inst. v. S. & H. Computer Sys., 605 F. Supp. 816, 830-31 (M.D. Tenn. 1985) (involving two computer programs for different computers and discussing derivative works issue). If the substantial similarity test adequately found infringement in the cases involving derivative works, there would be no need for the courts to redefine the idea/expression dichotomy.

89. There are many other possible reasons, such as self-fulfillment, that induce an author to produce literary or artistic works. Authors still create the majority of copyrighted works today, however, for the pecuniary rewards they offer. *See* Hurt & Schuchman, *supra* note 85, at 426 (stating that pecuniary gain is essential to creation of some works). Some commentators also argue that copyright is not the best way to provide incentive and that subsidies and lead time may be more effective. *See* Abrams, *supra* note 6, at 1121 (arguing that public benefit from copyright grants of monopoly is perhaps most relevant issue in copyright law); Hurt & Schuchman, *supra* note 85, at 427 (noting substantial advantage of being first in publishing industry). Lead time also is of substantial value in the computer software industry, because of the high obsolescence rate. *See infra* note 103. Copyright protection for software consequently need not be as extensive as in some other areas. Lead time can be threatened only by copying the source code, because appropriation of anything more abstract requires a substantial investment of resources to make the program competitive. Davidson, *Common Law, Uncommon Software,* 47 U. PITT. L. REV. 1037, 1080-81 (1986) (arguing that the more valuable the source code, the longer independent creation will take). As long as the source code is protected, the incentive to the original author will remain intact. *See infra* notes 144-52 and accompanying text.

90. H.R. REP. No. 1476, 94th Cong. 2d Sess. 54, *reprinted in* 1976 U.S. CODE CONG. & ADMIN. NEWS 5659, 5667 (including computer programs, as defined by 17 U.S.C. § 101, within subject matter category of literary works). Granting copyright protection, however, has not resolved the problems for the

authors is the exclusive right to prepare derivative works.[91] The extent of this exclusive right is well settled for authors of literary works, but authors of computer software cannot rely on this exclusive right because of the uncertainty the substantial similarity test creates.[92]

The substantial similarity test, as applied to the exclusive right to prepare derivative works, results in inconsistent and uncertain protection for computer software.[93] This inconsistency results from three sources. Derivative works are by definition dissimilar, and often are in a form different from the original.[94] Consequently, the similarities from the outset are few. The next complicating factor is the requirement that the infringing work must be substantially similar to the original at the idea level as well as in its expression.[95] Finally, when the above difficulties are combined with the highly technical nature of computer software, the substantial similarity test becomes very difficult for even the most sophisticated fact finders to ap-

---

computer software industry. The copyright law is designed to apply to works of fine art; courts therefore have difficulty applying the idea/expression dichotomy and the substantial similarity test to computer software. *See* Note, *supra* note 23, at 1268-84 (discussing development of copyright protection for computer software).

91. *See supra* note 1.

92. Some may argue that the exclusive right to prepare derivative works is not well settled for literary works either. The language of the statute, however, is much clearer with respect to literary works. *See* 17 U.S.C. § 102 (1982). For instance, the statute lists some specific examples of derivative works of literary works such as movies and dramatizations. *Id.* The Act does not include similar language regarding computer software, and thus the courts must interpret the broad language "works based upon the copyrighted work" to determine if there is an infringement. *Id.* § 106(2). The courts are forced to do the basic policy analysis and set the proper scope of protection for computer software. Also, the case law involving literary derivative works is much more extensive than the computer software case law. *See supra* part I(A).

Uncertainty in the computer software field results from the reliance of some courts on derivative works cases involving literary works as controlling law. *See, e.g.,* Vault Corp. v Quaid Software, Ltd., 847 F.2d 255, 267 (5th Cir. 1988) (relying on Litchfield v. Spielberg, 736 F.2d 1352, 1357 (9th Cir. 1984) (finding no infringement of play from movie and relying solely on substantial similarity), *cert. denied*, 470 U.S. 1052 (1985)). Other courts have not followed this analysis. *See, e.g.,* Midway Mfg. v. Artic Int'l, 704 F.2d 1009, 1013 (7th Cir.) (finding infringement by relying on economic impact and not on substantial similarity), *cert denied*, 464 U.S. 823 (1983). There is no clear consensus regarding application of the exclusive right to prepare derivative works, and this creates uncertainty.

93. *See supra* note 57.

94. *See supra* note 69.

95. *See supra* notes 46-57 and accompanying text.

ply consistently.[96] The uncertainty that the substantial similarity test creates in this situation ' thwarts the purpose of copyright law because it reduces authors' incentive to create new works with no corresponding increase in public access.[97]

This reduction in incentive stems from the impact of uncertainty of protection on an author's decision to invest the time and resources necessary to create a particular program. Pecuniary considerations may not always be paramount in the decision to create traditional copyrightable subject matter such as books, songs, or paintings,[98] but the production of computer software is big business.[99] Computer software companies use traditional management decision techniques in deciding whether to pursue a project.[100] The companies examine the potential market for the software, gauge the revenues that the software will generate, and weigh these revenues against the costs of producing the software.[101] Projects that do not produce revenues at least equal to the costs of the project are rejected.[102]

Ascertaining the costs and revenues of a project is difficult, however, when the copyright law ambiguously defines the ex-

---

96. Most courts deciding cases involving computer software recognize the need for expert testimony. *See supra* notes 43-44 and accompanying text.

97. Reduced protection from infringement results in a corresponding increase in the public's access to that work. *See supra* note 85. In this situation, however, the risk created by the unpredictability of infringement negatively affects both the author's protection and the willingness of third parties to use the copyrighted work as a stepping stone to further creativity. *See infra* notes 103-22 and accompanying text.

98. *See supra* note 89.

99. Both the software and hardware industries have experienced dramatic growth. In 1984, sales of turnkey computer systems approached $20 billion. PRACTICING LAW INSTITUTE, INTRODUCTION TO COMPUTER LAW 329 (1985).

100. Such techniques involve discounting the future cash flows from a proposed project and weighing this value against the present value of the cash outflows necessary to sustain the project. *See generally* J. WESTON & E. BRIGHAM, ESSENTIALS OF MANAGERIAL FINANCE 255-343 (5th ed. 1979) (outlining investment analysis models). The same techniques are used when analyzing a software investment decision. *See* N. STATLAND, CONTROLLING SOFTWARE DEVELOPMENT 134-36 (1986) (discussing need to balance costs against benefits of software development).

101. A rational decision maker will not proceed when the costs of the project are greater than the rewards. The concept of a rational producer mandates that the decision to invest in a particular project depends upon the returns expected. *See* KOHLER, INTERMEDIATE MICROECONOMICS 8-9 (1982) (explaining that rational behavior consists of choosing among alternatives that will enhance welfare).

102. *Id.*

clusive right to prepare derivative works.[103] The uncertainty created by the substantial similarity test is a form of risk that the software producer must consider when deciding whether to make an investment in software.[104] This risk reduces the potential revenue of the project and increases the cost of development by chilling programmers from using existing works as stimulation for the innovative process.[105] This impact on the revenues and costs of the potential project reduces the number of copyrightable programs. Therefore, the substantial similarity test as applied in this context does not serve the purpose of copyright law.[106]

Regardless of the level of protection Congress intended to extend to software authors, an uncertain infringement standard dictates that the intended monopoly will not be achieved because of the impact that risk has on the projected revenues of the project.[107] For example, assume two copyright systems,

---

103. *See supra* notes 93-97 and accompanying text. Another complicating factor is the high obsolescence rate of computer technology. PRACTICING LAW INSTITUTE, *supra* note 99, at 348 (noting problem of obsolescence). The shorter the life span of the technology, the lower the amount of revenue that can be generated.

104. Many scholars have considered the decision making process. *See, e.g.,* Modigliani & Pogue, *An Introduction to Risk and Return: Concepts and Evidence,* 30 FIN. ANAL. J. 68 (1984), *reprinted in* V. BRUDNEY & M. CHIRELSTEIN, CORPORATE FINANCE 93-101 (3d ed. 1987) (proposing use of Capital Asset Pricing Model); W. LEWELLEN, THE COST OF CAPITAL (1969), *reprinted in* V. BRUDNEY & M. CHIRELSTEIN, *supra,* at 57-64 (discussing impact of risk on investment decisions); J. WESTON & E. BRIGHAM, MANAGERIAL FINANCE (4th ed. 1972), *reprinted in* V. BRUDNEY & M. CHIRELSTEIN, *supra,* at 64-69 (same).

105. *See infra* notes 107-22 and accompanying text.

106. The 1976 Copyright Act provides copyright owners with a cause of action for infringement of their exclusive rights. 17 U.S.C. § 504 (1982). This cause of action allows the copyright owner to protect the investment in the copyrighted work. Even if others may independently create a competing program, the author is protected from competitors who do not incur the substantial costs of initial development. *See* Abrams, *supra* note 6, at 1121 n.4 (stating that copyright protection is necessary to offset high initial costs of production that copiers necessarily do not incur); Conley & Bryan, *supra* note 26, at 596 (stating that competitors can save time and money by relying on original author's work). This protection makes the revenue stream more predictable and makes investment in software more available.

107. Some argue that the exclusive right to prepare derivative works extends no additional protection to authors. *See supra* note 2. *But see supra* note 4. These authors follow the *Litchfield* rationale and argue that the exclusive right to prepare derivative works does not protect against copying that is not substantially similar. Even if one accepts this proposition as the true congressional intent, it still follows that the inherent uncertainty of the test as applied to computer software cases involving derivative works inhibits software producers. This proposition can be demonstrated mathematically. An investment's value is calculated as:

each attempting to extend to authors the same level of protection. One of the systems has exclusive rights that are unambiguous and allow the software producer to ascertain with near certainty the revenue that a program will generate.[108] In this case, the software producer knows the level of protection Congress intended and therefore can proceed with certainty toward investment.[109]

The second system's scope of protection is more ambiguous.[110] The software producer faces different possible outcomes, each with a different probability of occurrence.[111] Even

---

$$PV = \sum_{t=i}^{N} \frac{Rt - Ct}{(1 + r)^t}$$

Rt = the revenue earned in each period
Ct = the costs incurred in each period
 r = the discount rate

To compensate for risk, the discount rate is adjusted upward for increased variability in revenues and downward for increased variability in costs. Those adjustments reduce the present value of the investment, thereby reducing incentive to produce the software. A common measure of risk is the standard deviation of returns, which is calculated as follows:

$$= \sqrt{\Sigma \, Pi \, (Ri - Re)^2}$$

where:

Pi = the probability of each individual occurrence
Ri = each possible revenue outcome (net of costs)
Re = the expected value calculated as follows:
Re = Σ (Pi $\times$ Ri).

The higher the standard deviation of investment outcomes, the higher the risk. As risk increases, the discount rate also must increase, thereby reducing the value of a given investment. Thus, risk adversely affects the level of investment and defeats congressional intent. *See* V. BRUDNEY & M. CHIREL-STEIN, *supra* note 104, at 64-69 (discussing measure of risk and incorporating their measures into investment decision); F. MISHKIN, THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS 93-94 (1986) (discussing measures of risk).

108.   Such a system is impossible, but consideration of an ideal in contrast to the current system is a valuable aid in analysis. Perfect information is required for a competitive market. Failure of perfect information is a form of market failure, and one justification for intervention. *See* Note, *Eligibility for Copyright Protection: A Search for Principled Standards*, 70 MINN. L. REV. 579, 598 (1985) (discussing market failure in context of copyright protection). An unambiguous copyright law improves competitiveness in markets for copyrighted works.

109.   *See supra* note 100 and accompanying text.

110.   The divergence of recent cases demonstrates the ambiguity of the exclusive right to prepare derivative works in the context of computer software. *See supra* note 57 and accompanying text.

111.   When more than one outcome is possible, it is necessary to attach a probability to each outcome. For example, consider three levels of protection: high, intermediate, and low. Assume that each of these levels of protection translates into $100,000, $75,000, and $50,000 of return on investment respec-

assuming that the weighted probable revenue stream predicted by the software producer covers the same markets that Congress intended to protect, the possibility that courts will narrowly construe an ambiguous standard increases the risk of investment and reduces its value.[112] Investors will prefer an investment that produces a certain cash flow of $100,000 over a risky investment that returns $100,000. Risk averse investors thus consider the less risky investment more promising.[113]

In summary, the vagueness of the substantial similarity test as currently applied by most courts makes results uncertain and unpredictable. This unpredictability renders investment in copyrighted software more risky and less valuable. Software developers will reject some projects because they will be unable to predict whether the potential revenues will exceed development costs. This results in fewer copyrighted works.[114] Such a result conflicts starkly with copyright law's objective to promote creation of copyrightable works.[115]

The uncertainty inherent in the application of the substan-

---

tively. In other words, each level of protection extends the software producer's monopoly into more markets and results in more revenue. The ambiguity in the test for infringement of the exclusive right to prepare derivative works allows for a range of possibilities. To establish what the probable outcome will be, the producer must attach a probability to each of the possible outcomes. The probability established will depend upon perceived trends in recent cases, the nature of the program, and whether there is related precedent. If the established probability of protection is 25%, 60%, and 15% respectively, then the probable revenue stream is $77,500. Even assuming that the unambiguous copyright system generates the same level of investment, the risk inherent in the unpredictable system makes investment less likely. *See supra* note 107 and accompanying text.

112. *See supra* note 107.

113. *See, e.g.*, V. BRUDNEY & M. CHIRELSTEIN, *supra* note 104, at 58-65 (discussing risk aversion of investors).

114. This statement has two implications. First, it recognizes that a derivative work is dependent on a preexisting work. Second, a derivative work adds original authorship to the preexisting work. But for the fact that the author is taking the expression of a preexisting work without permission, the author of the derivative work could obtain copyright protection for the original portion added. *See* NIMMER, *supra* note 2, § 809 (stating that derivative work would be copyrightable but for lack of permission). A derivative work thus communicates to society more information than a simple reproduction, and the copyright law needs to ensure that derivative works are produced. Copyright law does this by granting authors the exclusive right to prepare derivative works. This Note proposes that the best way to ensure that derivative computer programs are prepared is to determine whether the program's source code is minimally similar. *See infra* notes 136-66 and accompanying text.

115. *See supra* note 85 and accompanying text. The argument that destruction of the incentive will reduce the total number of copyrighted works is not novel. *See* Hurt & Schuchman, *supra* note 85, at 426 (stating that lack of in-

tial similarity test to derivative works also alters the cost side of the investment decision.[116] One purpose for granting authors only a limited monopoly in a copyrighted work is to make that work available to others for use in the creative process.[117] Copyright laws should insure that others are free to take the idea presented by a program and use it as a stepping stone to their own creativity.[118] The copyright laws in this manner promote the progress of the sciences and useful arts.[119]

As some software manufacturers find, however, this stepping stone process often leads to infringement.[120] Similar to the effect of risk on potential revenues from a program, the risk of infringing a copyright increases the cost of software production.[121] The vaguer the standard of infringement, the more difficult it is for software producers to conform their activity to the law. Software producers therefore must factor potential litigation costs into the investment decision, resulting in increased costs.[122] These increased costs, in turn, will further discourage developers from producing some programs.

III. A PROPOSAL TO REDUCE THE UNCERTAINTY THE SUBSTANTIAL SIMILARITY TEST CREATES

This Note proposes that the courts reduce uncertainty caused by the substantial similarity test by establishing more certain rules regarding infringement of the exclusive right to

---

centive will reduce number of copyrighted works); Note, *supra* note 86, at 465 (arguing that impairing incentive undermines purpose of copyright).

116. Viewing the problem from the cost side of the investment equation, the investor worries about future litigation costs and about taking other noncopyright protective procedures. *See* Davidson, *supra* note 89, at 1037 (suggesting technique for analyzing competing software to avoid infringement); Hazen, *supra* note 49, at 128-29 (offering contract as alternative method of protection against infringement from derivative works). A less ambiguous copyright act would eliminate the extra costs and potential litigation from these procedures.

117. *See supra* notes 23-24, 90 and accompanying text.

118. *See supra* note 23 and accompanying text.

119. *See supra* note 5 and accompanying text.

120. *See supra* note 28.

121. This conclusion follows the risk analysis presented for the predictability of the potential revenue stream. *See supra* note 107. Risk from the possible occurrence of various possible costs requires downward adjustment of the discount rate, increasing the present value of the costs of the project. The cost variability results from the precautions taken to counteract the ambiguity of the substantial similarity test. *See supra* note 116.

122. Even if the actual costs do not increase, the possibility of increased costs makes the investment less desirable. *See supra* note 107.

prepare derivative works.[123] First, courts should use the costs and revenues that a program generates as a guide to defining the idea/expression dichotomy.[124] Second, courts need to reevaluate the substantial similarity test to take into consideration the inherent dissimilarities of derivative works.[125] These adjustments will increase the predictability of the copyright laws and will better serve the purpose of copyright.

As noted earlier, the language of the Copyright Act of 1976 provides that the infringing derivative work must be "based upon" the copyrighted work.[126] The statute does not define *based upon*,[127] and any test for infringement of the exclusive right to prepare derivative works must begin by defining that term. This proposal sets forth a method for proving that a work is an infringing derivative work and, therefore, "based upon" the preexisting work.

The first part of the proposed test follows the traditional test for infringement employed in "copying" cases.[128] Because independent creation of even an exact duplicate of a copy-

---

123. Bright line rules are advantageous because they offer predictability, but problems result when courts are not free to consider exigent circumstances. The bright line rule proposed here, however, comports with the purpose of copyright law. *See infra* notes 153-57 and accompanying text. *But see* Hazen, *supra* note 49, at 116-17 (stating that bright line test is precluded by vague language of statute).

124. This analysis follows the reasoning of *Midway Mfg. Co. v. Artic Int'l*, 704 F.2d 1009, 1013-14 (7th Cir.), *cert. denied*, 464 U.S. 823 (1983). *Midway* defined a derivative work as one that generates a significant demand. The court applied the economic analysis because it is consistent with the purpose of copyright. *Id.*; *see supra* notes 30-37 and accompanying text. Because the idea/expression dichotomy is simply a reflection of the purpose of copyright, the economic analysis of *Midway* can be used as a tool to define the idea/expression dichotomy. Use of economics is not new to copyright law. *See generally* Gordon, *Fair Use As Market Failure: A Structural and Economic Analysis of the Betamax Case and Its Predecessors*, 30 J. COPYRIGHT SOC'Y U.S.A. 253, 272-75 (1983) (advocating copyright law as remedy for market failure); Raskind, *A Functional Interpretation of Fair Use: The Fourteenth Donald C. Brace Memorial Lecture*, 31 J. COPYRIGHT SOC'Y U.S.A. 601, 626-39 (1984) (applying economic analysis in fair use context); Comment, *Fair Use in Copyright Law and the Nonprofit Organization: A Proposal For Reform*, 34 AM. U.L. REV. 1327, 1363 (1985) (noting courts using economic theory in copyright cases).

125. *See supra* note 57 and accompanying text.

126. The relevant sections of the Copyright Act of 1976 are § 106(2), granting the exclusive right to prepare derivative works, and § 101, defining a derivative work. *See supra* note 1; *see also* Conley & Bryan, *supra* note 26, at 609 (stating that "based upon" means that defendant used plaintiff's work and that this use can be seen by examining works).

127. *See supra* note 25.

128. *See supra* notes 38-45 and accompanying text.

righted work is not an infringement, the courts have required some evidence of copying.[129] This requirement also applies in derivative works cases.[130] Usually such an inquiry uses circumstantial evidence to raise an inference of copying because direct proof is often unavailable.[131] When a plaintiff chooses to prove copying through circumstantial evidence, the plaintiff first must prove that the defendant had access to the copyrighted work.[132] The plaintiff next must prove sufficient similarity of expression to raise an inference of unlawful copying.[133] At this point, the proposed test diverges from the traditional substantial similarity test in order to reduce the uncertainty created by that test in computer software cases involving derivative works.

In a traditional substantial similarity inquiry, a court first must ascertain whether the alleged infringer appropriated the protected expression of the work, as opposed to the unprotected idea.[134] Because the traditional idea/expression analysis is ambiguous, especially in the context of computer technology, copyright law needs a more concrete method of ascertaining where to strike the balance between incentive to authors and access to the public.[135]

The analysis of *Midway* answered this need by using economic analysis to decide whether there was an infringing derivative work. Derivative works cases involving computer software can also use economic analysis to distinguish idea from expression.[136] Courts should classify that part of a work which

---

129. *See, e.g.*, Whelan Assocs. v. Jaslow Dental Laboratory, 797 F.2d 1222, 1231 (3d Cir. 1986) (copying must be proven), *cert. denied*, 479 U.S. 1031 (1987). One of the major distinctions between copyright and patent law is that copyright does not prohibit independent creation. A subsequent independent inventor of a patented work obtains no rights, and will be infringing the patent if he manufactures and sells the invention. *See* 35 U.S.C. § 103 (Supp. IV 1986). A patent grants a more extensive monopoly than a copyright, but it is much harder to obtain and lasts for only 17 years. *See* 35 U.S.C. §§ 100-104, 154 (1982 & Supp. IV 1986). Some commentators are concerned that copyright law has been extending protection to ideas and, therefore, granting patent-like protection without the requisite limitation on terms or obtainability. *See* Brown, *supra* note 4, at 2.

130. *See, e.g.*, Litchfield v. Spielberg, 736 F.2d 1352, 1357 (9th Cir. 1984) (requiring some form of copying in derivative works case), *cert. denied*, 470 U.S. 1052 (1985).

131. *See supra* note 39.

132. *Id.*

133. *Id.*

134. The idea/expression dichotomy is an essential part of any analysis of copyright infringement. *See supra* notes 46-57 and accompanying text.

135. *See supra* notes 54-57 and accompanying text.

136. *See supra* note 124 and accompanying text. The legislative history of

will generate a significant demand as protected expression, and should classify the rest as idea.[137] Application of this test to computer programs requires examination of the process of computer software development.[138]

---

the Copyright Act of 1976 is scant, but it seems to support protection of the parts of a work that will generate a significant demand and therefore will be of value to the author. *See* LEGISLATIVE HISTORY, *supra* note 26, at 13; *see also* Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1212-15 (1986) (discussing legislative history of exclusive right to prepare derivative works in context of computer software); *supra* notes 10-26 and accompanying text (discussing history of copyright legislation). A committee print for the House Committee on the Judiciary stated that "the bill should, we believe, adopt a general approach aimed at providing compensation to the author for future as well as present uses of his work that materially affect the value of his copyright." LEGISLATIVE HISTORY, *supra* note 26, at 13. Others have argued that the legislative history of the exclusive right to prepare derivative works demonstrates that it was meant to expand the scope of exclusive rights. *See* Conley & Bryan, *supra* note 26, at 609-10; Hazen, *supra* note 49, at 117-18. *But see* Samuelson, *supra*, at 1213-14 (arguing that exclusive right to prepare derivative works was meant only to refine and simplify copyright, not to expand scope of exclusive rights).

137. This analysis is similar to the fair use doctrine. Copyright law provides that one can copy another's work if it is a "fair use." 17 U.S.C. § 107 (1982). The primary factor in determining whether a use is a fair use is the effect that the copying has upon the "potential market" of the copyrighted work. *See, e.g.*, Harper & Row, Publishers v. Nation Enters, 471 U.S. 539, 566 (1983) (stating that effect upon potential market is most important factor); Original Appalachian Artworks, Inc. v. Topps Chewing Gum, Inc., 642 F. Supp. 1031, 1036 (N.D. Ga. 1986) (finding that fair use did not exist because of effect on potential market); Metro-Goldwyn-Mayer, Inc. v. Showcase Atlanta Coop Prods., Inc., 479 F. Supp. 351, 358 (D. Ga. 1979) (emphasizing effect upon potential market in finding that musical was infringement of book); New York Times Co. v Roxburg Data Interface, Inc., 434 F. Supp. 213, 223 (D.N.J. 1977) (stating that competitive effect is important when dealing with compilations and directories). If there is no harm to the potential market of the original work, then generally there is a fair use and therefore no copyright infringement. *See, e.g.*, *Original Appalachian Artworks*, 642 F. Supp. at 1036, (finding that bubble gum cards depicting ugly children not fair use of "cabbage patch" dolls); Radji v. Khakbaz, 607 F. Supp. 1296, 1301-03 (D.D.C. 1985) (finding that translation of newspaper article was not fair use). By relying primarily on the impact on the potential market, the courts are extending protection to these potential markets. Examining the "potential market" of a work is similar to examining whether the software will generate a significant demand. Because the source code generates a significant demand, if others are allowed to appropriate the source code, the appropriation affects the potential market of the program and therefore results in an infringement.

138. *See* Whelan Assocs. v. Jaslow Dental Laboratory, 797 F.2d 1222, 1229-31 (3d Cir. 1986) (discussing development process and citing to programming resources), *cert. denied*, 479 U.S. 1031 (1987); *see also* N. STATLAND, *supra* note 100, at 87-90 (discussing development of computer software systems); *see generally* R. ARMSTRONG, MODULAR PROGRAMMING IN COBOL (1973) (discussing programming in COBOL computer language).

Hereinafter, reference to source code includes reference to the object code

The program development process involves four steps: systems design, programming and program testing, system testing, and maintenance.[139] Courts attempting to define the idea and expression of computer software usually focus on the distinction between the systems design and programming phase.[140] At the systems design stage the overall structure and organization of the system are defined, while at the programming stage this general design is made more detailed and reduced to an operational product, the source code.[141] The courts are split, some holding that the overall structure and organization of the software are protectable expression, and some holding that the expression is limited to the source code.[142] One way of examining this problem is to look at the costs and revenues generated at each stage of the process to determine the value of each stage to the author and to the public.[143]

---

of the program. It is well settled that both the source and object code of a program are copyrightable. *See, e.g.*, Digital Communications Assoc. v. Softklone Distributing Corp., 659 F. Supp. 449, 454-55 (N.D. Ga. 1987) (stating that both source and object code are copyrightable).

139. *Cf.* R. ARMSTRONG, *supra* note 138, at 7 (discussing program development). There are sub-phases within each of these steps. Systems design encompasses a feasibility study, specification, analysis, and engineering of the system. *Id.* At this stage an outline of the system is produced, which is normally expressed in the form of a flow chart. The flow chart specifies the flow of data in and out of the system, but is in a general form, with further specifications left for the programming phase. *See, e.g.*, N. STATLAND, *supra* note 100, at 64. The programming phase consists of making a detailed design of the system, actual programming, and testing program and interface. *See, e.g., id.* at 64-65 (showing sample program design flow chart).

140. *See supra* note 57 and accompanying text. Definition of the phases of development is crucial to use of this analysis. *Whelan*, for example, may have included the general organization and structure of the program within the ambit of protection because the experts defined the systems design stage very broadly to include some programming functions. The *Whelan* court did not mean that the structure and organization of the system is a general flow chart of data flows, but rather the structure of individual subroutines within each program. *Whelan*, 797 F.2d at 1230. This intermediate design/programming function is more properly characterized as creation of source code. This is not to imply that copying of the structure of subroutines will constitute infringement. There is the possibility, however, that similarity of subroutines can be used as an indication of copying of the literal source code. Such a determination requires expert testimony. *See infra* note 158 and accompanying text.

141. *See supra* note 139.

142. *See supra* note 57 and accompanying text.

143. Such an approach comports with the purpose of copyright law by balancing incentive to create with public access to the product of that creativity. By protecting an author's investment in a program, the copyright laws provide incentive to create. By allowing others access to the part of the work that does not require a substantial resource commitment, the copyright laws allow others to build upon the basic idea of the program. If the Copyright Act of

The higher the cost of development at each stage, the more valuable protection will be for the author, thereby increasing the incentive to create.[144] Costs usually peak toward the end of the programming phase.[145] If copyright law does not extend protection to the source code, others will be able to enter the market with substantially less cost, therefore reducing the incentive to produce original source code.[146] On the other hand, copying the general system design will not create a competitive advantage, because a competitor still must incur many of the

---

1976 protected the basic idea of the program, the program would be more valuable. The Copyright Act, however, prohibits such protection because of the resulting restrictions on innovation. *See supra* note 46.

144. At a minimum, an author expects to recover the costs of producing a program. *See supra* note 101. Thus, protection of these costs should be one of the primary concerns of copyright law. Protection of the costs of production is similar to the protection of the potential market in the fair use context. *See supra* note 137.

145. R. ARMSTRONG, *supra* note 138, at 7. *But see* Whelan Assocs. v. Jaslow Dental Laboratory, 797 F.2d 1222, 1231 (3d Cir. 1986) (stating that development of structure and organization of program is more costly than coding), *cert. denied*, 479 U.S. 1031 (1987); N. STATLAND, *supra* note 100, at 135 (stating that systems design is most cost-intensive phase). Such conclusions, although not necessarily at odds with the position of this Note, are a result of improper definition of the elements of system design. *See supra* note 140.

The overall structure and organization of a program is that part which can be revealed by examining the input and output functions of the program, but not by looking at the source code. The overall structure and organization of the program can be ascertained by simply observing how the program operates and interfaces with the user. This analysis follows that proposed in Davidson, *supra* note 89, at 1082, for distinguishing between the idea and expression of a program. Davidson suggests looking at a program as if it were a "black box." Anything that can be ascertained by looking at the outside of the black box is an idea, while anything that can be ascertained by looking inside the box is an expression. *Id.* Davidson argues that the "black box" approach serves the purpose of copyright because if what is inside is not very complex or original, independent creation will be swift. *Id.* at 1080-81. If, however, the inside of the box is very complex, it will be more valuable, and the time of independent creation should be longer. *Id.* Davidson states that the requirement of independent creation is necessary to preserve the author's incentive. *Id.*

Even though substantial resources may go into the design of a program's organization and structure, a programmer still must make additional substantial investments to complete the program. The programmer must solve the entire programming problem, and complete the coding, debugging, documentation, and maintenance. *Whelan*, 797 F.2d at 1231 n.21. This work is time-consuming and, given the short life span of most programs, the lead time maintained by the original programmer is sufficient protection.

146. *See* Abrams, *supra* note 6, at 1121 n.4 (stating that common argument for copyright protection is high initial cost of production not incurred by copiers); Conley & Bryan, *supra* note 26, at 596 (stating that competitors will save themselves time and money by relying on original author's work).

costs to develop an operational product.[147] Thus, examination of the costs associated with development of the system design and the source code indicates that protection should be limited to the source code.

This conclusion also follows from examination of the revenues that the relevant parts of a program will generate.[148] The value of a program derives from the future revenues that it will produce.[149] The system design will not generate revenue from consumers because it is not operational.[150] Other software developers will be reluctant to pay a substantial sum for the system design because it will not give them much of a competitive advantage.[151] Thus, the source code is the only part of the program that will generate a significant demand. Therefore, under this Note's proposed test, the source code merits the label of "expression."[152]

This conclusion results in more certain application of copyright law because little ambiguity exists in defining the literal source code.[153] Software producers will know that others are free to create competing programs with a similar design and that the revenue stream therefore will be restricted to the immediate market the program enters.[154] The immediate market of the program is protected from lower cost producers because, without being able to copy the source code, competitors will

---

147. Because the copier must invest substantial resources to complete the program, the copier is more like an independent creator. *See supra* note 145. This situation also demonstrates the dual nature of a derivative work, because a derivative work can be copyrightable if the work incorporates substantial differences from the original. *See supra* note 77.

148. This analysis is similar to that employed in *Midway Mfg. Co. v Artic Int'l*, 704 F.2d 1009, 1013-14 (7th Cir.), *cert. denied*, 464 U.S. 824 (1983); *see supra* note 124.

149. V. BRUDNEY & M. CHIRELSTEIN, *supra* note 104, at 33-39 (discussing use of discounting future cash flows to determine value of investment).

150. The system does not become operational until after the programming phase, and only at that time will the program be of value to the consumer. *See supra* note 145.

151. *See supra* note 146.

152. *See supra* note 55.

153. In the case of derivative works, it may be difficult for a finder of fact to determine whether the source code was copied. *See infra* note 158. This problem does not exist for the copier, however, because the copier knows the original source code and knows whether the changes are trivial. *See infra* note 159.

154. Others have argued that the exclusive right to prepare derivative works extends beyond the market the work first enters. *See* Goldstein, *supra* note 4, at 234. This extension seems to be more appropriate for literary works, however, than for computer software.

have to incur substantial investment costs to produce a competing program.[155] Also, greater certainty will enable others to use the program as a "stepping stone" in independent creation because, as long as no source code is copied, they are not in danger of infringing another's copyright.[156] Thus, the proposed approach reduces much of the uncertainty of the idea/expression portion of the substantial similarity test, thereby making the investment in software more certain.[157]

Because derivative works are dissimilar by definition, the next problem is to ascertain whether the alleged derivative work appropriated enough of the literal source code to be infringing. Expert testimony is essential to aid the trier of fact in ascertaining what the source code looks like.[158] Once this is determined, the trier of fact can make a side-by-side comparison of the two source codes.[159]

The trier of fact should look for any similarity. If none is found, there can be no infringement.[160] If even minimal portions of the source code are similar, however, courts should find an infringement of the exclusive right to prepare derivative works.[161] The competitive advantage obtained by copying even

---

155. *See supra* note 145.

156. *See supra* notes 116-22 and accompanying text.

157. Reducing the uncertainty of application of the copyright laws helps insure that the desired level of protection is realized. *See supra* note 107 and accompanying text.

158. *See* Conley & Bryan, *supra* note 26, at 581-82; *supra* note 39. Derivative works, by definition, are adapted from the original and, therefore, they may not seem similar to the ordinary observer. B. KAPLAN, *supra* note 17, at 34-39. Thus, experts are needed to elucidate the similarities between the works. *See supra* note 43; *see also* Beutel, *Modular Decomposition and the Substantial Similarity Test: An Evidentiary Approach to Proof of Software Design Piracy,* COMPUTER LAWYER, Oct. 1985, at 1, 13.

159. *See supra* text accompanying note 40. Conley and Bryan argue that the exclusive right to prepare derivative works should be interpreted broadly to cover those who copy the source code and then subsequently disguise it. Conley & Bryan, *supra* note 26, at 596-97. Subsequent alterations are important considerations, and expert testimony should be able to discover such situations. In such a case, the literal source code probably will have been copied, and infringement will exist. *Cf.* NIMMER, *supra* note 2, § 130.03[B] (stating that subsequent alterations will cure an infringement).

160. There must be copying of some of the expression in order for infringement to exist. *See supra* note 129. This conclusion is supported by the legislative history, which states that a derivative work must incorporate some portion of the original for infringement to exist. H.R. REP. NO. 1476, 94th Cong., 2d Sess. 62, *reprinted in* 1976 U.S. CODE CONG. & ADMIN. NEWS 5659, 5675.

161. The purpose for requiring only minimal similarity is to create a deterrent against any copying of source code without permission. A competitor who

minimal portions of source code is substantial, because copied
source code does not have to go through systems analysis, cod-
ing, or debugging.[162] This competitive advantage directly cuts
into the original author's incentive to create, especially because
the obsolescence rate of software is very high.[163] Thus, plain-
tiffs need show only minimal similarity to prove infringement
of the exclusive right to prepare derivative works.[164]

By requiring a finding of only minimal similarity, the pro-
posed approach makes the existence of infringement easier to
detect. The software industry will be put on notice that it can-
not copy source codes without obtaining the owner's permis-
sion.[165] Such a bright-line test makes investment decisions
easier by making the costs and revenues of the investment
more certain.[166]

Application of the proposed test to prior cases involving de-
rivative works demonstrates how the test operates. In *Vault
Corp. v. Quaid Software, Ltd.* the defendants had access to
plaintiff's computer program and there was evidence that they
took some of the plaintiff's source code verbatim.[167] Under the
proposed test, the alleged infringing program is "based upon"
the copyrighted program and thus violates the holder's exclu-
sive right to prepare derivative works.

---

wants to avoid the costs associated with creation of the source code can
purchase the right to use it from the original author. Such an approach will
allow the market, supported by the copyright law, to work out the value of the
source code between the two competitors.

This part of the test necessarily requires some discretion and is purely a
factual determination. Weight should be given to the relative importance of
the source code copied. *See supra* text accompanying note 44. This author be-
lieves that anything more than 10% of the total will be an infringement. More
than 10% similarity raises the inference that much more was copied, but that
it has been sufficiently disguised. In this case the copier escapes much of the
development cost and should not be allowed to compete with the original au-
thor, who incurred all of the investment cost.

162. Even assuming that most of the value of a program is in the system
design, copying of the source code includes copying the system design. Thus,
copying of the source code is appropriation of the original author's investment
and reduces the incentive to create.

163. Others often can independently create competing software in a short
period of time. Davidson, *supra* note 89, at 1081. If competitors also are al-
lowed to shorten the lead time by avoiding *any* of the costs of independent
creation, the original author's incentive is reduced.

164. If even minimal copying of source code can be shown, other unprov-
able copying often can be inferred.

165. Use of the market to value the software results in a more efficient al-
location of resources. *See supra* note 161.

166. *See supra* notes 103-15 and accompanying text.

167. 847 F.2d 255, 256-57 (5th Cir. 1988).

    The fair use doctrine, however, provides the defendants
with a defense to the claim of infringement.[168] The "unlock-
ing" program can be analogized to a criticism or parody of the
original work and thus falls within the fair use defense.[169] The
plaintiff is not expected to produce a program that will canni-
balize its own product, just as one is not likely to criticize one's
own artistic work.[170] Thus, the result under both the tradi-
tional substantial similarity test and the proposed test is the
same.[171] *Vault* demonstrates that traditional copyright restric-
tions, such as the fair use doctrine, apply equally to derivative
works cases that employ the proposed derivative works test.

    Q-Co Industries v. Hoffman presents a factual situation in
which the proposed test compels a finding of infringement, con-
trary to the result under the traditional substantial similarity
test applied by the court.[172] In *Q-Co* the defendants had access
to the plaintiff's copyrighted source code, and there was evi-
dence that the defendants copied some of that code.[173] Thus,
defendants created a teleprompter program that was based
upon plaintiff's copyrighted source code and therefore in-
fringed plaintiff's exclusive right to prepare derivative works.

    There was evidence in *Q-Co* that defendants devoted sub-
stantial resources to the development of the new IBM tele-

---

    168.   The Copyright Act of 1976 codified the fair use defense:
    [T]he fair use of a copyrighted work . . . is not an infringement of
    copyright. In determining whether the use made of a work in any
    particular case is a fair use the factors to be considered shall include–
        (1) the purpose and character of the use, including whether such
    use is of a commercial nature or is for nonprofit educational purposes;
        (2) the nature of the copyrighted work;
        (3) the amount and substantiality of the portion used in relation
    to the copyrighted work as a whole; and
        (4) the effect of the use upon the potential market for or value of
    the copyrighted work.
17 U.S.C. § 107 (1982).
    169.   *See* Goldstein, *supra* note 4, at 234-35 (discussing fair use in context of
derivative works and relation to parodies).
    170.   This is the traditional argument for finding that parodies and critiques
are a fair use. *Id.*
    171.   The court in *Vault* applied the substantial similarity test and refused
to find infringement. *Vault*, 847 F.2d at 267-68; *see supra* note 68 and accompa-
nying text.
    172.   625 F. Supp. 608, 615-16 (S.D.N.Y. 1985) (refusing to find infringement
without substantial similarity).
    173.   *Id.* at 614-15 (stating that there were textual similarities in codes).
The existence of even minimal similarities raises an inference that there was
much more copying than appears on the face of the documents, especially
when they are in different languages. *See supra* notes 158-61 and accompany-
ing text.

prompter.[174] Encouraging this type of activity serves the purpose of copyright law. Therefore, a finding of infringement seems to thwart that purpose.[175] A finding of infringement, however, does not require the defendant to refrain from producing or distributing its program. The proper remedy is to require the defendant to compensate the owner of the copyright for the costs of development that were avoided by copying the protected source code.[176] The defendant should have avoided the infringement action by contracting with the plaintiff for the right to use the copyrighted source.[177] By imposing a duty to contract, the original author's investment is protected and subsequent authors can improve on the original work, thereby serving both purposes of copyright law.

CONCLUSION

The substantial similarity test in copyright law results in ambiguity and uncertainty when applied to derivative works cases involving computer software. This uncertainty makes an investment in copyrightable software risky and therefore reduces the level of investment. This result is contrary to the purpose of the 1976 Copyright Act.

Courts can reduce the uncertainty of the substantial similarity test by finding infringement of the exclusive right to prepare derivative works when a defendant copies even minimal portions of copyrighted source code. Examination of the market for software indicates that strict protection of the source code comports with the purpose of copyright by protecting the original investment while allowing others to use the program as a tool for innovation. The proposed test serves the purpose of copyright by maintaining a balance between fostering incentive to authors and preserving public access to the work, and by reducing the uncertainty of the test for infringement.

Michael Wurzer

---

174. *Q-Co*, 625 F. Supp. at 612-13 (discussing substantial time and effort defendants invested in creation of new program).

175. *See supra* notes 144-47 and accompanying text.

176. *See supra* notes 161-63 and accompanying text; *see also* Goldstein, *supra* note 4, at 236-39 (arguing that infringement of exclusive right to prepare derivative works requires different remedies from those normally awarded).

177. *See* Hazen, *supra* note 49, at 128-29 (suggesting use of contract to reduce uncertainty in area of derivative works).