ALLOCATING OWNERSHIP RIGHTS IN COMPUTER-GENERATED WORKS†

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When computer software automatically generates output that is not identical to its own text, some of which is potentially copyrightable and some of which is not, difficult problems arise in deciding to whom ownership rights in the output should be allocated. Applying the traditional authorship tests of copyright law does not yield a clear solution to this problem. In this Article, Professor Samuelson argues that allocating rights in computer-generated output to the user of the generator program is the soundest solution to the dilemma because it is the one most compatible with traditional doctrine and the policies that underlie copyright law.

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I. INTRODUCTION

As "artificial intelligence"[1] (AI) programs become increasingly sophisticated in their role as the "assistants" of humans in the crea-

1. "Artificial Intelligence" is a term used to describe a specialty field within computer science that is aimed at producing computers that exhibit intelligent conduct. *See, e.g.*, Shurkin, *Expert Systems: The Practical Face of Artificial Intelligence*, 8 TECH. REV. 72 (1983).

> A system is judged to have the property of intelligence, based on observations of the system's behavior, if it can adapt itself to novel situations, has the capacity to reason, to understand the relationship between facts, to discover meanings, and to recognize the truth. Also, one expects an intelligent system to learn, *i.e.*, to improve its level of performance on the basis of past experiences.

ENCYCLOPEDIA OF SCIENCE AND ENGINEERING 110-11 (A. Ralston 3d ed. 1983) (entry on "Artificial Intelligence").

Although many people are profoundly skeptical about the ability of humans to design and build truly intelligent machines—machines capable of learning, of designing, of thinking, of solving complex problems—some very prominent scientists have undertaken the effort to investigate the possibility. *See, e.g.*, Minsky, *Why People Think Computers Can't*, 8 TECH. REV. 65 (1983); H. SIMON, THE SCIENCES OF THE ARTIFICIAL (2d ed. 1981); B. WEBBER & N. NILSSON, READINGS IN ARTIFICIAL INTELLIGENCE (1981) (31 papers on various aspects and research concerning artificial intelligence). The investigation has less to do with advanced mechanical design and more to do with some deep theoretical assumptions about what rationality and thinking are all about:

> According to a central tradition in Western philosophy, thinking (intellection) essentially *is* rational manipulation of mental symbols (viz., ideas). Clocks and switchboards [for example] . . . don't do anything like rational symbol manipulation. Computers, on the other hand, can manipulate arbitrary "tokens" in any specifiable manner whatever; so apparently we need only arrange for those tokens to be symbols, and the manipulations to be specified as rational to get a machine that *thinks*. In other words, AI is new and different because computers actually do something very like what minds are supposed to do. Indeed, if that traditional theory is correct, then our imagined computer ought to have "a mind of its own": a (genuine) *artificial mind*.

J. HAUGELAND, ARTIFICIAL INTELLIGENCE: THE VERY IDEA 4 (1985) (emphasis in original). For a discussion of the optimistic predictions about the future of artificial intelligence developments, see generally E. FEIGENBAUM & P. MCCORDUCK, THE FIFTH GENERATION: ARTIFICIAL INTELLIGENCE AND JAPAN'S COMPUTER CHALLENGE TO THE WORLD (1983). For a more journalistic introduction to the work of a group of artificial intelligence researchers, see generally F. ROSE, INTO THE HEART OF THE MIND: AN AMERICAN QUEST FOR ARTIFICIAL INTELLIGENCE (1984). Concerning the potential and actual commercial implications of artificial intelligence research, see gener-

tion of a wide range of products—from music to architectural plans to computer chip designs to industrial products to chemical formulae[2]—the question of who will own what rights in the "output" of such programs[3] may well become a hotly contested issue.[4] Because software is copyrightable,[5] and much software is now being copyrighted,[6] copyright law may be the doctrinal forum for the debate.[7]

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ally THE AI BUSINESS: COMMERCIAL USES OF ARTIFICIAL INTELLIGENCE (P. Winston & K. Prendergast ed. 1984).

2. *See, e.g.*, U.S. CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION 69-73 (1986) [hereinafter cited as OTA REPORT] (discussing intellectual property problems presented by what OTA calls interactive computing, by which they mean "any creative process in which a preliminary or final version of a work that is the result of interactions between a person and a programmed machine," *id.* at 69; giving numerous examples of programs that perform such functions, *id.* at 70-71, including a flowchart for a music generator program, *id.* at 71); *Special Issue on Computer Music*, 17 ACM COMPUTING SURVEYS 147-289 (1985); Blick, *Computer-Assisted Chemical Synthesis Packages: Is this a New Problem for Patentability?*, 1 J. INFORMATION SCI. 227 (1979); Feuer, *VLSI Design Automation: An Introduction*, 71 PROCEEDINGS OF THE IEEE 5 (1983); E. FEIGENBAUM & P. MCCORDUCK, *supra* note 1, at 61-75 (discussion of some existing "expert system" programs); Posner, *Architecture: Computers Do It Faster*, Wall St. J., Feb. 25, 1986, at 28, col. 1.

3. This Article will only consider the question of how ownership of intellectual property rights in computer output should be allocated in the absence of an explicit allocation of ownership rights in a sales or licensing agreement between the owner (or authorized distributor) of a generator program and the user. An agreement which simply gives to the owner of the copyrighted generator program the right to control the making of derivative works will not be considered an explicit allocation of ownership rights in computer-generated works. See *infra* text accompanying notes 86-144 for a discussion of the ambiguity of the derivative work right in this respect.

4. When one thinks of how widespread are uses of computer programs to generate other works—both written works and industrial products—one can see that the stakes of the allocation of ownership rights in computer-generated works are very high indeed. When the stakes are high and the statute ambiguous, the stage would seem to be set for a hot contest.

5. Computer programs in machine-readable form were explicitly added to the realm of copyright subject matter by Pub. L. No. 96-517, 94 Stat. 3007 (1980) (codified at 17 U.S.C. § 101 (1982)). Although there have been numerous challenges to the copyrightability of computer programs, *see, e.g.*, Data Cash Sys., Inc. v. JS&A Group, Inc., 480 F. Supp. 1063 (N.D. Ill. 1979), *aff'd on other grounds*, 628 F.2d 1038 (7th Cir. 1980), it is now generally accepted that computer programs are proper subject matter for copyright. *See, e.g.*, Apple Computer, Inc. v. Formula Int'l, Inc., 725 F.2d 521 (9th Cir. 1984); Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240 (3d Cir. 1983), *cert. dismissed per stipulation*, 464 U.S. 1033 (1984). *But see* Samuelson, *CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form*, 1984 DUKE L.J. 663; OTA REPORT, *supra* note 2, at 7, 132 (arguing that computer programs because of their functional character do not readily fit in the copyright system and may lead to transformation of the traditional rules of the system).

6. *See* OTA REPORT, *supra* note 2, at 115.

7. The same kind of issue may surface in the patent system as well. *See generally* Blick, *supra* note 2; Milde, *Can a Computer Be an "Author" or an "Inventor"?*, 51 J. PAT. OFF. SOC'Y 378 (1969). One of the significant differences between copyright and patent law that may affect how patent law deals with the ownership issue is that patent law does not give the patentee the exclusive right to prepare derivative works whereas copyright law gives such a right to copyright owners. *Compare* 35 U.S.C. § 271 (1982) *with* 17 U.S.C. § 106 (1982). Section IV.B., *infra*, will discuss the implications

It is a new sort of problem for copyright law. Until software was admitted to its realm, copyright law had excluded utilitarian works—that is, works that had functions beyond the conveying of information or the displaying of some sort of appearance—from its domain.[8] Of the wide diversity of copyrightable works, only software is capable of automatically generating "products," including many of a sort that copyright itself will not reach (*e.g.*, an industrial product).[9] Congress

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of the derivative work right in the copyright system as it affects the potential right of a programmer to claim control over the computer output. Although the patent doctrine of equivalents provides patentees with a basis for claiming rights in some derivative inventions, the range of derivatives that a patentee may control under patent law may be narrower than the copyright law allows because with patents, to be "equivalent," a derivative invention must do the same basic function in the same basic way. *See* 4 D. CHISUM, PATENTS § 18.04 (1986).

8. Traditionally, copyright protection has extended to works whose only "utility" was the conveying of information or the displaying of some sort of appearance or sound. This principle is codified in the copyright statute at 17 U.S.C. § 101 (1982) (definition of "useful article"), *id.* § 113 (providing that useful articles embodying designs from copyrighted drawings do not infringe them) and *id.* § 102(b) (processes not copyrightable). Works having other kinds of utilities besides conveying information or displaying appearances—for example, chairs, television sets, and airplane wings—have been excluded from protection by copyright. *See* H.R. REP. NO. 1476, 94th Cong., 2d Sess. 55 (1976) [hereinafter cited as HOUSE REPORT]. *See also infra* notes 124-35 and accompanying text. When Congress decided in 1980 to extend copyright protection to computer programs, *see supra* note 5, this tradition was broken because computer programs, at least in machine-readable form, do more than "convey" information or "display" appearances: they perform useful tasks. The task that a program may perform may be the monitoring of the operation of a catalytic converter or the injection of fuel into a car's carburetor, as easily as it may be the generation of an image on a screen or a new piece of music. *See* OTA REPORT, *supra* note 2, at 78-85. ("Computer programs, as hybrid functional works, describe and implement processes. They cause physical changes to occur in a machine and can interact with other programs or with an environment. A recipe encoded in a program language cannot only tell a programmer how to bake a cake, it can 'tell' the computer too. With the appropriate robotic apparatus, the recipe can *cause* the cake to be baked." *Id.* at 80.) *See generally* Boraiko, *The Chip*, 162 NAT'L GEOGRAPHIC 421 (1982). While the "output" of a computer program may be of many sorts, in the vast majority of cases the output is a different work, that is, something different in kind—not just in form—from the program itself. *See infra* note 144 and accompanying text.

While copyright has never had to cope with this kind of subject matter before, it is worth noting that at least one other form of intellectual property law has had some experience with dealing with ownership rights as to works produced through use of a protected work. Patent law has rules about who owns rights in the "output" generated through use of a patented machine. Just because a patentee has rights in the machine does not mean the patentee has rights in the output. A separate product patent is needed to give the patentee rights in the output. Because patent law has more experience with this type of problem, it may make sense to consider how this body of analogous law, and not just copyright, would deal with the issue when deciding how ownership rights to works generated through the use of a computer should be allocated.

9. The closest analogous subject matter to software in the copyright system seems to be the category of sound recordings. Sound recordings may consist either of grooves cut into plastic or magnetized segments of plastic tape that when used in conjunction with a machine (*i.e.*, "played") produce sounds corresponding to the sounds one might have heard at the live performance when the recording was made. Neither the grooves nor the magnetized tape is precisely the same "work" as

appears not to have understood that it was admitting a utilitarian subject matter to copyright when it passed the amendment explicitly recognizing the copyrightability of software.[10] The computer-generated works problem may require courts to confront this utilitarian quality of software.[11]

Within the framework of the copyright law, intellectual property ownership rights depend initially on "authorship."[12] That is, within

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the music that was recorded, and yet they are enough the same work that copyright law will protect the pattern of grooves or magnetization on tape in order to protect the value of the musical performance that corresponds to the pattern. The grooves are simply an alternate (if somewhat fuller and richer) way of "recording" music than writing notes on paper.

By contrast, a work generated by use of a computer and its programs may be different in kind, different in substance, and different in form from the original generator program. That is, there may not be the kind of one-to-one correspondence between program and output as there is between a sound recording and the sounds that may be heard when the recording is played. In fact, there may be no discernible correspondence at all. The text of the output may not match any part of the text of the program. Often it will be impossible to detect whether a particular computer-generated work was generated by a computer at all (and not written by a human), let alone generated from a particular generator program. Computer-generation of output is thus significantly different from recordation of music. See *infra* notes 124-35 and accompanying text for a discussion of the useful nature of computer-generated output and note 144 and accompanying text for a discussion of the purpose of computer programs.

An analysis of the computer-generated works problem must focus on the ownership issue not only when the type of work generated by a computer is of a sort that has traditionally been assumed to be copyrightable (music, cartoons, statistical compilations), but also as to noncopyrightable subject matter. Software generator programs can generate patentable subject matter, chip design subject matter, and unprotectable subject matter. *See supra* note 2 and *infra* notes 36-45 & 124-35 and accompanying text.

10. *See* Samuelson, *supra* note 5, at 727-49.

11. Courts have tended to downplay or ignore the utilitarian character of software in cases which have raised the issue in the past. Compare the lower and appellate court decisions in Apple Computer, Inc. v. Franklin Computer Corp., 545 F. Supp. 812, 823-24 (E.D. Pa. 1982), *rev'd*, 714 F.2d 1240, 1250-53 (3d Cir. 1983), *cert. dismissed per stipulation*, 464 U.S. 1033 (1984). As the OTA Report indicates, the functional character of software is creating severe doctrinal problems in application of doctrine to software copyright cases. *See* OTA REPORT, *supra* note 2, at 79-85. The courts, however, do not seem to be acknowledging their departure from traditional rules. *Id.* at 81.

12. Section 201(a) of the Copyright Act provides that statutory copyright "vests initially in the author or authors of the work." 17 U.S.C. § 201(a) (1982). Professor Nimmer states that "authorship is a *sine qua non* for any claim of copyright, be it statutory or (in the limited area remaining to it) common law. That is, the person claiming copyright must either himself be the author, or he must have succeeded to the rights of the author." 1 M. NIMMER, NIMMER ON COPYRIGHT § 5.01[A] at 5-3 (1985) (footnotes omitted). Neither "author" nor "authorship" is defined in the statute, but some examples of authorship are described therein. *See* 17 U.S.C. § 102(a) (1982) (emphasis added) which provides in part:

> Copyright protection subsists . . . in original *works of authorship* fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Works of authorship include the following categories: (1) literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accom-

the copyright framework, to ask who is the author of a computer-generated work is to ask who has ownership rights in it.[13] As yet there has been no judicial decision allocating rights in computer-generated works.[14] It can, however, only be a matter of time before courts are forced to resolve the issue.

There are at least five ownership allocation possibilities: one might decide to allocate intellectual property interests in the output to the computer, the user, the author of the generator program, both jointly, or no one.[15] Each of these "solutions" to the problem—ex-

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panying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audio-visual works; and (7) sound recordings.

Intellectual property law distinguishes between ownership of a physical embodiment of the copyrighted work and ownership of an intellectual property interest in it. *See id.* § 202. Thus, one may be the owner of a copy of a book or sculpture without having any intellectual property rights in the copyright. This Article will concern itself exclusively with the problems presented by allocating intellectual property interests, not personal property interests, in a particular embodiment of the intellectual property.

13. There are two situations in which copyright law allocates authorship/ownership rights to someone other than the actual creator: (1) to employers as to their employees' work within the scope of employment, and (2) those who have specially commissioned certain categories of works. Both situations are dealt with under the "work made for hire" provisions of the Copyright Act. *See* 17 U.S.C. §§ 101, 201(b) (1982) (definition of "work made for hire" and provision vesting copyright ownership in the employer or person for whom certain specially commissioned works were prepared, respectively).

14. Through interviews with computer scientists, software industry representatives, and Defense Department personnel involved in procurement of software, the author has been informed of a number of specific instances in which software firms have made claims to works generated through use of a particular computer program. The author has, however, been unable to find any case law on the computer-generated work issue. *But see infra* note 137, concerning a similar issue in New York Times Co. v. Roxbury Data Interface, Inc., 434 F. Supp. 217 (D.N.J. 1977) (personal name index compiled by defendant based on a New York Times Index held not to be an infringement).

15. Two other allocation possibilities that have been discussed in the legal literature on this subject will not be addressed at any length in this Article: assignment to some deserving soul by a fictional human author, *see* Butler, *Can a Computer Be an Author? Copyright Aspects of Artificial Intelligence*, 4 COMM/ENT L.J. 707 (1982), and a joint authorship of the programmer and one who owns the data base from which the generated work was drawn, *see* Hewitt, *Protection of Works Created by the Use of Computers*, 133 NEW L.J. 235 (1983). Butler, who found doctrinally unsatisfying all other possible solutions to the computer-generated works authorship dilemma, proposed that in each instance of the creation of a computer-generated work, a court should decide the ownership issue by first assuming the existence of a fictional human author for the work who could obtain the copyright, and then by assigning that copyright to whoever deserved it the most. Butler, *supra*, at 744. While it is easy to scoff at Butler's proposal—a worse solution could hardly be imagined—this author respects the depth of Butler's probing into the issue. His absurd solution should be taken as a sign of how frustrated a person can become when trying to answer this authorship question satisfactorily within the traditional bounds of copyright. That is, Butler's absurd solution is a sign of how difficult this problem truly is. (The fact that so many authors have given so many different answers to the question, *see infra* note 16, is another indication of how tough the problem is.) It is worth

cept the last one—has had a champion.[16]

The five sections of this Article will analyze the reasons for and against allocating intellectual property rights in computer-generated works to each of these possible candidates.[17] Within each section, the issue of whether each particular candidate should be designated[18] as the owner of the intellectual property interests in a computer-generated work will be discussed not only in terms of the analytic frame-

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noting that Butler is not the only person to have studied the issue and to have arrived at an absurd conclusion. *See infra* note 68 and accompanying text.

16. For the computer, see generally Milde, *supra* note 7; for the user, see generally NATIONAL COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT (1979) [hereinafter cited as CONTU FINAL REPORT]; for joint authorship, see *infra* note 33 and accompanying text concerning CONTU's partial endorsement of joint authorship. *See also supra* note 15. Although there is as yet no law review article supporting sole ownership rights in the programmer, the author attended a legal workshop on September 25, 1984, sponsored by the Office of Technology Assessment of the United States Congress as part of its study of Intellectual Property Rights in an Age of Electronics and Information. (*See* OTA REPORT, *supra* note 2, at vii.) At the session in which the issue of ownership rights in computer-generated works was discussed, all lawyers who participated in the discussion (except this author) expressed the opinion that the programmer would be the sole author/owner of the output. Concerning the possibility that no one is the author of a computer generated work, see *infra* notes 155-68 and accompanying text.

Many others have posed the question of who should be recognized as the owner of computer-generated works without themselves attempting to answer the question. *See, e.g., Copyright and Technological Change: Hearings before the Subcomm. on Courts, Civil Liberties, and the Administration of Justice of the House Comm. on the Judiciary*, 98th Cong., 1st Sess. (1983) at 8 (testimony of Benjamin M. Compaine, Executive Director, Program on Information Resources Policy, Harvard University), at 131 (statement of Richard H. Stern, Esq.) [hereinafter cited as *Copyright Hearings*]. *See also* OTA REPORT, *supra* note 2, at 69-73.

17. When speaking of "computer-generated" works the author refers not only to the hardware of the computer, but also to the hierarchy of programs—microcode, operating system programs, and assisting application software—that work together to generate output. Computer scientists speak of this complex hierarchy of machine parts and programs as a "virtual machine" or "virtual computer." *See* T. PRATT, PROGRAMMING LANGUAGES: DESIGN AND IMPLEMENTATION 14 (2d ed. 1983). This reflects that the software is merely a substitute for hardware components that might otherwise have been constructed to perform the function. *Id.* at 19.

18. The reason this Article speaks of "allocating" intellectual property rights in computer-generated works or "designating" a particular person as the owner of such rights is that the author believes that the question is a new one for copyright law and one to which the statute and case law provide no clear answer. It seems unlikely that Congress will legislatively solve this issue until the courts have answered it in an unpopular way. *See* Milde, *supra* note 7, at 380. *But see* OTA REPORT, *supra* note 2, at 90-91 (discussing the pros and cons of allowing the courts to decide how to accommodate the complex new technology questions within the traditional intellectual property law framework, and concluding that Congress should make the decisions:

> In light of the Supreme Court's consistent signals to Congress that the judiciary should not serve as a policy-making forum for patent and copyright law, resort to the courts to resolve many of these technological issues may be tantamount to a delegation of Congress' policymaking authority. Even if the judiciary acts with restraint with respect to policymaking, the application of obsolete law to novel circumstances may end up skewing the policy objectives that the statute seeks to promote.).

work of traditional copyright doctrine, but also in terms of policy considerations. Analyzing the issue entirely within the existing doctrinal framework may lead to unsatisfactory results: sometimes the analysis may seem inconclusive because this is a kind of problem that copyright has no experience addressing. At other times, it may lead to absurd, inequitable, or inefficient results. Whatever ownership allocation decision is made, it should be one that makes "sense" not only in terms of doctrine, but also in terms of the realities of the world in which the question will have to be addressed.

The Article concludes that, in general, the user of a computer generator program should be considered the author of a computer-generated work, and should be free to exploit this product commercially.[19] The only exception to this rule should be for instances in which the work generated by a computer incorporates a substantial block of recognizable expression from the copyrighted program.[20] To the extent that the generated work incorporates the protected expression, it should be considered either a "copy" or a "derivative work" of the generator program, and the owner of the generator program copyright should have rights to control unauthorized copying or distribution of that unauthorized copy or derivative work.

II. CAN A COMPUTER BE AN AUTHOR?

As early as 1965 the Register of Copyrights expressed concern about whether a computer could own rights in computer-generated works.[21] In a report to Congress, the Register of Copyrights raised several difficult questions: Would computer-generated works have a human "author"?[22] Was the computer merely an assisting instrument of its human user or was what copyright law had traditionally regarded as "authorship" actually conceived and executed by a machine and not by a human?[23] The questions were apparently raised in the Register's mind because of contemporaneous attempts to register works created by computers.[24] The Register did not report on how those applications for registration were handled, or how he thought

19. *See infra* notes 79-85 and accompanying text.

20. *See infra* notes 120-23 and accompanying text.

21. U.S. COPYRIGHT OFFICE, SIXTY-EIGHTH ANNUAL REPORT OF THE REGISTER OF COPYRIGHTS (1965) [hereinafter cited as SIXTY-EIGHTH ANNUAL REPORT].

22. *Id.* at 5.

23. *Id.* Interestingly, the Register did not ask whether under the Constitution or the copyright statute the computer could be an author. *See* Milde, *supra* note 7, at 378.

24. SIXTY-EIGHTH ANNUAL REPORT, *supra* note 21, at 5.

they should be handled.[25] Rather, the Register simply posed the question to Congress.

At the time the Register made this Report, Congress was in the midst of a major revision of the copyright laws.[26] Congress apparently found the Register's questions to be sufficiently disturbing and perplexing as to require more thorough investigation, for in 1974 Congress created the National Commission on New Technological Uses of Copyrighted Works (CONTU or Commission) to study a variety of new technology issues,[27] among them, the issue of authorship of computer-generated works.[28]

In 1978, CONTU made its final report to Congress.[29] Most of the Commission's attention had been devoted to the photocopying[30] and software copyrightability problems,[31] but one short section of the CONTU Final Report addresses the issue of authorship of computer-generated works.[32] CONTU seems to have found the issue to be a simple one for it opines that the answer it gives, which is that the user of the program is the author of the computer-generated work, is the

25. *Id.*

26. The revision of the copyright laws began in 1955 when Congress appropriated funds for a comprehensive study of needed changes in the law. *See* CONTU FINAL REPORT, *supra* note 16, at 3. It culminated in the passage of the Copyright Act of 1976, Pub. L. No. 94-553, 90 Stat. 2541 (codified as amended at 17 U.S.C. §§ 101-810 (1982)), on October 19, 1976.

27. The 93d Congress authorized establishment of this Commission as part of the Act of Dec. 31, 1974, Pub. L. No. 93-573, tit. II, 88 Stat. 1873, 1873-74. Congress gave the Commission three years to conduct a study of computer-related uses and reproductions of copyrighted works and of photocopying practices and technologies. *Id.* President Ford announced the appointment of the commissioners in mid-July 1975. The commissioners held their first meeting in October 1975 and issued their final report on July 31, 1978. *See* CONTU FINAL REPORT, *supra* note 16, at 3-8.

28. In § 201 of the Act that gave rise to creation of CONTU, Pub. L. No. 93-573, tit. II, 88 Stat. 1873, Congress asked the Commission to study and make recommendations on legislation or procedures concerning "the creation of new works by the application or intervention of such automatic systems of machine reproduction."

29. *See supra* note 27.

30. Chapter 4 of the CONTU Final Report was concerned with drawing a proper balance between the rights of copyright owners and the general interests and needs of members of the public as to photocopying of copyrighted works. This chapter constitutes 40% of the CONTU Final Report (32 of 80 pages). *See* CONTU FINAL REPORT, *supra* note 16, at 47-78.

31. The software copyrightability discussion found in Chapter 3 of the CONTU Final Report is the second most extensive subject covered in the report, constituting 37% of the report (30 of 80 pages). *See id.* at 9-38. Certain issues concerning computer data bases were also included in Chapter 3, and occupy six pages of the report. *Id.* at 38-43.

32. Only three pages of the CONTU Final Report were given over to a discussion of the computer-generated works issue. *See id.* at 43-46.

"obvious" one.[33]

Concerning the question whether a computer could be said to be "the author" (or "an author") of works created through its use, CONTU expressed certainty that it could not: "On the basis of its investigations and society's experience with the computer, the Commission believes that there is no reasonable basis for considering that a computer *in any way* contributes authorship to a work produced

33. *Id.* at 45. Yet read closely, the CONTU Final Report seems to confound or contradict its simple answer and to suggest a variety of other seemingly incompatible solutions to the issue.

Right after giving the simple straightforward answer reflected in the text, CONTU went on to obfuscate the issue, by saying: "The simplicity of this response may obscure some problems, though essentially they are the same sort of problems encountered in connection with works produced in other ways." *Id.* Just what those "problems" were, CONTU left unclear. It adverted only indirectly to one of them by using an illustration to demonstrate how similar the computer-generated works problem was to problems that copyright had dealt with in the past. In the illustration, CONTU asked the reader to suppose that a number of people had a hand in the use of a computer to prepare a complex statistical table. CONTU observed that often all would be employees of the same firm, so that if the work had been done within the scope of their employment, the employer would be the owner of the work. If the users did not work for the same firm, but were voluntarily working together, CONTU observed that copyright joint authorship rules could be applied to allocate ownership rights. *Id.* CONTU thus hints at joint authorship as a solution without indicating just who the joint authors might be. Perhaps this solution applied only when there were multiple users of a program that was generating a new work. If CONTU had other such "problems" in mind, it left them unstated.

At another point in the report, CONTU also hinted that the programmer might have some claim to the output in some instances. Although finding computer output to be an "entirely separate" work from the program or data base that produced it, CONTU went on to say:

> It is, of course, incumbent on the creator of the final work to obtain appropriate permission from any other person who is the proprietor of a program or data base used in the creation of the ultimate work. The unlawful use of a program or data base might *limit* or *negate* the author's claim of copyright in the ultimate work, just as the failure of a translator to obtain a license from the proprietor of the translated work might prevent securing copyright in and making use of the translation.

Id. at 45-46 (emphasis added). CONTU insisted that these qualifications had nothing to do with the question of authorship. *Id.* at 46. CONTU did not explain why it thought the failure to get permission to *use* a copyrighted program or data base (something the copyright owner normally has no statutory authority to control) would "limit or negate" the user's copyright in the output. See *infra* notes 103-06 and accompanying text for a fuller discussion of this issue. But to the extent that CONTU was of the view that both the user and programmer might have some rights in the output, CONTU may in a second place have suggested a joint authorship solution.

The CONTU Final Report also took cognizance of opinions that artificial intelligence might advance to the point that computers were able to "achieve powers that would enable them independently to create works that, although similar to other copyrightable works, would not or should not be copyrightable because they had no human author," CONTU FINAL REPORT, *supra* note 16, at 44, but thought predictions of this sort were too remote and speculative to be taken seriously. *Id.* CONTU did not say whether, if time proved it wrong about these predictions, it would agree with those who thought truly computer-generated works could not be copyrightable for lack of a human author or would support granting rights to the machine.

through its use."[34] CONTU likened the computer to a camera or a typewriter, all three being instrumentalities that in themselves were completely lacking in creative capabilities while requiring human direction to bring about a creative result.[35] CONTU reviewed a number of instances of works generated through the use of a computer.[36] "In every case," said CONTU, "the work produced will result from the contents of the data base, the instructions indirectly provided in the program, and the direct discretionary intervention of a human involved in the process."[37] CONTU regarded as too speculative to require serious consideration the proposition that computers could or would soon be able to exhibit creative authorship.[38] In CONTU's view, the computer was not and could not be "the author" of anything.

Some authors have taken issue with CONTU's assumption that computers are incapable of exhibiting sufficient originality or creativity to support a copyright.[39] To demonstrate this point, one author began an article with a somewhat wacky but coherent paragraph that had been written by computer.[40] The very recent Office of Technology Assessment Report on "Intellectual Property Rights in an Age of Electronics and Information" responds to this aspect of the CONTU Final Report by saying:

> It is misleading, however, to think of programs as inert tools of creation, in the sense that cameras, typewriters, or any other tools of creation

34. CONTU FINAL REPORT, *supra* note 16, at 44 (emphasis added).

35. *Id.*

36. The examples were: cartooning in which a computer filled in the gaps between frames drawn by the cartoonist; the composition of music accomplished by having the computer select a series of notes and arrange them into a composition in accordance with rules as to tonal qualities and rhythmic patterns; the simulation of sounds of musical instruments; and the manipulation of statistical information to produce an analysis. *Id.*

37. *Id.*

38. *Id. But see supra* note 33 and *infra* notes 40-45 and accompanying text.

39. *See, e.g.*, Butler, *supra* note 15, at 729; OTA REPORT, *supra* note 2, at 72-73. *See also* Milde, *supra* note 7, at 378 (arguing that perhaps a computer should be recognized as an "author").

40. *See* Butler, *supra* note 15, at 707 (quoting RACTER, *Soft Ions*, OMNI, Apr. 1981, at 96-97):

> Helene watched John and cogitated: A supper with him? Disgusting! A supper would facilitate a dissertation and a dissertation or tale was what John carefully wanted to have. With what in mind? Wine, otters, beans? No! Electrons. John simply was a quantam logician; his endless dreams were captivating and interesting; at all events Matthew, Helene, and Wendy were assisting him in his infuriated tries to broaden himself. Now legions of dreams itched to punch Wendy's consciousness. Yet John whispered, "Just a minute! Helene's a maid, I'm a quantam logician; can maids know galaxies and even stars or a multitude of galactic systems? . . . Can maids realize electrons?"

> are inert. Moreover, CONTU's comparison of a computer to other instruments of creation begs the question of whether interactive computing employs the computer as a co-creator, rather than as an instrument of creation.[41]

Forty years ago the eminent British mathematician and computer scientist Alan Turing stated the challenge that has led to a vast scientific inquiry into artificial intelligence. As paraphrased by another author, "In the last analysis, . . . the question of whether a computer can 'think' or not can be answered in the affirmative if a human being, by asking it questions, could not tell from the answer whether he were interrogating a man or a machine."[42] No deep study of the literature on artificial intelligence is necessary to observe that a great many brilliant scientists take the idea of machine intelligence very seriously.[43] While there may be some debate about how advanced the state of the art currently is, there is no question but that many machine-generated works are already available, and that in the future they can be expected to become ever more complex, sophisticated and valuable.[44]

If a machine can think, it would seem logical that it could also compose or design a work.[45] If a machine does compose something, such as a piece of music, and it is impossible to tell by hearing the

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41. OTA REPORT, *supra* note 2, at 72.

42. Milde, *supra* note 7, at 382 (summarizing Turing, *Can a Machine Think?*, 4 WORLD OF MATHEMATICS 2099 (1956)). Turing apparently developed this test after finding unsatisfactory the academic debates about whether machines could think or be intelligent. *See* J. HAUGELAND, *supra* note 1, at 6-9.

43. *See supra* note 1.

44. Shurkin, *supra* note 1, at 78. *See* OTA REPORT, *supra* note 2, at 72.

45. *See, e.g.*, D. VOISINET, INTRODUCTION TO COMPUTER AIDED DRAFTING 16-17 (2d ed. 1986) (listing examples of industries for which this system would be useful, including architecture). *See also Special Issue On Computer Music*, *supra* note 2.

It is interesting to note that in the legislative history to the Semiconductor Chip Protection Act, now codified at 17 U.S.C. §§ 901-914 (Supp. II 1984), there was before Congress considerable evidence of the substantial role computer software played in the process of designing the layout of circuits for chips. *See Copyright Protection for Semiconductor Chips: Hearings on H.R. 1028 Before the Subcomm. on Courts, Civil Liberties, and the Administration of Justice of the House Comm. on the Judiciary*, 98th Cong., 1st Sess. 380-86 (1983) (reproducing Feuer, *supra* note 2) [hereinafter cited as *House Chip Hearings*]. Design programs of this sort do much the same thing as human engineers would do if set to the same task: testing various possible combinations to see what would be the best and most efficient way for a particular function or set of functions to be carried out. Yet much of the discussion of the chip design process was conducted as if it was conducted entirely by humans drawing tiny circuits. When occasionally the issue of machine originality arose, it evoked some nervous laughter, but not any serious consideration. *See, e.g., The Semiconductor Chip Protection Act of 1983: Hearings on S. 1201 Before the Subcomm. on Patents, Copyrights and Trademarks of the Senate Comm. on the Judiciary*, 98th Cong., 1st Sess. (1983) at 88 (testimony of Professor Arthur Miller of Harvard Law School), at 26 (testimony of Dorothy Schrader, general counsel of the U.S. Copyright Office) [hereinafter cited as *Senate Chip Hearings*].

music whether it was composed by a computer or by a human, one might wonder whether the notion of machine authorship ought to be accepted.

What then is the "case" for allocating authorship rights to a computer under the copyright statute? While Congress may never have anticipated machine authorship, the statute itself says nothing about what kind of being one has to be in order to qualify as an author.[46] To qualify, there must only be a category of work that is eligible,[47] some tangible expression of it,[48] and some minimal quantum of originality[49] (and perhaps creativity).[50] Let us grant that a category of eligible work (say, music) and a tangible expression of it (a printed score) can be generated by a computer program.[51] In that case, copyright protection should be available if the last of the requirements, originality, can be shown.

"Originality" is required by statute to qualify for copyright protection. Only "original works of authorship" are statutory subject matter of copyright,[52] and then only if they are "fixed" in some "tangible medium of expression."[53] The legislative history of the 1976 Act indicates that originality and fixation are the two "fundamental criteria of copyright protection."[54]

Despite its fundamental importance, the statute does not define what is meant by originality. The legislative history indicates that it was "purposely left undefined" and that Congress "intended to incorporate without change the standard of originality established by the courts under the present statute."[55] The legislative history goes on to

46. *See* Milde, *supra* note 7, at 378. Milde's article was written under the Copyright Act of 1909, 17 U.S.C. §§ 1-32, which was revised by the Copyright Act of 1976, Pub. L. No. 94-553, 90 Stat. 2541, rather than under the Copyright Act of 1976, 17 U.S.C. §§ 101-810 (1982), which is now in force. But the point he makes is valid under the current statute as well.

47. *See* 17 U.S.C. § 102(a) (1982).

48. *Id.*

49. *Id.*

50. Concerning a creativity requirement, see Bleinstein v. Donaldson Lithographing Co., 188 U.S. 239 (1903); 1 M. NIMMER, *supra* note 12, § 2.01[B] at 2-15 ("The smaller the effort . . . the greater must be the degree of creativity in order to claim copyright protection."). Because the present copyright statute does not separately require creativity, this discussion will focus chiefly on the originality requirement.

51. See *infra* notes 128-35 and accompanying text concerning the problems that may arise as to ownership issues when the output is not of a copyrightable sort.

52. 17 U.S.C. § 102(a) (1982).

53. *Id.*

54. HOUSE REPORT, *supra* note 8, at 51.

55. *Id.*

say that the standard "does not include requirements of novelty, ingenuity, or esthetic merit, and there is no intention to enlarge the standard of copyright protection to require them."[56]

The case law reflects a very minimal standard of copyright originality. In one of the most famous originality cases, *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*,[57] a lithographer who made and distributed copies of the plaintiff's mezzotint engravings of "great master" paintings attacked the copyright of the mezzotintist by arguing there was no originality in the expression of the mezzotints. The lithographer argued that the aim of the mezzotintist had been to copy as exactly as was humanly possible the expression of the great masters—which expression was in the public domain.[58] The great masters had expressed originality, argued the lithographer, not the mezzotintist. The court disagreed, observing that "far less exacting standards" of originality had been required for copyrights as compared with patents.[59] Although it was true that in the common sense of the term, "original" could mean "startling, novel, or unusual, a marked departure from the past," that was not the meaning of the term in copyright.[60] In copyright, "original" means only "that the particular work 'owes its origin' to the 'author.' "[61] Because of this, the court recognized that it was possible for identical or very similar works created independently by different authors to be separately copyrighted without either infringing the other.[62]

Specifically as to the mezzotints, the court observed that so long

56. *Id.* Although it is primarily to the case law on originality that the legislative history indicates one should turn to discern the meaning of "originality," there is some additional indicia of the standard of originality tucked away in the recesses of the 1976 Act. The definition of "compilation," for example, refers to the "collection and assembling of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship." *See* 17 U.S.C. § 101 (1982). Similarly, the definition of "derivative work" refers to editorial revisions, annotations, and other modifications as potentially original material that may qualify for separate copyright protection. *Id.* Another provision indicates that a copyright in a compilation or derivative work "extends only to the material contributed to by the author of such work," and not to any of the preexisting material. *Id.* § 103(a). All of this suggests that any contribution that may be made to the creation of a work—selections, coordinations, arrangements, editings, modifications, and the like—can serve as a basis for finding that small degree of originality that is necessary to support a copyright. *See also* 1 M. NIMMER, *supra* note 12, § 3.03.

57. 74 F. Supp. 973 (S.D.N.Y. 1947), *aff'd*, 191 F.2d 99 (2d Cir. 1951).

58. 74 F. Supp. at 975.

59. 191 F.2d at 100-01.

60. *Id.* at 102.

61. *Id.* at 102-03.

62. *Id.* at 103.

as there were discernible differences between the old masters' and the mezzotintists' works

> even if their substantial departures from the paintings were inadvertent, the copyrights would be valid. A copyist's bad eyesight or defective musculature, or a shock caused by a clap of thunder, may yield sufficiently distinguishable variations. Having hit upon such a variation unintentionally, the "author" may adopt it as his and copyright it.[63]

The copyright standard of originality is sufficiently low that computer-generated works, even if found to be created solely by a machine, might seem able to qualify for protection. Although both the programmer and user might contribute to the framework within which the computer makes its selections or arrangements of data, the computer actually makes the selection. Trying various combinations of data is one of the things that computers do best. Consequently, unless the Constitution were construed to bar machine authorship,[64] perhaps the copyright statute should be construed to permit it.

Machines may be capable of exhibiting sufficient originality to qualify for copyright, and may be able to express that originality in a tangible form. What basis, then, would there be for denying a copyright to a computer? Despite the fact that the statute does not *require* that one be human to qualify as an author, it is still fair to say that it was not within Congress' contemplation to grant intellectual property rights to machines. In the long history of the copyright system, rights have been allocated only to humans.[65]

The system has allocated rights only to humans for a very good reason: it simply does not make any sense to allocate intellectual property rights to machines because they do not need to be given incentives to generate output.[66] All it takes is electricity (or some other motive force) to get the machines into production. The whole purpose of the intellectual property system is to grant rights to creators to induce them to innovate. The system has assumed that if such incen-

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63. *Id.* at 105. *But see* L. Batlin & Son, Inc. v. Snyder, 536 F.2d 486 (2d Cir.), *cert. denied*, 429 U.S. 857 (1976) (mere reproduction of a work of art in a different medium does not constitute sufficient originality to support a copyright). Other cases have adopted the originality standard set forth in the *Catalda* case. *See, e.g.*, Original Appalachian Artworks v. Toy Loft, 684 F.2d 821, 824 (11th Cir. 1982); Knickerbocker Toy Co. v. Winterbrook Corp., 554 F. Supp. 1309, 1317 (D.N.H. 1982); Kuddle Toy, Inc. v. Pussycat-Toy Co., 183 U.S.P.Q. (BNA) 642, 658 (E.D.N.Y. 1974).

64. *See* Milde, *supra* note 7, at 390, concerning the Constitutional issue.

65. Milde points out that in at least one instance the Copyright Office denied registration to a machine-generated pattern for linoleum tile. *Id.* at 403.

66. *See* Butler, *supra* note 15, at 741-42. *See also* OTA REPORT, *supra* note 2, at 151-53.

tives are not necessary, rights should not be granted.[67] Only those stuck in the doctrinal mud could even think that computers could be "authors."[68]

In future sections, we will attempt to consider the potential solutions not only in terms of whether they make sense from a doctrinal standpoint, but also whether they make sense in terms of the realities of the world in which the problem exists.

III. Is the User of a Generator Program the Author of Computer-Generated Output?

If a computer is not a meaningful candidate to be considered for the authorship rewards of copyright, who is? CONTU found this to be a simple question: "The obvious answer is that the author is one who employs the computer."[69] CONTU favored allocating authorship rights to the user because of the Commission's perception that the user would always have made a very substantial contribution to shaping the output.[70]

Of course, there are many instances in which computer-generated works will have been "written" entirely (or virtually entirely) by the human user.[71] In other instances the user's directions for the computer manipulations will have been so extensive and detailed that

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67. *See, e.g.*, Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 HARV. L. REV. 281, 284-93 (1970); Brown, *Eligibility for Copyright Protection: A Search for Principled Standards*, 70 MINN. L. REV. 579, 596 (1985). Machines may not need rights to be induced to generate output, but that, of course, does not mean that no one needs incentives in order for products of generator programs to be made available. *See infra* notes 164-66 and accompanying text.

68. Milde, although arguing that a computer could be an author within the meaning of the copyright statute, nonetheless still sought a human or a group of humans to give the money to. It was not the individual computer that may have created or contributed to the generation of the work, but the manufacturer of the computer that Milde would have receive the rewards for the creation. Milde, *supra* note 7, at 390. Milde argues that computer manufacturers need such incentives to encourage investment in computer designs. *Id.*

69. CONTU FINAL REPORT, *supra* note 16, at 45. But see *supra* note 33 for CONTU's equivocations about this "obvious" answer.

70. *See supra* notes 35-37 and accompanying text.

71. This Article, for example, was produced through the use of a word-processing program. All of the words in the Article were chosen and arranged by the author (except, perhaps, for a few editorial alterations made by the Law Review staff). Had this Article been processed through a grammar or diction program, it is conceivable that the program would have made (or proposed) some changes to the text, yet this hardly would undermine the writer's claim of authorship to the Article. The expression would still overwhelmingly be this author's. *See* OTA REPORT, *supra* note 2, at 69 (the proportion of work done by the machine and by the human user will vary depending on how the generator program is written and how it is used).

stating that the user is the author does not present a conceptual problem.[72] But when the user's instructions become increasingly brief or general and the role of the computer in the design or arrangement process becomes correspondingly greater,[73] the authorship of the user becomes increasingly difficult to defend.[74] It is difficult to justify user authorship when the role of the user of a generator program has been reduced to merely causing the output to be generated (for example, typing the word "compose" in a music generator program).[75] There can, of course, be no user authorship if the output of a generator program is, say, a valuable piece of music that was encoded in the program in this precise arrangement by the programmer.[76] The programmer must be considered the author in that case, or the composer whose work the programmer borrowed. But if the generator program instead produces raw output dissimilar in text from the generator program, can anyone be said to be the "author" of the raw output? Whatever the user does to the text thereafter to edit it or change it will, of course, create a basis for saying that the user may be an author of those portions of the text that he modified. But can he be the author of the unmodified portions? Or if the raw output is "perfect," can the user claim any intellectual property rights in it at all?

Under the traditional paradigm of copyright, the answer to these questions would seem to be "no." A human claiming authorship rights has traditionally had to have "tinkered" with the subject mat-

72. The use of a computer to "fill in the gaps" between cartoon frames developed by the user was one of the examples of computer-generated works discussed by CONTU. *See* CONTU FINAL REPORT, *supra* note 16, at 44. This is an instance of a user giving extensive and detailed instructions to a computer, which automatically then produces a series of images which still largely seem to be authored by the user.

73. Much of the process of designing semiconductor chips is done automatically today by giving the generator program some general instructions that then cause the program to try various combinations of circuitry layouts. *See* Feuer, *supra* note 2.

74. While it may seem appealing to use what some of my students have called "the comparative sweat" test to determine who contributed most to the creation of a particular computer-generated work as a way of allocating authorship, this has the signal disadvantage of unpredictability in instances of computer-generated work because different persons may take radically different views of their respective contributions.

75. *See* OTA REPORT, *supra* note 2, at 69-73.

76. If the programmer has encoded a piece of music (or other work) in the program and the output generated by the program is a copy of a substantial block of expression contained in the program, it would, of course, be the programmer's expression (or that of someone from whom he copied) that would have been copied. As to this, the programmer would have the same rights to enforce his copyright in this instance as any other author. See *infra* notes 100-06 & 122-35 and accompanying text for a more complete discussion of this and related points.

ter, even if by accident, to make the work indisputably "his own."[77] The Copyright Office has previously rejected machine-generated works as copyrightable by the firm that owned the machine that did the generating.[78]

Under these circumstances, it may seem indefensible to allocate ownership rights to the user who has merely typed the word "compose." There are some statutory and some policy reasons why it may nonetheless be sensible to allocate rights in the output to the user. For one thing, the user will have been the instrument of fixation for the work, that is, the person who most immediately caused the work to be brought into being. Copyright law has traditionally considered the person who has "fixed" a work in a tangible medium as the "author" of it.[79] Since it is the user of a generator program who most immediately and directly causes music or a story to be generated, the user would seem to have the strongest claim to owning what is produced by his instruction.

The copyright standard of originality, which is low, also supports the position that the user is entitled to the rights in the output of a generator program.[80] One who tape-records a live performance of improvised jazz, for example, is considered the "author" of the sound recording produced thereby under copyright law, even though the creative input by the user of the recorder might be limited to pressing

77. *See supra* notes 57-63 and accompanying text. *See also* 1 M. NIMMER, *supra* note 12, § 2.01[A] at 2-9.

78. *See supra* note 65.

79. The copyright statute requires fixation of the work, *see* 17 U.S.C. § 102(a) (1982), and envisions that fixation will be by or under authority of the author, *see id.* § 101 (definition of "fixed"). It is, for example, the photographer of Oscar Wilde who owns the copyright in the photograph made of Oscar Wilde, *see* Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53 (1884), even if the value of the photograph is attributable more to its being of Oscar Wilde, than to its being artistically posed. (Similarly, it is the television cameraman who records the baseball game who owns the copyright in the recorded version, and the writer who drafts an interview with Barbra Streisand, not Barbra Streisand, who owns the copyright in the interview.)

The authorship of the famous Zapruder film of the Kennedy assassination came under attack in Time, Inc. v. Bernard Geis Assoc., 293 F. Supp. 130 (S.D.N.Y. 1968). The defendants (in essence) claimed that Zapruder had only been an ordinary unartistic fellow who just happened to have his home movie camera running when the presidential procession drove by and Kennedy was shot. There was, the defendants argued, no "original expression" by Zapruder. What was valuable about the film was not the technical skill or art displayed by Zapruder, but that it captured at close range the murder of a President. The court, however, upheld the validity of the Zapruder copyright (which had been assigned to Time, Inc.) and the right of Zapruder to claim a copyright in the film. *Id.* at 141-43.

80. *See supra* notes 52-63 and accompanying text.

the "record" button.[81] If this is sufficient originality to support a copyright, there would seem no insuperable difficulty with designating the user of a generator program as the author of a work generated by the program even if all the user did was type the word "compose." That the user will often also select, arrange, edit, and polish the raw output reinforces the existence of sufficient originality necessary to support a user copyright in computer-generated works.

Allocating the copyright in computer-generated works to the user would not be the first time the law allocated rights to those who were responsible for causing a creative work to be brought into the world, although they might not have been directly involved in the creative effort. The "work made for hire" rule, for example, gives a direct copyright interest to employers for all works prepared by their employees; the employer need not have had any direct role in the creative process.[82] Since one who buys or licenses a generator program has in some sense "employed" the computer and its programs for his creative endeavors, similar considerations to those that underlie the work made for hire rule support allocation of rights in computer-generated works to users.[83]

From a policy standpoint, there are several reasons it would make sense to designate the user of a generator program as the "author" of its output, even when the user's contribution is minimal. For one thing, the user will generally have already tithed to the owner of the program for rights to use it, either by purchase, lease, or license. This provides the programmer with some reward for the value of what he has created (that is, the program). It is not unfair in these circumstances to give some rights to a person who uses the work for its intended purpose of creating additional works.[84]

Furthermore, the user will often play a much greater role in shaping the output into a commercially valuable form than merely pressing a button or typing a simple instruction that triggers the generative process. Often, the user will have to provide relatively elaborate instructions to the machine and the raw output will need

81. *See* 17 U.S.C. § 114 (1982) (special provision limiting the set of exclusive rights as to sound recording copyrights to recapture of actual sounds recorded; this rule permits valid sound recording copyrights by more than one person who simultaneously record the same event).

82. *See id.* § 201(b). *See also supra* note 13.

83. Indeed, the language of the CONTU Final Report refers to its choice for authorship of computer-generated works as "the one who *employs* the computer." CONTU FINAL REPORT, *supra* note 16, at 45 (emphasis added). *See also* Hewitt, *supra* note 15, at 237.

84. See *infra* note 144 and accompanying text for more discussion of this and related issues.

substantial modification to be made valuable. Moreover, even the process of recognizing the quality of the output and/or selecting and identifying those parts of the output that are valuable and should be retained, or must be changed to fit the pattern the user envisioned for the work, may be a substantial creative act.[85]

In addition, the user may use a program for functions that are beyond the programmer's expertise. For example, a programmer may have worked with an experienced architect (or group of architects) to develop a program capable of generating architectural plans. The programmer himself may not be an architect, and may not be able to utilize his own program to create a comparable architectural design that an experienced architect using the program could develop with its aid. Similarly, though a programmer may have studied musical theory and written a program that generates very fine musical compositions, the programmer himself may not, in fact, be able to assess accurately which of the pieces generated by the program are musically superior to the others, or which parts of the raw output are better than other parts, let alone what to do to fix the parts that are not very good. It may be that an experienced composer must use the program in order to create the quality of music that the programmer had hoped for.

In summary, from a doctrinal standpoint, the fact that the user of a generator program will have been the human instrument of fixation of computer-generated output and will have often contributed substantially to the originality of expression in such output supports recognizing authorship rights in the user. There are also both doctrinal and policy reasons to allocate ownership rights to the user even in the "hard case" of minimal input by the user. Because there may be some readers who may harbor lingering doubts about this allocation choice, the next three sections of this Article will explore three other allocation decisions and will reveal why each of these presents more serious doctrinal and practical problems than does the decision to allocate rights to users.

85. Patent law is probably more receptive than copyright to the idea of treating the insight arising from accidental discoveries as indicative of creativity (*i.e.*, invention). *See, e.g.*, Radiator Specialty Co. v. Buhot, 39 F.2d 373, 376 (3d Cir. 1930). ("Invention is not always the offspring of genius; more frequently it is the product of plain hard work; not infrequently it arises from accident or carelessness; occasionally it is a happy thought of an ordinary mind; and there have been instances where it is the result of sheer stupidity.") *See also* 7 U.S.C. §§ 2401-2402 (1973) (giving intellectual property protection to persons who "discover" new varieties of plants). Perhaps copyright should develop more flexibility about creative discoveries.

IV. SHOULD THE PROGRAMMER BE CONSIDERED THE AUTHOR OF A COMPUTER-GENERATED WORK?

A. Direct Authorship in the Programmer

The primary reason the programmer deserves serious consideration as a claimant for ownership rights in the output of his copyrighted program is that the programmer will have been a substantial contributor to the production of any output generated through use of the program.[86] But for the programmer's creativity, the output might never have been brought into existence. If the output produced by a particular generator program is of excellent quality, it will be fair to attribute at least part of the excellence to the programmer. Creating an excellent generator program is intellectually demanding, as well as time-consuming and expensive for the programmer.[87] Furthermore, it is fair to reward the programmer for the value attributable to this fruit of his intellectual labor, even though it may be a fruit he had not envisioned.[88]

Also, by comparison with the user's input, which may be limited to uncreative acts such as typing "compose" into a music generator program, the programmer's contribution to the generated work will often seem to be the more substantial and significant.[89] The computer, after all, simply follows the instructions of the programmer.[90]

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86. Yet, the kind of contribution the programmer may have made may be of a different sort than copyright would traditionally recognize as authorship. This Article is an example of a computer-generated work in which the word processing programmer's "contribution" to the *content* of the output is nonexistent from an authorship standpoint.

87. The effort that is put into creation of a copyrightable work is sometimes said to be among the things the copyright laws intend to protect. *See, e.g.*, Orgel v. Clark Boardman Co., 301 F.2d 119, 120 (2d Cir. 1962); Toksvig v. Bruce Publishing Co., 181 F.2d 664, 667 (7th Cir. 1950). *But see* 1 M. NIMMER, *supra* note 12, § 3.04 at 3-19.

88. *See* J. HAUGELAND, *supra* note 1, at 12 (emphasis added):

> What gets programmed directly is just a bunch of general information and principles, not unlike what teachers instill in their pupils. *What happens after that*, what the system does with all this input, *is not predictable by the designer* (or teacher or anybody else). The most striking current examples are chess machines that outplay their programmers, coming up with brilliant moves that the latter would never have found. Many people are amazed by this fact; but if you reflect that invention is often just a rearrangement (more or less dramatic) of previously available materials, then it shouldn't seem so surprising.

89. See *supra* note 74 concerning problems with a "comparative sweat" test of authorship.

90. *See* J. HAUGELAND, *supra* note 1, at 9-12 (emphasis in original):

> Many people are especially doubtful about "automating" creativity, freedom, and the like. No computer, they suppose, could ever be truly inventive, artistic, or responsible, because "it can only do what it's programmed to do." Everything depends, however, on just what this alleged limitation means. In one technical and boring sense, of course, it's perfectly true that computers always follow their programs, since a program is nothing but a careful

It was the programmer who wrote into the program the capability that allowed the user to produce the output by entering general instructions into the computer. The more intricate and precise guidance to the computer, however, will have come from the programmer. From the programmer's point of view, the user of a generator program might seem no more entitled to be considered the "author" of the output than the user of a videogame machine would be considered the author of the audiovisual work created by his control of the play when he hits a button to "shoot" at images of attacking spaceships.[91] In many cases, the program would have generated

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specification of all the relevant processes inside the machine. That, however, doesn't prove anything because a similar point might be made about us. Thus, assuming there were a "careful specification" of all the relevant processes in our brains (laws of neuropsychology, or something like that), it would be equally easy to say: "We—or rather our brain parts—always act only as specified." But, obviously, no such fact could show that we are never creative or free—and the corresponding claim about computers is no more telling.

. . . .

You might think that being "programmed for creativity" is a contradiction in terms. But it can't be, as we can see by again considering ourselves. In some sense, surely, we are elaborate integrated systems with an overall design—the result of evolution, perhaps. Thus when we're healthy (not malfunctioning), we "only do what we're designed to do." But then, assuming that creativity and freedom are not (always) unhealthy, we must be "designed for creativity," etc. This is no contradiction because the relevant sense of "design" relates only to overall capacities and characteristics; but that's also the very sense of "programming" in question.

Still, there's one last argument: it's only a metaphor to say that we were "designed" by evolution; evolution is not an actual designer, but only a mindless natural process. Computers, on the other hand, are quite literally *programmed* by actual (human) programmers. So when we're creative, it's all our own; but when a computer printout contains something artistic, that's really the programmer's artistry, not the machine's. But wait: how does that follow? Why should an entity's potential for inventiveness be determined by its ancestry (like some hereditary title) and not by its own manifest competence? What if, for instance, the very same computer system had resulted from an incredible laboratory accident; could *that* make any difference to whether the resulting system was creative? Or, turning the tables, what if you or a I had been concocted out of petroleum by-products at Exxon; would that mean that all our later inventions and artworks automatically belonged to a team of chemists? I certainly hope not.

. . . .

None of this proves that computer systems *can* be truly creative, free, or artistic. All it shows is that our initial intuitions to the contrary are not trustworthy, no matter how compelling they seem at first. If you're sitting there muttering: "Yes, yes, but I know they can't; they just couldn't," then you've missed the point. Nobody knows. Like all fundamental questions in cognitive science, this one awaits the outcome of a great deal more hard research. Remember, the real issue is whether, in appropriate abstract sense, we are computers ourselves.

See also supra note 1.

91. *See* Midway Mfg. Co. v. Artic Int'l, Inc., 704 F.2d 1009 (7th Cir. 1983) (Defendant, a videogame competitor, had copied plaintiff's videogame program and then attacked the validity of

the same output no matter which human user caused the output to be generated.

Moreover, while the programmer might be willing to tolerate private noncommercial use of the output by the user,[92] he might object if the user attempts to cash in on the value of the output by selling it in the public market. This may lead the programmer to insist on recognition of some intellectual property rights in him.

As strong as these pro-programmer arguments may seem, there are some strong reasons why the computer program author should not be given rights in all works generated by use of his program. For one thing, the programmer can protect his interests legitimately by not distributing the program. By keeping the program to himself and copyrighting every piece of music or patenting every nonobvious chemical formula that the program generates, the programmer would be able to prevent others from obtaining interests in the program's output. If he does this, of course, the programmer will not make any money directly from the program, although he may profit from selling the output that the program generates. Thus, the programmer has a choice, and should not complain about the consequences of his choice to market the program.

If the programmer chooses to exploit the value of the program by charging a significant fee for its acquisition, it seems only fair that he agree to yield some of his rights to those who have paid for that right. Generating output is the purpose of such programs. Indeed, the programmer must cede some rights to the output produced through use of the program to create incentives for users to use the technology.

Furthermore, the purchaser of a generator program can reasonably assume that acquisition of the program brings with it the right to use it to create output. A purchaser is likely to feel defrauded by the programmer if the programmer demanded rights to computer-gener-

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plaintiff's copyright by arguing that players of the game were co-authors because of variations in the play introduced by them. The court rejected the argument on the ground that the programmer's structuring of the degree of variability of the program meant that players were not really co-authors.). *But see* OTA REPORT, *supra* note 2, at 72 ("However, as computer programs increasingly permit the user wider choice in structuring input and output [as compared with videogame programs], the analogies between interactive computer programs and traditional works will begin to break down. Courts will then be left with little guidance, and even less expertise, to solve these highly complex conceptual and technological issues.").

92. Private noncommercial uses might be within the reach of the "fair use" doctrine of copyright. *See* 17 U.S.C. § 107 (1982); Sony Corp. of Am. v. Universal City Studios, 464 U.S. 417 (1984).

ated works after the user made an arrangement to sell rights in the output to someone else.[93] At the very least, the programmer should be required to give ample notice of an intent to assert ownership in works generated from his program.

Granting all rights to the programmer would mean that the programmer would automatically own everything the program was *capable* of generating.[94] This solution over-rewards the programmer, particularly in light of the fact that the programmer is no more able to anticipate the output than anyone else.[95]

Additionally, allocating ownership rights exclusively to the programmer would cause some serious enforceability problems. First, the output will be in the hands of or under the control of the user and the user would have a strong interest in *not* reporting back to the programmer that a new piece of property has been created in which the programmer has rights. Second, it will often be difficult if not impossible to discern whether a particular work was generated by a program at all—let alone by this particular program. As a result, enforceability problems would be particularly acute if rights are allocated to the programmer.

From a doctrinal standpoint, regarding the programmer as the legal "author" of whatever output might be generated through use of his program leads to serious problems. The first doctrinal problem arises because the programmer may not be the instrument of fixation

93. One might argue that by licensing the use of the generator program, the programmer implicitly granted the user rights in whatever output was generated from the computer program.

94. This is similar to Samuel Morse's eighth patent claim in O'Reilly v. Morse, 55 U.S. (15 How.) 62 (1854). Morse claimed rights in all uses of electromagnetism for printing intelligible characters at a distance, no matter what device or system was used to accomplish this result. Morse claimed that any later developed device for this purpose would simply be a new application of the communicative power of electromagnetism, which was what Morse had discovered. The Supreme Court rejected the claim, stating: "[I]t has always been held that the patent embraces nothing more than the improvement described and claimed as new, and that any one who afterwards discovered a method of accomplishing the same object, substantially and essentially differing from the one described had a right to use it." *Id.* at 119. There must be room for future inventors to develop and be able themselves to use their different application of the principle. *Id.* at 113.

A similar policy underlies the copyright rule that protection extends only to the expression of the writer, not to the ideas, processes, systems, and the like that may be embodied in the copyrighted work. *See* 17 U.S.C. § 102(b) (1982); *infra* notes 124-44 and accompanying text. Because it is possible to put the entire English language into a computer program that can construct prose, *see supra* note 40 and accompanying text, it would theoretically be possible for the programmer to claim rights in all writings that were—or could be—produced by the program. Such a claim may seem ridiculous, and yet it would be a logical result of automatically awarding rights in whatever the program did or could produce.

95. *See supra* note 88.

of the work. Copyright law tends to treat the person who causes a work to be fixed in a tangible medium as its "author,"[96] and in the case of computer-generated works, the person who uses the generator program will cause the output to be "fixed." The programmer creates the *potentiality* for the creation of the output, but not its *actuality*. It would be a substantial break from copyright tradition to award rights to a person who merely creates a potentiality for, but not the actuality of, creation of a work.

Another doctrinal problem with designating the programmer as the author of all the output from his program is connected to the problem of unpredictability of output.[97] If the programmer has not conceived—indeed, cannot conceive—what output will be created, it does not seem appropriate to designate him as the author of the output. Conceiving a work is part of what traditional copyright doctrine has meant by authorship and creativity, without which rights should not inure in the programmer.[98]

B. Ownership in the Programmer Based on the Derivative Works Right

1. Doctrinal Basis for the Claim

The theory of direct authorship, however, is not the only route by which a programmer might be able to acquire rights to control what others do with output generated by his program. A second and seemingly more promising route to programmer control over computer-generated works would be to posit that all computer-generated output are derivative works of the copyrighted generator program. At first impression, it might seem that if output *was* a derivative work, the allocation of ownership issue would be simple: the output, as a derivative, would be "owned" by the programmer or the owner of the data base.[99] The matter, however, is not that simple.

Ownership of a copyright in the generator program clearly gives the programmer the right to control the making of derivative works.[100] An unauthorized derivative work would infringe the copy-

96. *See supra* notes 12 & 79 and accompanying text.

97. *See supra* note 88.

98. *See* 1 M. NIMMER, *supra* note 12, §§ 1.06[A], 2.01.

99. At the OTA legal workshop, mentioned *supra* note 16, this was the predominant view of the copyright lawyers who discussed the computer-generated works problem based on the music generator program discussed in the OTA REPORT, *supra* note 2, at 71.

100. 17 U.S.C. § 106(2) (1982).

right.[101] This infringement would provide the programmer with a basis for blocking an assertion of rights in the derivative work by the infringer.[102] Because intellectual property law defines ownership rights in terms of having rights to *exclude*,[103] it might seem that if the programmer could prevent the user from asserting a claim of ownership rights in an unauthorized derivative, the programmer would "own" the derivative.

Yet, copyright law distinguishes between one who is an "owner" of a copyright because of his own authorship of a work and one who has the right to "limit or negate" the claim of authorship of another arising from creation of an infringing derivative.[104] Copyright law recognizes the possibility of some original authorship existing in an infringing derivative work.[105] This original expression may be

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101. *Id.* § 501.

102. *See id.* § 103(a); 1 M. NIMMER, *supra* note 12, § 3.06 at 3-22.3 ("The effect [of § 103(a)] generally would be to deny copyright to derivative works, in which the preexisting work tends to pervade the entire derivative work . . . .").

103. The copyright law, like the patent law, gives the owner of the intellectual property interest various rights to *exclude* other people from doing things with the protected work. *See* 17 U.S.C. § 106 (1982); 35 U.S.C. § 154 (1982) (setting forth the sets of exclusive rights). In copyright, this would seem to include the right to control not only the making of, but also the distribution of unauthorized derivative works. As explained below, this would not necessarily give the first work's author any affirmative rights in any original expression added by the maker of the unauthorized derivative.

104. Thus, CONTU spoke of a potential right of a programmer to "limit or negate" the rights of an unauthorized user of the program in the output generated by him:

> It is, of course, incumbent on the creator of the final work to obtain appropriate permission from any other person who is the proprietor of a program or data base used in the creation of the ultimate work. The unlawful use of a program or data base might *limit* or *negate* the author's claim of copyright in the ultimate work, just as the failure of a translator to obtain a license from the proprietor of the translated work might prevent securing copyright in and making use of the translation.

CONTU FINAL REPORT, *supra* note 16, at 45-46 (emphasis added). The power to block another from copyrighting an unauthorized derivative comes from 17 U.S.C. § 103(a) (1982) of the copyright statute. *See supra* note 102 and accompanying text.

What CONTU seemed not to realize is that there is a big difference between an unauthorized *translation* of a book and an unauthorized *use* of a generator program to create output. Translations, which involve taking the expression of a writer in one language and attempting to find the nearest equivalent expression for the writer's words in another language, copy the original text to an extent that will be atypical of computer-generated works. Output often bears no, or only an indistinct, resemblance to the text of the program. Translations are listed as one of the categories of subsequent works intended to be within the meaning of derivative work in the copyright statute. *See* 17 U.S.C. § 101 (1982) (definition of "derivative work"). Creating output is only a *use* of a program; copyright owners have no statutory authority to control uses. *See id.* § 106. *See also infra* notes 136-44 and accompanying text.

105. The writer who makes an unauthorized screenplay from a copyrighted novel, for example, will be the "author" of the screenplay. Copyright law automatically confers on the screenplay writer

"owned" by the infringer in the sense that the infringer can preclude the owner of the copyright in the first work from asserting the right to distribute the unauthorized derivative commercially.[106]

If computer output was automatically considered a derivative work of a copyrighted generator program (as a screenplay is of a novel), then output could, in the eyes of the law, always and automatically be controlled by the programmer. In that case, the programmer's right to negate any assertion of rights by the user would render meaningless CONTU's proposal that the user be treated as the "author" and "owner" of the output, because in reality the programmer's power over derivatives would give him virtually total control over the output of the program.

It is, therefore, very important to determine whether computer-generated output is a derivative work within the meaning of the copyright law. It is to this question that we now turn.

2. *Why Computer-Generated Works Might Seem to be Derivative Works*

At first blush, it might seem indisputable that computer-generated output is a derivative work. The copyright statute grants copyright owners the exclusive right to control preparation of derivatives[107] and defines "derivative work" in a very broad fashion:

> [A derivative work is] a work based upon one or more pre-existing 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 . . . [and includes a] work consisting of editorial revisions, annotations, elaborations, or other modifications

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an ownership right in what he has contributed to the screenplay over and above what comes from the novel. *See* 17 U.S.C. § 103(b) (1982). On the other hand, to the extent that the screenplay incorporates expression from the novel, and the novel's expression is inextricably interconnected with the expression of the screenplay, and the novelist objects to an unauthorized screenplay being made, the novelist can assert whatever rights he has that arise from his copyright in the novel. The novelist can seek to have the infringing screenplay destroyed, and can certainly prevent its distribution. *See id.* §§ 501-503. That would not mean, however, that the novelist could simply treat the screenplay as if he had written it. *See* 1 M. NIMMER, *supra* note 12, § 3.04, at 3-15 n.4.

106. That is, "negative rights" (*i.e.*, the right to exclude) are not the same as "positive rights" (*i.e.*, the right to make copies, etc.). In the case of an unauthorized screenplay derived from a copyrighted novel, the screenwriter could block any effort by the novelist to get a copyright in the whole screenplay (or that part of it which was the screenwriter's original expression), for as to this, the novelist would not be the "author." *See* 1 M. NIMMER, *supra* note 12, § 3.04, at 3-19.

107. 17 U.S.C. § 106(2) (1982).

which, as a whole, represent an original work of authorship.[108]

This broad definition appears to reach all works "based upon" a copyrighted work, regardless of how it is transformed or recast.

On the face of it, it is hard to deny that a computer-generated work seems to be "based upon" the underlying program. To the extent that it "comes from" the generator program, it was "derived" from the operation of the generator program. In common sense terms, that is what "based upon" means. Computer generation of output also involves a transformation or recasting of things contained in the program (or a data base). Since the statutory definition also refers to "transformations" and "recastings" as being included in the derivative works right, it might seem irrefutable that computer-generated works are derivatives.

3. *Why Computer-Generated Works are Generally Not Derivative Works*

As one examines the issue more closely, however, it appears that what Congress intended "derivative works" to mean is narrower than the common sense interpretation of the broad "based upon" language would suggest. The legislative history of the 1976 Act, as well as case law concerning derivative works, demonstrate that Congress did not intend computer-generated works to be automatically and invariably considered "derivative works" controlled by the program copyright owner. In the following subsections, several reasons for concluding that computer-generated works are not automatically derivative works of the generator program will be presented.

a. *Congress Did Not Intend to Include All Computer Output in the Definition of Derivative Works*

That Congress had no intention to include computer-generated works within the meaning of "derivative work" when it passed the 1976 Act is easily demonstrated. The legislative history is clear on this point. Congress had referred the perplexing issue of authorship of computer-generated works to CONTU for study in 1974.[109] Congress thereby decided not to decide the issue until it received the CONTU Final Report. CONTU did not report back to Congress

108. *Id.* § 101 (definition of "derivative work").

109. *See supra* note 28 and accompanying text.

about its conclusion on this issue until 1978.[110] Thus, it is fair to conclude that in 1976, when the new copyright statute was enacted, Congress had not decided what to do about computer-generated works.

To the extent that the CONTU Final Report may be construed to reflect what Congressional intent eventually was, it is worth reiterating that CONTU concluded that the user should be considered the "author" of a computer-generated work,[111] and that computer-generated works are "entirely separate" from the underlying program.[112]

Another reason that computer output ought not to be considered a derivative work under the 1976 Act is because there seems to be no evidence that Congress intended to vastly expand the set of copyright rights by creating a unified "derivative work" right. Prior to the enactment of the 1976 Act, there was no general exclusive right to prepare derivative works given to copyright owners. Rather, earlier copyright statutes had specified particular types of derivative works that certain types of copyright owners had a right to control.[113] Owners of literary work copyrights, for example, had the right to control translations of their copyrighted work into different languages or dialects.[114]

The main reason that Congress seems to have adopted a new approach to derivative works in setting forth the exclusive rights of the 1976 Act was to further its general aim of simplifying copyright classifications.[115] Although the exclusive rights section in the 1976 Act gives copyright owners a general right to control derivatives, the 1976

110. *See supra* note 27.

111. *See supra* note 69 and accompanying text.

112. *See* CONTU FINAL REPORT, *supra* note 16, at 45. It is also worth noting that the CONTU Final Report does not say that computer-generated works are derivative works of copyrighted generator programs (even though hinting that they might be). *See supra* note 33.

113. 17 U.S.C. § 1 (1970) (revised 1976). The text of the exclusive rights provision of the Copyright Act of 1909 was very lengthy and cumbersome.

114. *Id.* § 1(b). In addition, courts under the prior copyright statute had construed the exclusive right to control "copying" of copyrighted works broadly enough to reach instances where a second author appropriated some elements of the original author's expression, even if the second author transposed the original from one medium of expression to another, thus providing a second way for copyright owners to control derivative works. *See, e.g.*, cases discussed in Goldstein, *Derivative Rights and Derivative Works in Copyright*, 30 J. COPR. SOC'Y 209, 214-26 (1982).

115. *See, e.g.*, Goldstein, *supra* note 114, at 214-15 ("The 1976 Act expanded and simplified the earlier formula, attaching the right to prepare derivative works to all forms of copyrighted works."). That is, rather than naming each specific type of derivative work that should be protected as to each specific type of copyrighted work, the 1976 Act simply gave the copyright owner an exclusive right to prepare derivative works.

definition of "derivative work" strongly resembles the prior copyright statute in that it lists specific types of derivative works that are included.[116] Indeed, nothing in the legislative history indicates that Congress intended to vastly expand the set of rights copyright owners would have over derivatives by creating a general derivative work right. Congress was merely restating preexisting law in a more simple and concise way.

b. In General, Computer-Generated Output Does Not Fall Within the Existing Definition of Derivative Works

Before passage of the 1976 Act, two prominent copyright scholars warned that the very broad definition of "derivative work" might prove troublesome in the future.[117] It did not take long for the prediction to be fulfilled. Relying on the vague language of the derivative work definition, litigants in some cases brought after passage of the 1976 Act have asserted that Congress intended a vast expansion of copyright owner's rights.[118] Litigants in these cases have argued that as long as a second author bases his or her work upon any part of a preexisting copyrighted work, the second work may be considered an infringing derivative work. Courts have rejected these claims, holding that the 1976 Act incorporates the longstanding copyright principle that there must be a substantial similarity in the *expression* of the two works, and not just in their ideas, for an infringement to occur.[119] Despite the broad "based upon" language of the derivative work defi-

116. *Compare* 17 U.S.C. § 101 (1982) (definition of "derivative work") *with* 17 U.S.C. § 1 (1970) (revised 1976) (listing specific derivatives).

117. *See, e.g.*, Panel discussion between Ralph S. Brown, Jr., Benjamin Kaplan, Dan Lacy, and Caryl Haskins, *Property Rights Under the New Technology, reprinted in* COMPUTERS, COMMUNICATIONS AND THE PUBLIC INTEREST 189, 205, 210 (M. Greenberger ed. 1971) (Professor Brown stating his belief that the proposed definition of "derivative work" is "pernicious"; Professor Kaplan concurring with Professor Brown about the "strangely broad" definition of "derivative work"). *See also* Brown, *The Widening Gyre: Are Derivative Works Getting Out of Hand?*, 3 CARDOZO ARTS & ENTERTAINMENT L.J. 1 (1984) (Professor Brown's thoughtful analysis of the expanding bounds of the derivative works rule).

118. *See, e.g.*, Berkic v. Crichton, 761 F.2d 1289 (9th Cir. 1985); Litchfield v. Spielberg, 736 F.2d 1352 (9th Cir. 1984).

119. *See, e.g.*, Litchfield v. Spielberg, 736 F.2d 1352 (9th Cir. 1984). The plaintiff, Litchfield, argued that 17 U.S.C. § 106(2) (1982) "was intended to expand the definition of derivative works." 736 F.2d at 1357. In so arguing, Litchfield put forth the "novel proposition" that substantial similarity between the works at issue was not a necessary element of proof. *Id.* The court rejected the argument, holding that substantial similarity is necessary to prove infringement. *Id.* at 1355. *See also* Berkic v. Crichton, 761 F.2d 1289, 1291 n.1 (9th Cir. 1985):

> [T]he plaintiff's argument that his "derivative work" copyright claim presents issues separable from his main copyright claim is frivolous. If the plaintiff cannot show a sub-

nition, Congress did not intend the derivative work right to change this longstanding rule.

Both the text of the 1976 Act and the legislative history of the derivative work right show that Congress did not intend the term to be construed in the broadest and most literal way. A close review of the text of the definition itself suggests that in order for a second work to be a "derivative work," it must incorporate protected elements of expression from a first work. Indeed, *all* of the examples listed in the definition of derivative work involve incorporation of expression from a first work.[120] A portion of the legislative history that accompanied passage of the 1976 Act makes this principle explicit: "[T]o constitute a violation of § 106(2), the infringing work *must incorporate a portion of the copyrighted work in some form.*"[121] Therefore, the admittedly vague definition of derivative work must be interpreted narrowly to comply with Congressional intent.

In general, computer-generated works do not incorporate recognizable blocks of expression from the underlying program or from the data base that the program draws upon in the generative process. For this reason, computer-generated output should not automatically be considered "derivative works" within the meaning of the copyright statute merely because in common parlance it could be said that the output was "derived" from or "based upon" the generator program. If, however, computer-generated works incorporate recognizable blocks of expression from the underlying programs, and do so in a manner that cannot be a fair use of the underlying program,[122] then and only then can the computer output be a derivative work.[123]

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stantial similarity between the defendants' work and his own, he cannot prevail on a claim for alleged violations of his right to prepare derivative works.

120. *See supra* text accompanying note 108.

121. HOUSE REPORT, *supra* note 8, at 62 (emphasis added). The legislative history also gives examples of noninfringing works based on other works: a detailed commentary on a work or a musical composition inspired by a novel. These, according to the legislative history, would not normally constitute infringements of the derivative works right. *Id.* That is, even though music might have been "inspired" by a novel—and therefore might in some sense be "based upon" it—the music would not be a "derivative work" within the meaning of the statute. Even though the detailed commentary may be "based upon" a copyrighted poem or novel or whatever, unless it incorporates substantial portions of the previously copyrighted work's expression, it will not infringe.

122. The fair use doctrine of the copyright law is codified at 17 U.S.C. § 107 (1982). It is a limited privilege in a person other than the owner of the copyright to reproduce some part of the copyrighted work for a purpose and in a manner that will not appreciably interfere with the economic interests of the copyright owner. It is not clear whether it would have any applicability to the computer-generated work problem.

123. The author of a recent Note has developed an interesting theory concerning appropriate

c. *Useful Articles Made From Copyrighted Drawings Are Not Derivative Works*

That the derivative works right does not encompass all things "based upon" copyrighted works is also illustrated by the "useful article" provisions of the copyright law.[124] Although the design of a useful article such as a chair, a table, or a teapot may be "based upon" a copyrighted drawing, and thus might seem a derivative work to which the copyright owner has the exclusive right, the law has been quite clear that the copyright does not extend this far. The owners of engineering designs, for example, have sought to assert rights to structures erected based upon copyrighted drawings.[125] Courts and commentators alike have concluded that these structures are not copies or derivative works of the drawings.[126] Although at least one author has argued that such a rule is illogical,[127] the legislative history of the useful article provisions establishes that the 1976 Act retained this traditional rule.[128]

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limitations on the scope of copyright in an advanced technological age. *See* Note, *Toward a Unified Theory of Copyright Infringement for an Advanced Technological Era*, 96 HARV. L. REV. 450 (1982). That author asserted that unless a second author makes a commercial use of a first author's work of an iterative sort (*i.e.*, iterating the same or a substantially similar expression), rather than an interactive or productive sort (*i.e.*, using the copyrighted work to create new works), there should be no copyright infringement. *Id.* at 461-62.

The idea is not an entirely new one. The year before the first electronic digital computer was built, Zachariah Chafee expressed one of the guiding principles of copyright in this way:

> *The protection given the copyright-owner should not stifle independent creation by others.* Nobody else should *market* the author's book, but we refuse to say nobody else should *use* it. The world goes ahead because each of us builds on the work of our predecessors. . . . Progress would be stifled if the author had a complete monopoly of everything in his book for . . . [a] long period. Some use of its contents must be permitted in connection with the independent creation of other authors. The very policy which leads the law to encourage his creativeness also justifies it in facilitating the creativeness of others.

Chafee, *Reflections on the Law of Copyright: I*, 45 COLUM. L. REV. 503, 511 (1945) (emphasis in original).

124. 17 U.S.C. §§ 101, 113 (1982) (definition of "useful articles"; limitation on the exclusive rights of copyright owners in drawings as to useful articles based upon the drawings).

125. *See, e.g.*, Muller v. Triborough Bridge Auth., 43 F. Supp. 298 (S.D.N.Y. 1942).

126. *See* Katz, *Copyright Protection of Architectural Plans, Drawings, and Designs*, 19 LAW & CONTEMP. PROBS. 224, 236 (1954) ("An architectural plan is a technical writing. It is capable of being copied only by similar technical writings, that is, by other plans, etc. A structure is a result of plans, not a *copy* of them.") (emphasis in original; footnote omitted).

127. Goldstein, *supra* note 114, at 227-32.

128. *See* 17 U.S.C. § 101 (1982) (definition of "useful article"). The utilitarian issue is sometimes posed as differentiating between "applied art," which is copyrightable, and "industrial design," which is not. Clarifying what was meant by "industrial design," the House Report stated:

> [A]lthough the shape of an industrial product may be aesthetically satisfying and valuable, the Committee's intention is not to offer it copyright protection under the bill. Unless the

This rule implies that to be a potentially infringing derivative work, the second work must be of a sort *that is itself copyrightable* (if fixed in a tangible medium of expression).[129] Thus, a bridge made to implement the design reflected on a copyrighted set of engineering drawings cannot be a derivative work under the copyright law because the bridge itself is not copyrightable.[130] A bridge is not a copy or a derivative work of the plans, but an implementation of the ideas that are embodied in the copyrighted work. This is the mandate of *Baker v. Selden*,[131] which holds that copyright does not extend to the useful system a copyrighted work discloses.[132] This rule was codified in the 1976 Act.[133] If one does not wish to allow copyright law to become a substitute for patent law in the protection of machine designs,[134] the rule is eminently sensible.

Drawing on the useful articles analysis, one could say that to the extent that the output of a computer program is a useful article (such

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shape of an automobile, airplane, ladies' dress, food processor, television set, or any other industrial product contains some element that physically or conceptually, can be identified as separable from the utilitarian aspects of that article, the design would not be copyrighted under the bill.

HOUSE REPORT, *supra* note 8, at 55. The test of separability does not depend on the intent of the designer:

> [E]ven if the appearance of an article is determined by aesthetic (as opposed to functional) considerations, only elements if any, which can be identified separately from the useful article as such are copyrightable. And even if the three-dimensional design contains some such element (for example, a carving on the back of a chair or a floral relief design on silver flatware), copyright protection would extend only to that element, and would not cover the overall configuration of the utilitarian article as such.

Id.

129. The legislative history of the derivative work right indicates that Congress intended for a live performance of a choreographic work to infringe the derivative work right in a copyrighted notation of a sequence of dance steps. Legislative history also indicates that such a live performance could not be a "copy" of the copyrighted work because it would not itself be fixed in a tangible medium of expression. HOUSE REPORT, *supra* note 8, at 64. Professor Nimmer is of the opinion that the derivative work right is superfluous. 2 M. NIMMER, *supra* note 12, § 8.09[A]. This author agrees with Professor Nimmer. Whatever the "copying" right of the set of exclusive rights does not pick up, the "public performance/display" rights will.

130. A decorative monument made from a set of copyrighted drawings, however, *can* be a derivative work because the monument is not a useful article. HOUSE REPORT, *supra* note 8, at 62.

131. 101 U.S. 99 (1879).

132. "[W]here the art it teaches cannot be used without employing the methods and diagrams used to illustrate the book, or such as are similar to them, such methods and diagrams are to be considered as necessary incidents to the art, and given therewith to the public." *Id.* at 103. *See also* 1 M. NIMMER, *supra* note 12, § 2.18.

133. 17 U.S.C. § 102(b) (1982).

134. *See, e.g.*, Note, *Semiconductor Chip Protection: Changing Roles for Copyright and Competition*, 71 VA. L. REV. 249, 292-93 (1985) (warning against compromising the social purposes of copyright by using copyright to protect utilitarian works).

as a computer chip) or other uncopyrightable work (such as a chemical formula), it could not be considered a derivative work within the meaning of the copyright statute even if it incorporates a recognizable block of expression from the underlying program.[135] Therefore, at the very least, use of a generator program to prepare "derivative" works of this kind should not be considered an infringement of the computer program copyright.

d. What Happens If One Takes the Computer Out of the Problem?

Yet another way to analyze the computer-generated works problem is to take the computer out of the problem and ask who would be the author of a generated work if instead of writing a program, the programmer had written a book setting forth his algorithm for whatever the program could do. The answer would seem to be that whoever followed the instructions the author set forth as steps for carrying out the algorithm to produce "output" therefrom would be the output's author. No other result would seem consistent with the rule of *Baker v. Selden*. This rule means that a copyright in a book describing a musical composition algorithm would not extend to the "art" the book described or the useful results that might be produced by using the "art" that the book describes, but only to the author's "expression" of the idea.[136] If one applied this reasoning to the computer implementation, it would seem that the programmer would own the rights to the composition produced by the program when he used it and that the user would own them when he used it.[137]

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135. However, perhaps these semiconductor chip designs or chemical formulae could be protected by the Semiconductor Chip Protection Act or Patent Act. *See* 17 U.S.C. §§ 901-914 (Supp. II 1984); 35 U.S.C. §§ 101-104 (1982). The standard of novelty applied to these articles would be taken from the applicable statute, not the Copyright Act.

136. *See supra* note 132 and accompanying text.

137. A recent case raising this issue in a noncomputer context held that a second work which drew upon the first was not an infringing work. New York Times Co. v. Roxbury Data Interface, Inc., 434 F. Supp. 217 (D.N.J. 1977).

Roxbury was the publisher of a multivolume work entitled "Personal Name Index to 'The New York Times Index' 1851-1974." *Roxbury*, 434 F. Supp. at 219. Users of this work could look up the name of any prominent person of the era and find out whether there had been any news stories about that person in the New York Times. They could *not* find out in what issue of the New York Times such stories appeared or what the topic of any such stories might have been. *Id.* What they *could* find out was in what volumes (and pages) of the annual New York Times Index (NYT Index) (published by the New York Times) they should look to get further information.

The New York Times sued Roxbury for infringement of its copyrights. Roxbury admitted to having "copied" the volume and page numbers from the NYT Index. The Times emphasized that

e. Congress Did Not Intend to Give Copyright Owners an Exclusive Right to Use a Copyrighted Work

Congress gave copyright owners five exclusive rights when it passed the 1976 Act.[138] The right to prepare derivative works was one of them. The right to use a copyrighted work was *not* one of them. Concerning an exclusive use right, the copyright law differs from the patent law, which does give the owner of the intellectual property interest an exclusive right to use (or authorize use of) the protected work.[139] Congress recently rejected an exclusive "use" right for semiconductor chip designs, partly because of the Copyright Office's objection to a use right being included in the copyright (or a copyright-like) statute.[140] As the general counsel pointed out, there

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50% of the headings in its index had been appropriated; Roxbury admitted to having taken about 8% of the words in the index. Virtually the whole of the defendants' work came from the NYT Index. Although the Times did not publish an index of the sort Roxbury had compiled, the Times published a number of other indexes to its newspaper (including an electronic data base) and had been considering publishing a personal names index.

Despite these many facts favorable to the New York Times, the court held that Roxbury had made only a fair use of the NYT Index and denied preliminary injunctive relief. Concerning the purpose of the defendant's use of the New York Times' material, the court noted that Roxbury's work would serve the public interest in dissemination of information because it would substantially facilitate research work. *Id.* at 221. The court said that the nature of the NYT Index did not require extensive comment, but noted that it was more a work of diligence than creativity, *id.*, and that greater license is usually allowed to take from the former than the latter. Although the extent of the taking was not insubstantial, *id.* at 222, the court noted that Roxbury had not appropriated the *correlation* between personal names and the page and issue citations to the New York Times, which was the essence of the expression of the NYT Index. *Id.* As to the potential harm to the New York Times' market, the court pointed out that the evidence showed that the Times had decided *not* to publish a personal names index because they did not think there was any money in it. Because of this and because the Roxbury index did not displace the NYT Index, the court found an insufficient potential for harm to the market to find the use an infringement.

Curiously, the "derivative works" issue was not directly discussed in the *Roxbury* case. It is clear from the facts that the Roxbury index was "based upon" the NYT Index in the loose sense of the term. Yet it did not "incorporate" the "expression" of the NYT Index (*i.e.*, the correlations), and therefore, was not a derivative work in the stricter sense of the term. That Roxbury had expended considerable effort in compiling the index and that the index did not displace the New York Times' own index weighed heavily in the balance. *Roxbury* has been hailed by one commentator as representing the future trend in copyright law. *See* Denicola, *Copyright and Free Speech: Constitutional Limitations on the Protection of Expression*, 61 CALIF. L. REV. 283, 295-97 (1979).

138. 17 U.S.C. § 106 (1982). The rights are: to make copies, to prepare derivative works, to distribute copies, to publicly perform certain categories of works, and to publicly display certain categories of works.

139. *See* 35 U.S.C. § 154 (1982) (giving patentees exclusive rights to make, use and sell their inventions).

140. *See* Samuelson, *Creating a New Kind of Intellectual Property: Applying the Lessons of the Chip Law to Computer Programs*, 70 MINN. L. REV. 471, 494-95 (1985) (discussing the original version of the Senate bill which included a use right).

has never been an exclusive right to use a copyrighted work in copyright law, either in the United States or abroad.[141]

If, however, one accepted the argument that a computer-generated output is automatically a derivative work of the generator program, one would in effect be transforming the set of exclusive rights that Congress explicitly provided so as to include a use right which they did not include. The point is a simple one, but also a deep one. The underlying problem here is that copyright has inadvertently been made to take in a utilitarian subject matter.[142] Not surprisingly, the utilitarian character of software is causing some doctrinal chaos.[143]

That generator programs have a utilitarian function is obvious. It is the very purpose of a generator program to generate output automatically.[144] Generator programs are tools. Engineered to be useful in the production of other works, they are a kind of factory. By creating a derivative work right, Congress did not intend to make "use" of a computer program (or any other copyrighted work) a violation of the exclusive rights of copyright any more than Congress intended to make any work loosely "based on" another work an infringing derivative work. Yet, if all output was a derivative work, it would be as if Congress had created all exclusive use right. Until Congress makes use an exclusive right, the derivative work right must be interpreted narrowly to comport with Congress' intent to limit application of the derivative work right to those situations in which the output incorporates expression from a copyrighted work and is itself copyrightable.

In summary, the programmer's claim to direct authorship of de-

141. *See* Statement of Dorothy Schrader, *Senate Chip Hearings*, *supra* note 45, at 20:

> [A]bove all, we are concerned about the new use right. This is a right that, as far as we are aware, has absolutely no equivalent in copyright law either in the past history of the U.S. copyright law or in any copyright law abroad. It may be a patent concept, but it has not heretofore been part of the copyright law.

142. *See supra* note 8 and accompanying text.

143. *See supra* notes 5 & 11 and accompanying text.

144. Contrast generator programs with the nature and function of other copyrighted works. It is in the nature of a computer program to generate output. It is the very purpose of program instructions to produce this output. It is not in the nature of a novel to generate screenplays. The function of a novel is to convey ideas through words. Nor is it in the nature of paintings to automatically create posters or napkins embodying the pictorial design. The function of a picture is to display an appearance. People who buy novels or buy paintings are able to make use of these works for their intended purpose. It is only when purchasers (or users) go beyond the intended scope of the value made available to them and usurp the potential value such works may have in other media that the copyright law reacts. The aim of copyright's derivative work right is to preserve the right of a novelist to write or authorize the writing of a screenplay based on the novel, the right of a painter to make or authorize the making of posters of his or her paintings, and the like. This interest is not triggered when generator programs perform their normal and intended functions.

rivative works is tenuous because he neither conceived nor fixed the work. The programmer's ability to control output through the derivative work right is also suspect because Congress did not intend the derivative work right to be so broad. Unless the output is a copyrightable work and incorporates a recognizable block of the programmer's expression, computer-generated output should not be considered a derivative work.

V. SHOULD BOTH THE USER AND THE PROGRAMMER BE CONSIDERED JOINT AUTHORS OF COMPUTER OUTPUT?

A joint authorship approach to allocating ownership rights in computer-generated works is appealing because it seems to solve a difficult problem without requiring a choice between the two primary claimants, the user and the programmer. If the merits of the case for allocating rights to either the programmer or the user are not entirely satisfactory, it might appear reasonable to give both of them rights. CONTU hinted at this solution in its discussion of the computer-generated works;[145] others have found appeal in it as well.[146]

From a doctrinal standpoint, it may be difficult for the user and the programmer to qualify for recognition as joint authors under the existing statutory structure.[147] Although joint authorship is not de-

145. The CONTU Final Report does not make a clear statement on the merits of joint authorship. The committee approached the issue as follows:

> Finally, we confront the question of who is the author of a work produced through the use of a computer. The obvious answer is that the author is one who employs the computer. The simplicity of this response may obscure some problems, though essentially they are the same sort of problems encountered in connection with works produced in other ways.
>
> One such problem is that often a number of persons have a hand in the use of a computer to prepare, for example, a complex statistical table. They may have varying degrees and kinds of responsibility for the creation of the work. However, they are typically employees of a common employer, engaged in creating a work-for-hire, and the employer is the author. When the authors work together as a voluntary team and not as employees of a common employer, the copyright law with respect to works of joint authorship is as applicable here as to works created in more conventional ways, and the team itself may define by agreement the relative rights of the individuals involved.

CONTU FINAL REPORT, *supra* note 16, at 45. This explanation leaves unclear just *who* CONTU thought the joint authors might be. Attempting to rely on standard doctrine or on agreements parties might make, as CONTU would have us do, begs the underlying questions of what is the applicable law on this issue and what private parties should do to resolve it. *See also supra* note 33.

146. *See, e.g.*, Hewitt, *supra* note 15, at 235 (discussing Whitford Commission Report).

147. The user and the owner of the data, or the programmer and the owner of the data, would find it equally difficult to qualify as joint authors under the existing statutory structure.

fined in the statute,[148] "joint work" is defined as "a work prepared by two or more authors with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole."[149] With respect to computer-generated works, a joint intent as to particular output of a computer program between the programmer and some remote user would be difficult to establish.[150]

Joint authorship also creates a number of more practical disadvantages. Joint authorship fractionates ownership rights, rather than consolidating them.[151] Also, if the programmer of the generator program is given rights because of his contribution, the claims of contribution from the operating system programmer, the owner of the microcode embedded in the hardware, and the programmer who wrote the optimizing compiler that transformed the source code for the generator program into machine-readable form must also be considered. Once fractionation begins, it is difficult to stop.[152]

The kind of agreement and harmony of interest that is typical of joint authorship situations is lacking in the typical computer-generated work situation. When two physicists, for example, write a book together, they will typically be working together on an ongoing basis

148. "[The definition of a joint work] should be understood as a definition of joint authorship." 1 M. NIMMER, *supra* note 12, § 6.03 n.2.

149. 17 U.S.C. § 101 (1982) (definition of "joint work"). As the statutory language suggests, joint authorship seems to require a showing that there be some agreement that the separate products of each respective contributor is intended by all to be regarded as parts of an indivisible whole. 1 M. NIMMER, *supra* note 12, § 6.02.

150. *See, e.g.*, Picture Music, Inc. v. Bourne, Inc., 314 F. Supp. 640, 642-43 (S.D.N.Y. 1970), *aff'd*, 457 F.2d 1213 (2d Cir.), *cert. denied*, 409 U.S. 997 (1972) (No joint work was found where the authors worked in separate places, at different times, and without the necessary intent.) *But see* Shapiro, Bernstein & Co. v. Jerry Vogel Music Co., 161 F.2d 406, 410 (2d Cir. 1946) (common design to collaborate found despite the fact the authors never met and worked at different places and times). The crucial element is the common design, that the works are intended to be merged. *See* 1 M. NIMMER, *supra* note 12, § 6.03.

151. One of the policy considerations that underlies the copyright "work made for hire" rule is that it consolidates copyright ownership in the employer, rather than dividing the interest among the employees. This facilitates the employer's efforts to exploit the commercial value of the intellectual property so as to put the firm on a solid financial footing so that the employer can afford to continue to employ creative people. (There are, of course, other policies that support the "work made for hire" rule, including that the employer paid for the work, may have given directions as to the substance of the work, and may retain right of final edit and release.) *See, e.g.*, Angel & Tannenbaum, *Works Made for Hire Under S.22*, 22 N.Y.L. SCH. L. REV. 209, 212 (1976) (concerning arguments that employees should be recognized as authors, rather than their employers).

152. Society has yet to realize the full effect of modern database technology and telecommunication networking capability on the fractionation of ownership interests. Relatively inexpensive computers can retrieve data from distant sources. If each "data donor" has an ownership interest in the resultant product, a nearly unsolvable fractionation problem exists. *See* OTA REPORT, *supra* note 2, at 6, 68-69, 97-116. *See also* Butler, *supra* note 15, at 733 n.139.

and will have some understanding about the contributions to be made by each and about how they will share or allocate other responsibilities and rewards as between themselves. In addition, both will typically be involved in selling the work to a publisher. Although disputes obviously can and do occur in this framework, at least the joint authors have a preexisting relationship and harmony of interest, established before the marketing of the jointly authored product, which makes it more likely that they will act in each other's best interest.[153]

With a computer-generated work, however, the user, who will be the direct cause for the work being brought into existence, will typically have had no direct dealings with the programmer. Even where some direct dealings have occurred, it is unlikely that the kind of collaborative animus that typifies joint authorship situations will exist. The user typically will use the generator program at a site remote from the programmer, and at a time when the programmer has no involvement in the work done by the program's user.

Although the user may make use of the program as an aid to innovation, it may be that the user will also be an innovator in the field in which the program may assist his creative effort. For example, the user may be a musician/composer using a music generator program, or an architect using an architectural plan generator program. Where this is so, it may be difficult or impossible for the programmer to prove that any particular work had been generated from his program. It may be that nothing in the text of the generated work would reveal its true source.[154] Three reasons, then, would make proof of joint authorship difficult: the user would not have the same interest as the programmer in this regard, the user would have a strong interest in denying that the program had any role in the creative process, and detection of the program's role may not be apparent.

With so little basis for harmony of interest between these parties, recognizing joint authorship as the solution to the computer-gener-

153. Although the level of agreement between two people as to the creation of a work jointly need not be terribly strong, it must nonetheless exist and not be a legal fiction. The two authors must work with a preconcerted design that their respective creations will form part of a whole. *See* 1 M. NIMMER, *supra* note 12, § 6.02.

154. *See supra* notes 85 & 88 and accompanying text. The computer-generated works problem also raises the problem of accurately determining what constitutes the programmer's copyrighted expression. Is the protected expression the source code or the output? The program, as such, is not "expressed" in the output produced, but the source code of the program is also not revealed to the user because it is encoded in a machine-readable form. *See* Samuelson, *supra* note 5, at 681-82.

ated work problem may be unworkable. It is more satisfactory in theory than it would prove in practice.

VI. WHY GIVE ANYONE OWNERSHIP RIGHTS IN COMPUTER-GENERATED WORKS?

If one cannot satisfactorily resolve the authorship dilemma regarding computer-generated works by applying traditional authorship tests, and if the joint authorship solution is perceived to be unworkable, perhaps it is best not to give anyone property rights in whatever raw text some fertile computer has generated. Let the raw output be in the public domain, just as a found object would be. Let the user make use of the copy or copies of the work that the program emits. Let the user claim a copyright in the expression he contributes to the final product, but give to no one the exclusive right to the text generated by the computer.[155]

Admittedly, it is a radical suggestion, but at least a few points can be made in favor of it. If there is no human author of the computer-generated work, the intellectual property system has assumed no one deserves to be rewarded for it. If there is no human author of such a work, how can any human be motivated to create it? The copyright system assumes that society awards a set of exclusive rights to authors for limited times in order to *motivate* them to be creative so that their creativity will add to the society's store of knowledge.[156] The "end" sought by granting copyrights is the creation and dissemination of knowledge;[157] the seemingly unpleasant "means" to this

155. *See, e.g.*, Hewitt, *supra* note 15, at 235 ("[A] possibility is that no one can claim copyright to the originality of a machine, and like the infinite variety of 'art' in nature around us, the ideas are a gift to mankind."); Butler, *supra* note 15, at 734 ("Consistent with the traditionally implied assumption that authors contemplated by the Act are necessarily human, courts might choose to deny copyright protection for AI produced materials. . . .").

156. *See supra* notes 66-68 and accompanying text. Justice Reed stated the purpose of the Constitutional empowering clause in Mazer v. Stein, 347 U.S. 201, 219 (1954):

> The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in "Science and useful Arts." Sacrificial days devoted to such creative activities deserve rewards commensurate with the services rendered.

Samuel Johnson made the point with characteristic clarity: "No man but a blockhead ever wrote except for money." J. BOSWELL, LIFE OF DR. JOHNSON (1776) (quoting Samuel Johnson).

157. *See, e.g.*, OTA REPORT, *supra* note 2, at 38 ("[I]t was clear from the time of the Constitutional Convention that intellectual property law was intended to serve the goals of education and learning. . . ."); J.L. Mott Iron Works v. Clow, 82 F. 316, 318-19 (7th Cir. 1897) ("The object of [the copyright clause] was to promote the . . . general knowledge in science and useful arts."); Twentieth

end—unpleasant because of the higher prices and reduced production the copyright monopoly entails—is the granting of a set of exclusive rights to the creators.[158] If it is not clearly necessary to grant the exclusive rights to stimulate creativity, traditional principles would seem to argue that the set of exclusive rights not be awarded to anyone.[159]

A threshold question in evaluating the "no ownership rights" proposal is whether allocating rights to someone is necessary to cause the raw material to be generated at all. An argument can be made that it is not. The programmer can already be rewarded for the commercial value of the program—which is what he created—through sales of the program or license fees for use of the program. That is probably all the motivation he needs. The user will be motivated in two ways to use the computer to create the raw material at issue: first, the program will not be worth the money he paid for it if he does not use it to create something; second, the user can transform the raw material into a commercially valuable version in which he can obtain an intellectual property interest. The user can get a copyright in the transformed version of which he may indisputably be the kind of "author" the copyright law envisions. So perhaps granting no ownership rights in the raw output would be the best rule.

One reason not to adopt this seemingly sensible proposal is that it conflicts with the temper of the times. At the moment, the legislature, the executive branch, and the courts seem to strongly favor maximizing intellectual property rewards, especially for high technology inno-

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Century Music Corp. v. Aiken, 422 U.S. 151 (1975). In the latter case Justice Stewart articulated the underlying purpose of the copyright system:

> The limited scope of the copyright holder's statutory monopoly, like the limited copyright duration required by the Constitution, reflects a balance of competing claims upon the public interest: Creative work is to be encouraged and rewarded, but private motivation must ultimately serve the cause of promoting broad public availability of literature, music, and the other arts. The immediate effect of our copyright law is to secure a fair return for an "author's" creative labor. But the ultimate aim is, by this incentive, to stimulate artistic creativity for the general public good. "The sole interest of the United States and the primary object in conferring the monopoly," this Court has said, "lie in the general benefits derived by the public from the labors of authors. . . ." When technological change has rendered its literal terms ambiguous, the Copyright Act must be construed in light of this basic purpose.

Id. at 156 (citations omitted).

158. *See* 17 U.S.C. § 106 (1982) (set of exclusive rights of copyright). See also 35 U.S.C. § 154 (1982) for the exclusive rights granted by the patent system.

159. *See, e.g.*, Breyer, *supra* note 67, at 350-51.

vators.[160] The hope seems to be that maximizing rewards will strengthen high technology industries, which will keep the American economy strong. For some, the very notion of output being in the public domain may seem to be an anathema, a temporary inefficient situation that will be much improved when individual property rights are recognized.[161] Rights must be given to someone, argue those who hold this view; the question is to whom to give rights, not whether to give them at all.

A more practical problem with the "no rights to raw output" proposal is that it would be difficult, if not impossible, to prove what the original content of the raw output was and to reward the user only for that which he personally added to the final product.[162] In this respect, the "no rights" proposal suffers from a deficiency similar to that found with the joint authorship proposal.[163] The user might not remember the exact composition of the raw output. Even if he did recall, there would be considerable incentive to misrepresent his memory as being dimmer than it was, and even to perjure himself. Detecting and proving this perjury would be difficult. Practically speaking, the user could probably enforce an ownership interest in the whole of the final product, not just in that part that he actually contributed to it. The result would be the same as if one gave rights to the user in the first place.

Perhaps the best reason to allocate ownership interests to someone, however, is that someone must be motivated, if not to create the work, then to bring it into public circulation. If a flawless work has been created by use of a computer program, and the law deems the work incapable of being owned because of the lack of a human author, the user who proximately caused its creation has little incentive to go to the trouble of bringing forward what the law says is in the public domain. The user is more likely to withhold it from the public, or to lie about who created the work, or to make some little change in

160. In recent years some new forms of intellectual property law have been created and some old forms have been extended to accommodate high technology innovators. *See, e.g.*, Semiconductor Chip Protection Act of 1984, 17 U.S.C. §§ 901-914 (Supp. II 1984); Plant Variety Protection Act, 7 U.S.C. §§ 2321-2582 (1982). See also Copyright Act of 1976, 17 U.S.C. §§ 101-810 (1982), which extended the duration of copyright protection from 28 years (renewable for another 28 years) to life plus 50 years. *Compare* 17 U.S.C. § 302(a) (1982) *with* 17 U.S.C. § 24 (revised 1976).

161. *See generally* Lange, *Recognizing The Public Domain*, 44 LAW & CONTEMP. PROBS. 150 (1981) (expressing dismay at the fervor with which litigants and judges have been actively encroaching on the public domain in the name of furthering innovation).

162. *See supra* notes 56-63 & 71-77 and accompanying text.

163. *See supra* note 154 and accompanying text.

it (perhaps not an improvement) just to establish a stake in it.[164]

The need to reward those who bring innovations to the market has always been part of the realities of the intellectual property system, even if not part of the sentimental ideology that pervades public thinking about intellectual property. The commercial value of a book or a recording or a television program is only partially attributable to the merits of the work of the author. The actual reward system reflects this judgment, for the author of a work typically reaps only a small part of the commercial value that is derived from it.[165] As much or more of the commercial value of the work can be attributed to such things as the packaging and promotional efforts of the publisher or the recording studio or the broadcast of a television program over a national network. It is the publishers, the recording studios and the networks who make the market for creative works. As the market-makers, they take the greatest risks and reap the greatest rewards from the distribution of intellectual property.[166]

While users of generator programs may not be the ultimate market-makers for computer-generated works, they are in much the same position as traditional authors in the sense that they are in the best position to take the initial steps that will bring a work into the marketplace. Society has an interest in such works being made available to the public. Innovations that are kept secret do not promote the progress of science and the useful arts as much as innovations that are revealed and disseminated.[167] If someone must be given incentives to bring the work forward, it is the user who is best situated to respond to the motivation.

Recognizing the user as the owner of computer-generated works would also seem to be consistent with the constitutional purposes underlying federal intellectual property law because it has more potential to advance the pace of innovation than would be the case if no one was granted rights.[168] That giving rights to the user is also the most

164. *See supra* note 77 and accompanying text.

165. Although the stated purpose of copyright is the compensation of authors, the reality is often that the publishers reap the lion's share of the rewards. *See* Chafee, *supra* note 123, at 504, 506-11; *Copyright Hearings*, *supra* note 16, at 49.

166. *See* Breyer, *supra* note 67, at 293-94.

167. "[A]uthorship, although often profoundly, even painfully, solitary, is fruitful and socially useful only when its works are disclosed." D. Ladd, Donald C. Brace Memorial Lecture, New York University Law Center (Apr. 13, 1983), *reprinted in* 25 PAT. TRADEMARK & COPYRIGHT J. (BNA) No. 627, at 530, 533 (1983).

168. That innovation is the key interest promoted by the Constitutional empowering clause was emphasized by Richard Stern in his statement before the House Committee on the Judiciary,

practicable solution and the one least likely to lead to litigation also supports recognizing the user as the clear and only owner of computer-generated works.

Copyright Hearings, supra note 16, at 130-31. In Mr. Stern's view, the Constitution only empowers the Congress to pass intellectual property laws which further the public interest in innovation.