
Concatenative Sound Synthesis and Intellectual Property: An Analysis of the Legal Issues Surrounding the Synthesis of Novel Sounds from Copyright-Protected Work

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Abstract

Concatenative sound synthesis (CSS) is only as good as the database from which it draws its sound units. As in concatenative speech synthesis, “good” sound concatenations require databases rich in sound material. How better to satisfy this than by using the world’s entire library of sound recordings? As can be expected, this concatenative fodder includes work protected by copyrights; and some of these rights appear to forbid the use of these works in both the databases used by, and the results of, the CSS algorithm. These pragmatic concerns necessitate a discussion of the ramifications of intellectual property for CSS, not to mention the appropriation in its output. This article addresses these issues with reference to intellectual property law and copyright precedent, particularly in the USA, and assesses the defensibility of using copyright-protected material in CSS.

1. Introduction

One of the most interesting aspects of concatenative sound synthesis (CSS) is its ability to transform recorded sound into novel expressive forms that might not resemble the original sources. Though the concept is not new, this automated method of *micromontage* (Roads, 2001) presents exciting avenues of exploration for a composer. In the author’s electroacoustic composition “Concatenative Variations of a Passage by Mahler” (CVM), five recorded interpretations of the percussion

crescendi from Mahler’s second symphony (Mahler, 1987, p. 322, bars 192–196), are concatenatively transformed into 11 micromontages (Sturm, 2004, 2006). The forms of the crescendi are rendered with bits and pieces from many sound sources: Anthony Braxton playing alto saxophone (“Saxubus”); J.S. Bach’s “Partita” for solo flute (“Lix Tetrax”); animal sounds (“Creatures”) and other sound effects (“Boils and Bells,” “Gates I,” “II”); popular music (“A Capella,” “Limbo,” “Highway to Heaven, Stairway to Hell”); and even the original interpretations of Mahler (“Passage I,” “II”). CVM is a culmination of the author’s research in creative CSS, and a demonstration of the method and its exciting possibilities.

During the composition of CVM issues surrounding the ethics and legalities of music appropriation, and specifically the method of CSS, began to surface. By using sound material authored and owned by others, what rights are or are not granted to the creator of the new work? Without authorization from the rights-holders of the original works concatenatively appropriated, can the new works be performed, included on a commercial CD, or even freely distributed over the Internet? More fundamental to CSS, can a database of copyright-protected sound material even be compiled to accommodate the needs of the algorithm? In order to facilitate research and results there can be no restrictions on the sound material used, and no looming legal jeopardy to those who are interested in exploring it. Since CSS can be only as good as its database is large and diverse, favourable answers to these questions are crucial to its continued development.

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The following section introduces the context and concepts of intellectual property and copyright. Several legal precedents are then presented that are relevant to musical compositions and sound recordings, particularly those involving the practice of popular music sampling—a close relative of CSS. The final section discusses the legal ramifications of intellectual property for CSS, and answers the questions posed above, using CVM as a test case. Although attention is mostly paid to statutes and precedents within the USA, because of a common heritage of jurisprudence the conclusions remain essentially the same for other Western nations.

2. Intellectual property: copyrights

The phrase “intellectual property” (IP) refers to legal policies regarding everything from patents, trademarks, and copyright, to authorship, use, and access (Vaidhyathan, 2001, p. 12). It is as much a tool for authors and owners of intellectual creations, as it is for a community at large; in fact, IP aims to maintain a balance between them. The modern importance of IP cannot be underestimated. John Bliss, the president of the International AntiCounterfeiting Coalition, has said, “Intellectual property is to the twentieth century what coal was to the nineteenth century. [It] has become like a natural resource. It is every bit as valuable, if not more valuable, than personal property” (Paradise, 1999, p. 4).

Copyright—one aspect of IP—is a “bundle of rights” that is awarded to an author and/or owner of an *expression* for a limited time. An expression, as opposed to an idea, is basically anything that is fixed in some tangible medium, such as lyrics, a play or novel, a particular written arrangement of musical notes, a painting, and so on.

The Western concept of copyright has a long history that reaches back to before the Renaissance. Modern copyright parlance began in England in the “Statute of Anne” (1709), designed to protect the authors and publishers of written literary works, and to encourage “learned Men to compose and write useful books” (Leval, 1990, p. 1109). A similar statement exists in the US Constitution, ratified in 1788, US Const. amend. 8 § 8. Over the course of a few centuries in Europe and the USA, copyright has been augmented to protect different types of expression, such as written and recorded music, notated choreography, paintings, sculpture, architectural plans, and most recently, computer software, microchips, and even boat hulls. In many cases there could be several “layers” of copyright. For musical recordings, one copyright might protect the sound recording itself, another the underlying musical composition, another the lyrics, and yet another the arrangement of songs on the album.

The purposes of copyright are many: a reward to a creator and/or owner of an expression; an incentive to

create, publish, and distribute; to guarantee public access to useful information; and in general, as a catalyst for the enrichment of society. US Supreme Court Justice Sandra Day O’Connor has echoed this: “The primary objective of copyright is not to reward the labor of authors, but ‘to promote the progress of Science and useful Arts’. To this end, copyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by a work” (Hoffman, 1999, p. 30; inner quote from US Const. amend. 8 § 8). To these reasons, Vaidhyathan adds another in his book “Copyrights and Copywrongs”: “[copyright] exists to encourage the investment of time and money in works that might not otherwise find adequate reward in a completely free market” (2001, p. 8).

Basically any intellectual expression, with only a few restrictions, is eligible for copyright protection: it “must be an original work of authorship fixed in a tangible medium of expression;” and have “at least some minimal degree of creativity,” 17 USC § 102(a) (2005). When disputes arise, a judge or jury can determine the degree of originality using particular tests described below.

Copyright grants the author and/or owner, for a limited time, *exclusive* rights to a work’s existence, reproduction and distribution, and how and when it is used and presented. These rights, in total or in part, can be transferred to other parties though they themselves may not have had anything to do with the work. This is typical in the music industry where a songwriter maintains copyrights to a song, but the record label owns the rights to the recording of that song, and the album on which it appears. Since copyright in a work is granted for a limited time, when it expires the work enters the *public domain*. Once a work is in the public domain, it cannot be protected again in its once protected form, and it is free to be used in any way without fear of reparation.

In the USA the exclusive copyrights pertaining to sound recordings include: making and distributing copies of the work; creating derivative works; and performing the work in public, 17 USC § 106 (2005). The concept of a derivative work is complex, but in essence it is “based upon one or more pre-existing works, such as a translation, musical arrangement, . . . motion picture version, . . . or any other form in which a work may be recast, transformed, or adapted,” 17 USC § 101 (2005). When a derivative work makes use of a work to which one does not possess rights, then the copyright in the new work “extends only to the material contributed by the author, . . . and does not imply any exclusive right in the pre-existing material,” 17 USC § 103(b) (2005).

In addition to these rights, in the UK and other European countries, non-transferable *moral rights* are given to the author of an intellectual creation. These include the right to be named as creator of the work, and the right to maintain the work’s integrity (Frith & Marshall, 2004, p. 9). For instance in the UK,

“A derogatory treatment of the artwork (whether by adaptation, addition, deletion, or other alteration which distorts or mutilates the work or is otherwise prejudicial to the honour or the reputation of the author) is actionable at the behest of authors or their heirs (section 80 of the UK Copyright Designs and Patent Act 1988)” (Rubinstein, 1999, p. 137). Fortunately, the monopoly granted to the owner of copyright is balanced by the doctrine of *fair use*, whereby one is allowed to use a protected work when that use promotes the main goals of copyright: to encourage learning and new works. The concept of fair use has existed for over 300 years in England, and has been formally applied in the USA since 1841 (Leval, 1990, p. 1105; *Folsom v. Marsh* 9 F.Cas. 342 (1841)).

US Code states that, “the fair use of a copyrighted work...for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright,” 17 USC § 107 (2005). Uses of copyright-protected work that are considered fair, and thus defensible, include: a library making a copy of a deteriorating work; a teacher making a few copies of a chapter, illustration, or musical excerpt, for use in class; reproduction for purposes of commentary, criticism, satire and parody; making a copy because of unavailability in the marketplace; and scholarly research. In cases where fair use is argued, US Code provides four factors that the court should consider: (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes; (2) the nature of the copyrighted work; (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work, 17 USC § 107 (2005).

Each one of these factors is closely inspected, and weighed together to form a judgment.

The first factor, which has been called “vitality important to the fair use inquiry” (Leval, 1990, p. 1111), aims at determining the reasons why the allegedly infringed work, or primary work, was quoted or appropriated; and whether the questionable uses of it in the secondary work can “fulfill the objective of copyright law to stimulate creativity for public illumination” (Leval, 1990, p. 1111). If a person did so in order to save time and money, or to reap the benefits of the original work’s popularity, then the use would probably be found unfair. The second factor looks at whether the primary work has “thin” protection by copyright (a work more of fact than expression), or “thick” protection (a highly original work). The third factor is arguably the most significant factor for music cases, yet it is the least well defined. If an artist took a part that is not significant to the protected work as a whole, e.g. a chord, or rhythm, and not the melody, or chorus, then a finding of fair use is more likely.

The fourth factor deals with potential harm that could be caused by the secondary work to the marketability of the original. Like the first factor, this one is usually weighed heavier than the others because of its significance to the incentives for creating and distributing new work.

Now that an overview of intellectual property and copyright law has been presented, the kinds of things that have and have not represented actionable infringements of copyrights can be examined. Obviously there have been no cases that address CSS specifically; but since the basis of CSS is identical to that of digital sampling, i.e. the lifting and placement of portions of recorded sound, a survey of these cases will provide a basis for determining the defensibility of CSS in general.

3. Sampling precedents

It has been noted by many throughout history that in art and science there can be nothing truly new; everything builds on what came before, and can be considered derivative in some sense of the word. The history of Western music abounds with examples of this, not only by composers emulating and extending styles, but also in quotation and downright theft. From the form of variations, to blues, jazz, and rap musicians, to modern works by Charles Ives and Luciano Berio, quotation is a natural and logical tool for the sound artist.

Sampling, as a means for modern-day quotation and appropriation, enables anyone to extract and use sound material from a recording, copyright-protected or not. Early examples of this include composers Edgard Varèse, Iannis Xenakis, and Bernard Parmegiani, constructing works by splicing analogue tape in the 1950s; and James Tenney in 1961 doing the same with a recording of Elvis. More common today is digital sampling, where exact replicas of digital recordings are made, modified, and integrated into new musical contexts. A humorous example of this is Charles Dodge’s “Any Resemblance is Purely Coincidental”, in which he uses various transformations of an old recording of Enrico Caruso.

Most well-known instances of this occur in popular music, such as hip-hop and rap, which have roots in the 1960s reggae and dub musicians of Jamaica, and even further back to oral traditions of Africa. Though Tenney and Dodge did not rouse controversy, when the rap and hip-hop genres started accruing sizable profits in the early 1990s, digital sampling became a legal problem (McLeod, 2001, p. 86). Today, not only are there businesses specializing in licensing musical property, there are also entire departments in record companies actively searching new media for unlicensed uses of their property (McLeod, 2001, p. 89).

Surveying the landscape of music-related copyright infringement cases in the USA reveals a rich history extending back to the 19th century; but only a few of

these have direct import for digital sampling. Most lawsuits filed against artists for digital sampling are settled out of court, providing business precedent, but no legal precedent. Those cases that have reached court sometimes provide inconsistent judgments and conflicting results, but usually maintain sight of the basis for copyright.

In the case of *Grand Upright v. Warner Bros.*, 780 F. Supp. 182 (1992), Raymond “Gilbert” O’Sullivan filed for an injunction against Warner Brothers Records and rap artist Biz Markie for using a 20-second sample from O’Sullivan’s popular 1973 song “Alone Again (Naturally)”. Markie looped this sample throughout his song “Alone Again” on an album released by Warner Brothers Records. Before the album was released, Markie solicited O’Sullivan for a licence to use the sample, which O’Sullivan refused. Warner Brothers released the album anyway. Markie was found guilty of copyright infringement, and an injunction was issued against Warner Brothers.

Controversially, to make its decision the court did not consider any factor of fair use, and relied only on the fact that the plaintiff owned the copyrights to the composition underlying the sampled work, and that the defendant sought permission to use the work from the plaintiff (Latham, 2003, p. 123). In his ruling U.S. District Judge Kevin Thomas Duffy quoted from the Bible: “‘Thou shall not steal’ has been an admonition followed since the dawn of civilization. . . . The conduct of the defendants herein . . . violates not only the Seventh Commandment, but also the copyright laws of this country”, 780 F. Supp. 182, 183 (1992). Judge Duffy further referred the case for criminal prosecution, which could have resulted in a prison sentence per 17 USC § 506(a) (2005).

A seemingly contradictory precedent is set by the case *Campbell v. Acuff-Rose Music, Inc.*, 510 US 569, 114 S. Ct. 1164 (1994). In this case, the owners of the copyrights to the song “Oh, Pretty Woman”, written by William Dees and Roy Orbison, sued rap group 2 Live Crew for their use of the distinguishing bass line of the original composition, and their adaptation of the lyrics, in their piece “Pretty Woman”. Previous to its release, 2 Live Crew had notified the copyrights’ owners that 2 Live Crew would assign “all credit for ownership and authorship of the original song to Acuff-Rose, Dees, and Orbison, and that they were willing to pay a fee for the use they wished to make of it”, 510 US 569, 572, 114 S. Ct. 1164, 1168 (1994). Though the offending recording was of a commercial nature, the US Supreme Court found, on appeal, in favour of the defendants because they used the original within the conditions of fair use. Specifically, the use was fair because the new work was a parody of the original with sufficient transformation. The opinion of the Supreme Court in this case states: “The more transformative the new work, the less will be the significance of other factors, like

commercialism, that may weigh against a finding of fair use”, 510 US 569, 114 S. Ct. 1164, 1166 (1992).

Contrary to this ruling on parodies and satire are the legal woes provoked by the activist media artists Negativland. In 1991 they released a short CD entitled “U2”, which made satirical use of samples of the rock group U2, and off-air, off-colour remarks by popular music radio-show host Casey Kasem. This elicited a 180-page lawsuit from the publisher and record label of U2, claiming copyright and trademark infringements (Watt, 2002, p. 172). Negativland’s small record company quickly capitulated and settled the matter out of court, depriving the judicial system of an important precedent that would further elucidate fair use in music sampling (Watt, 2002, p. 173).

In *Newton v. Diamond*, 349 F.3d 591 (2003), the popular hip-hop group Beastie Boys was sued for looping throughout a song a six-second, three-note sample. At issue was the fact that the defendants obtained a licence to sample the recording of the primary work, but not the underlying composition. The district court, as well as the court of appeals, found for summary judgment (meaning no trial is needed) in favour of the defendant on the grounds that their taking was “de minimis non curat lex”—the court does not concern itself with trifles. In other words, the portion the defendants took “lacked sufficient originality to merit copyright protection” in the composition underlying the recording, 349 F.3d 591, 592 (2003). Since the amount they took was small and insignificant to the original work, there was no issue.

For the case of *Williams v. Broadus*, 2001 WL 984714 (S.D.N.Y.), popular rap artist Snoop Dogg was sued for using some lyrics and digital samples without authorization. In a unique twist, the defendant claimed that since the segments used were themselves instances of unauthorized copying from another work, and since copyright only extends to portions of works that are new and original per 17 USC § 103(b) (2005), then he was not in violation since the plaintiff did not own rights to those portions. The plaintiff however demonstrated that his work was sufficiently differentiable from the work it sampled from, claiming “the song would remain essentially intact even if the sampled notes were removed”, 2001 WL 984714 (S.D.N.Y.) at 5. Copyright then does protect those parts Broadus used in his new work. The defendant’s request for summary judgment was denied, and the matter was settled out of court.

In *Jarvis v. A & M Records*, 827 F. Supp. 282 (1993) the use of small samples is again the issue, but with a different outcome than *Newton v. Diamond*, 349 F.3d 591 (2003). In this case the defendant had taken samples without authorization of a recording of the complaining work: the spoken words “oohs”, “moves”, and “free your body”; and a “distinctive keyboard riff”, 827 F. Supp. 282, 289 (1993). The court found that the copyright of the original work had been infringed since

the samples were used in a way similar to their function in the original; furthermore each of the samples represents “an expression of an idea that was copyrightable,” 827 F.Supp. 282, 292 (1993). Though the samples were short, since their expression is not obvious, like the common chord progressions found in popular music, they merit a “thicker” copyright protection.

From these cases it can be seen that there are no hard-line rules for what constitutes a fair use of musical material. For a court to find a copyright has been infringed, a plaintiff must prove three things: first, legal possession of the copyright in question; second, that unauthorized copying did occur *in fact*; and finally, that the amount taken was substantial enough to warrant legal action. For the latter two the courts have utilized specific tests to determine whether an infringement has occurred, and to what extent (Christian, 2004, p. 135). To test copying in fact, the court looks for evidence that points to the defendant having access to and copying the primary work. This can include admission, testimony, or musical analyses of both compositions. To determine the extent of appropriation, the court examines the *substantive similarity* of the pieces by invoking the concept of the “lay listener”: would a person neither musically trained, nor familiar with the works in question, find the two works sufficiently similar? If the lay listener cannot perceive a substantive similarity between the works, then the extent of taking may be deemed minimal.

Matters have been different when considering infringements of copyrights in sound recordings, the owners of which are usually not the artists. Thus far very few owners of copyright in sound recordings have actually pursued legal matters (Shultz, 2005, p. 327). In the recent case *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004), a song from the sound track of a movie was alleged to infringe on the plaintiffs’ copyrights to a sound recording and the underlying composition. The secondary work made use of a two-second sample of an arpeggiated guitar chord sampled from a recording. It was lowered in pitch and looped to form a 16 beat phrase that lasts approximately seven seconds and appears five times in the offending work.

The court determined that the sample taken, though brief, had sufficient originality to merit protection. It then weighed whether the defendants, who had acquired only a license to use the underlying composition, had used the sample within the limits of *de minimis*, or fair use. Though a district court found the use was *de minimis*, upon appeal the Sixth Circuit court argued that the scopes of copyright in a sound recording, per 17 USC § 114(b) (2005), clearly imply that “a sound recording owner has the exclusive right to ‘sample’ his own recording”, 383 F.3d 390, 398 (2004); and that this right precludes anyone else from doing so without permission. Regardless of how little was used of the original recording, and regardless that “no reasonable juror”

would link the sample in the secondary work to the original, “Get a license or do not sample” was the maxim kindly offered by the court, 383 F.3d 390, 398 (2004).

This decision has not gone without criticism, as its significance is far reaching and it completely defeats fair and *de minimis* uses (Garnett, 2005; Shultz, 2005). In *Campbell v. Acuff-Rose Music, Inc.*, 510 US 569, 114 S. Ct. 1164 (1994) the Supreme Court stated an analysis of fair use “is not to be simplified with bright-line rules, for the statute, like the doctrine it recognizes, calls for case-by-case analysis”, 510 US 569, 577 (1994). In this new light, *Newton v. Diamond*, 349 F.3d 591 (2003) has to be revised because “sampling is never accidental... It is a physical taking rather than an intellectual one”, *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004). In particular, the Sixth Circuit literally interpreted Title 17 § 114(b) of US Code to mean: “the world at large is free to imitate or simulate the creative work fixed in the recording so long as an actual copy of the sound recording itself is not made... When you sample a sound recording you know you are taking another’s work product”, *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004).

Another reason this precedent is troublesome is because it is physically nonsensical. The “do not sample” maxim considers it unlawful when a single impulse from a digital sound recording is admittedly taken—of which there are only a finite number of possible values because of the finite precision of computers. A guiding precedent comes from the century-old case *Edison v. Lubin*, 122 F. 240 (3d Cir. 1903). In this case American inventor Thomas Edison complained his rights were infringed when competing filmmaker Sigmund Lubin took a single frame from a film made by Edison’s movie company and released it for public view (Vaidhyathan, 2001, p. 89). Since Edison previously registered the film with the Library of Congress to secure copyrights (necessary at that time), he claimed unfair use. At first a judge ruled against Edison, stating that copyright protection does not extend to a film (which it did not at the time), though it is essentially a rapid sequence of copyrightable photographs; and that Edison should have registered each frame of the film separately. Edison appealed this decision arguing, “the protectable ‘expression’ of a photograph is what viewers interpret from it, not the particular arrangement of the silver crystals on the celluloid substrate” (Vaidhyathan, 2001, p. 90). Thus a film, since it contains an expression like a photograph, should be protected in the same way a photograph is. On appeal, the Third Circuit court decided in Edison’s favour, and in so doing expanded the protection of copyright to films.

Digital samples can be likened to the silver crystals of early photographic plates. Individually they give no impression, express nothing, and therefore cannot be protected as such; but when several thousands are perceived in an organized manner, to the extent that an

impression other than a click or pixel is undeniable, such as an image in a single frame of a movie, one begins to traverse the wide boundary between digital impulses and expression. From the precedent of *Edison v. Lubin*, 122 F. 240 (3d Cir. 1903) then, a sequence of digital samples should not be protected just because they form a part of a copyrighted work. Only when that sequence is undeniably expressive, and when that expression satisfies a constraint of minimum originality, copyright protection should apply.

It is quite likely that the interpretation of copyright by the Sixth Circuit will be revisited and modified. In fact, in *Campbell v. Acuff-Rose Music, Inc.*, 510 US 569, 114 S. Ct. 1164 (1994) the Supreme Court disagreed with and reversed the Sixth Circuit findings for the plaintiff (Shultz, 2005, p. 335). Barring the example of *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004) then, what can be said about the legality of taking a portion of a copyrighted work and transforming it? Unless the transformation is so considerable that it passes the test of the lay listener, its use will be judged unfair given that the secondary work can be considered a derivative work, the creation of which is an exclusive right of the rights holder per 17 USC § 106 (2005). The following precedent illustrates this argument.

Four years after the 1971 sound recording amendment to US Code—effectively giving sound recordings made after 15 February 1972 copyright protection to combat recorded music piracy, 17 USC § 107(f) (2005)—the Ninth Circuit decided the first criminal prosecution having to do with sound pirating, *US v. Taxe*, 380 F. Supp. 1010, 540 F.2d 961 (9th Cir. 1976). The defendants were accused of distributing and selling tens-of-thousands of 8-track re-recordings of popular music tapes. On the reproductions however, the defendants had made alterations to the original material by speeding it up or slowing it down, adding and deleting frequencies, adding echo, and adding elements from a Moog synthesizer. The jury found that these alterations “were insubstantial to the human ear and were intended to be so”, 380 F. Supp. 1010, 1013 (1976). The defendants were convicted of sound pirating among other things.

The opinion of presiding Judge Hill raised two interesting questions that foreshadow modern sampling:

First, whether the most trivial re-recording (the re-recording of one or two notes) would be an infringement, and second, whether re-recording combined with such comprehensive changes that the work is no longer recognizable as the original work (i.e., extreme speed changes or running the recording in reverse) would constitute an infringement, 380 F. Supp. 1010, 1014 (1976).

The judge briefly addressed each of these instances as being far enough from what Congress intended to prohibit with the 1971 Sound Recording Act that they could be considered fair use. In other words, de minimis

could be found if the taking is small enough, and fair use could be found if the transformation of the re-recording is sufficient enough. The latter interpretation is concurred with in one of the most important documents for the modern interpretation of fair use. Judge Pierre N. Leval writes in his commentary “Toward a Fair Use Standard”:

I believe the answer to the question of justification [of fair use] turns primarily on whether, and to what extent, the challenged use is transformative. The use must be productive and must employ the quoted matter in a different manner or for a different purpose from the original. A quotation of copyrighted material that merely repackages or republishes the original is unlikely to pass the test. . . . If, on the other hand, the secondary use adds value to the original—if the quoted matter is used as raw material, transformed in the creation of new information, new aesthetics, new insights and understandings—this is the very type of activity that the fair use doctrine intends to protect for the enrichment of society (1990, p. 1111).

In this document Judge Leval provided a new test to determine if fair use has been made. Known as the “transformative use test”, it states fair use can be found if the secondary use is in line with the principles of copyright: to encourage the enrichment and development of society by giving incentives to authors and publishers to create and distribute works of quality (Leval, 1990, p. 1134). Its applicability for defending instances of sampling is obvious, depending on the reasons for doing so in the first place.

In their volume *Kohn On Music Licensing*, Kohn and Kohn discuss “The Digital Sampling Controversy” (1996, p. 1287). They suggest that a significant reason why samples are used in popular songs is to piggyback on the success of a pre-existing work or artist (Kohn & Kohn, 1996, p. 1290). Thus the time and money an artist and company have spent on making a work or artist commercially successful is used to someone else’s benefit. Kohn and Kohn also frame the activity of sampling as a way for an artist and label to save time and money on finding the “right” sound: “. . . using samples of existing recordings obviates the need to employ the talents of live musicians who could otherwise, albeit at greater expense, produce the desired performance or sound mix” (1996, p. 1298). In his opinion to *Grand Upright v. Warner Bros.*, 780 F. Supp. 182 (1992), Judge Duffy remarked of the defendants: “Their only aim was to sell thousands upon thousands of records” (780 F. Supp. 182, 185). The opinions of the Sixth Circuit in *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004), and *US v. Taxe* 380 F. Supp. 1010, 540 F.2d 961 (9th Cir. 1976), make the same assessment.

It is now common practice, since at least *Grand Upright v. Warner Bros.*, 780 F. Supp. 182 (1992), for popular artists to request and pay for authorization to

use samples. But since this practice is not regulated, costs can be so prohibitive in many cases that artists are discouraged from using samples at all. In many cases it is cheaper to hire the original musicians to make a new recording from which to sample from (McLeod, 2001, p. 94). Rights owners might even never provide authorization to sample, as is the case with rights to work by the Beatles (Bergman, 2005, p. 636). In a recent display of civil disobedience, Brian Burton (DJ Danger Mouse) created “The Grey Album”, combining rap lyrics from Jay Z’s “The Black Album”, and unauthorized samples from The Beatles’ “The White Album” (Bergman, 2005, p. 620). Such an undertaking would obviously have been impossible without the exchange of a large sum of money. At an initial printing of 3000 copies, this “promotional” album was an instant success, and positively reviewed by *Rolling Stone Magazine* among others (Bergman, 2005, p. 621). It was not long before the owners of the works by The Beatles threatened Burton if he did not cease and desist; but by that time the work’s popularity had spread throughout the Internet, where it has remained freely available since (Achenbach, 2004, p. 188).

It is no accident that the majority of litigation is directed toward economically successful artists. It is rare, but not impossible, that a modern academic composer finds such trouble. Though composer James Tenney received no order to cease and desist with his use of Elvis, avant-garde composer John Oswald ran into considerable trouble with his album “plunderphonics” in 1989 (Oswald, 2005a). This album contains remarkable compositions manually assembled from hundreds of snippets of recorded music ranging from Dolly Parton, The Beatles, and Metallica, to Beethoven, Stockhausen, and Ligeti. Most notorious was the album cover art: Michael Jackson’s head pasted on a naked, white woman’s body. This perhaps was the final straw, and so Jackson and CBS Broadcasting sued Oswald (Oswald, 2005a). As usual, this suit was settled out of court, and not in Oswald’s favour. Though Oswald gave credit in the program notes to every artist he “plundered”, and distributed the CD for free to libraries, radio, and press, complete with a “Not for sale” sticker, he was ordered to hand over the master recordings and destroy all remaining copies. Oswald continues to work in “plunderphonia” without much legal trouble since, he says, his music makes very little money (Oswald, 2005b).

The precedents presented above demonstrate the legal precariousness of creating works from copyright-protected material if all *clearly identifiable* samples of the originals are not cleared with the rights holders. As evinced by the cases of Negativland and Oswald, trouble can also arise when a work might be confused with, or gives a derogatory treatment of, another artist. By realizing that CSS is an unconventional practice of popular music sampling, the impact of IP and copyright law on CSS can finally be assessed.

4. CSS and the law

The statutes and precedents discussed above can be used to determine the defensibility of CSS and its output. There are two separate issues to address: first, the unauthorized incorporation of copyright-protected material into a corpus database; and second, the existence of such material in the synthesis performed by the algorithm. The first issue is a rather simple one. The second issue is more complex, and will utilize portions of CVM as test cases. Finally, the implications of these statutes and precedents for the continued development of CSS will be summarized.

Any CSS algorithm has at its disposal a collection of recorded sound data that has been analysed and is readily accessible in the corpus database. The creation of such a database is most conveniently done by “ripping” the contents of digital recordings onto a hard-drive. When done in a lossless fashion, i.e. not using lossy digital audio compression, *exact* copies are created, which, per 17 USC § 114(b) (2005), is an exclusive right of the copyright owner only. This strict interpretation is of course unrealistic since it omits completely justifiable actions, such as making backup copies of purchased music. But the purpose of a corpus database for CSS is unlike that of insuring one’s music purchase; it is essential for the CSS algorithm. Must an explorer of CSS then licence copyright-protected music before including it in a corpus database?

This can be addressed by considering an expanded form of Judge Leval’s transformative use test mentioned above, where the *function* of the secondary work, here the corpus database, is evaluated in relation to the function of the original. Copyright specialists Nimmer and Nimmer describe this functional test: “[if] the defendant’s work, although containing substantially similar material, performs a different function than that of the plaintiff’s, the defense of fair use can be invoked” (Nimmer & Nimmer, 1978, § 13.05[B], p. 194; Kudon, 2000, p. 606). In creating the corpus databases for use in CSS, the underlying data representing a sound recording may not change, but its function is transformed from one of entertainment to one of supplying statistical data for driving sound synthesis. As long as the corpus database is not distributed or sold, its incorporation of material protected by copyright is defensible.

The creation of corpus databases however is becoming more difficult with the continuing pervasion of digital rights management (DRM) schemes and other anti-piracy measures used to control digital media content. The Digital Millennium Copyright Act of 1998, among other amendments, adds chapter 12 “Copyright Protection and Management Systems” to Title 17 of US Code, prohibiting the circumvention of these controls, 17 USC § 1201(c) (2005). This means that acquiring sound data in a form useful for CSS, i.e. artifact-free, could require

software that illegally circumvents DRM technology. This still may not mean that any and all circumvention represents an offence. As iterated in *US v. Taxe*, 380 F. Supp. 1010, 1014 (1976), a principal purpose of modern music copyright law is to deter wholesale music pirating, and not to deter creative uses of technology.

Having considered the unauthorized incorporation of copyright-protected material in a corpus database to be fair use by the functional transformative use test, what now can be said about the output of CSS? The author's composition CVM, a work derived from numerous copyright-protected sound recordings, provides adequate test cases. For which variations can the defence of de minimis or fair use be argued?

CVM currently consists of 11 variations, each concatenatively springing forth from five interpretations of a passage by Mahler by five different conductors (Sturm, 2004, 2006). A few of these variations, being derived from personal and royalty-free samples, pose no legal quandary. Though each is derived from the statistics of a copyright-protected recording—the Mahler recording—any resemblance of a variation to the expression of the original is unlikely to rouse litigation. The interesting examples are afforded by the variations that utilize copyright-protected material: “Lix Tetrax”, with sound material from Jean-Pierre Rampal playing J.S. Bach’s “Partita” for solo flute; “Saxubus” with sound material from Anthony Braxton’s 1969 album “For Alto”, for solo alto saxophone; “Limbo” with sound material taken from three hours of music from “The Lawrence Welk Show”; and “Highway to Heaven, Stairway to Hell”, with sound material from Led Zeppelin’s “Stairway to Heaven”, and AC/DC’s “Highway to Hell”.

To ascertain whether a particular use is fair, the most important thing to show is how well that use supports the objectives of copyright. As discussed above, the courts have devised various tests to determine this. In order to find copyrights have been infringed, one must show that unauthorized copying did in fact occur; and that the amount taken was substantial enough to warrant legal action, i.e. not de minimis (Christian, 2004, p. 134). If a challenged use satisfies these requirements, then each factor of fair use must be looked at in order to determine the compatibility of the use with the goals of copyright.

It turns out that since the Sound Recording Act of 1971 federally protects only recordings fixed after 15 February 1972, 17 USC § 301(c) (2005), to sample any recording made before then requires only a license from the owner of the underlying work, if any is needed at all. In the case of the Braxton recording made in 1969 then, “Saxubus” could only be infringing on the rights of the underlying composition. Because “Lix Tetrax” uses a performance recorded in 1975, of a work by Bach that is in the public domain, it might only be infringing on the rights of the recording. (It might not be protected since the recording was made and published outside the USA.)

Both “Limbo” and “Highway to Heaven, Stairway to Hell” however, could be infringing the rights of the compositions, lyrics, and recordings.

The remaining requirement then is determining if the amount taken from the original works is substantial. As mentioned above, the courts have used the lay listener test to answer this question. Given two works in consideration, e.g. Bach’s “Partita” and “Lix Tetrax”, would a juror hear a substantial similarity between them?

In “Lix Tetrax”, nothing more than the flute’s timbre of Bach’s “Partita” remains, yet the new expression is surprisingly fluid and natural; the underlying composition has been completely transformed. In “Saxubus”, Braxton’s wild improvisations have been transformed into a steady rhythmic pedal point with pointillist references to his playing style and expressive range; it is quite different from Braxton’s album. It is moot whether Rampal or Braxton would recognize their playing in each variation, since they are not the lay listeners as applied in *Jarvis v. A & M Records*, 827 F. Supp. 282 (1993), *Newton v. Diamond*, 349 F.3d 591 (2003), and *US v. Taxe*, 380 F. Supp. 1010, 540 F.2d 961 (9th Cir. 1976). With these precedents and a comparative listening to these two variations and the original works, it is very likely that they are sufficiently transformative of and differentiable from the original compositions. What then can be said of the original sound recordings, protected by a different layer of copyright?

By the very nature of CSS, “Saxubus” and “Lix Tetrax” are composed entirely from the sounds fixed in the primary works; there is no sound in them that is “original”. The argument put forth in *Williams v. Broadus*, 2001 WL 984714 (S.D.N.Y.), that if the offending samples were removed the composition would remain unharmed, is not true here. If the offending samples were erased from “Saxubus” and “Lix Tetrax”, nothing would remain save for their structures.

According to *Bridgeport Music, Inc. v. Dimension Films*, 383 F.3d 390, 398 (6th Cir. 2004), any amount taken without authorization represents an infringement—a bright-line rule that is inconsistent with the purposes of copyright. Conversely, by *US v. Taxe*, 380 F. Supp. 1010, 540 F.2d 961 (9th Cir. 1976), as long as the transformations are substantial to the human ear, the uses can be considered fair. With each sample lasting less than 400 milliseconds in both “Lix Tetrax” and “Saxubus”, and taken from different locations in the original works, the transformation is quite considerable. This position is further strengthened when considering that expressions near the limits of human perception—on the order of hundreds of milliseconds (Roads, 2001, p. 21)—do not possess sufficient originality to warrant protection, which is a consequence of *Edison v. Lubin*, 122 F. 240 (3d Cir. 1903). Though “Saxubus” and “Lix Tetrax” entirely consist of sound material taken directly from copyright-protected works, the uses can be argued

de minimis because they do pass the lay listener test. The new works transcend the derivative of both the recordings and the underlying works, and are thus new expressions fully protectable throughout.

The results in “Limbo” and “Highway to Heaven, Stairway to Hell” however are different, precisely because a lay listener is able to recognize the originals in both works. Unlike in “Saxibus” and “Lix Tetrax”, the duration of source material used can be from hundreds of milliseconds to several seconds depending on whether the CSS algorithm found suitable matches (Sturm, 2004). Furthermore portions of results are looped and used as *ostinati*, thus increasing the chances for familiarity. In most cases the samples selected are short, but many are still distinctive, due in part to the popularity of the original works. The author made no attempt to control which samples were selected, leaving that to the statistics of Mahler and the matching process of CSS. Though these samples were not used in any way reminiscent of the originals, contrary to *Jarvis v. A & M Records*, 827 F.Supp. 282 (1993), because sounds in “Limbo” and “Highway to Heaven, Stairway to Hell” can readily be identified as originating from the original works, contrary to *Newton v. Diamond*, 349 F.3d 591 (2003), their use is not *de minimis*. It can thus only be considered whether or not the use is fair.

As presented above, fair use requires the consideration of four factors, 17 USC § 107 (2005). Most significant to the problem at hand are the first and fourth factors: character and purpose of use, and effect on the market, respectively. The author’s purpose for sampling two of the greatest rock hits in was not “to sell thousands upon thousands of records”, *Grand Upright v. Warner Bros.*, 780 F. Supp. 182, 185 (1992); nor to save time and money spent in the studio painstakingly reproducing sounds fixed in these two works. Neither was it to piggyback on the success of those artists. Rather it was to humourously juxtapose the two expressions by Led Zeppelin and AC/DC, with the eschatological significance of Mahler’s passage (the gates of Hell opening).

Since “Limbo” and “Highway to Heaven, Stairway to Hell” do not fit the definition of parody or satire put forth by *Campbell v. Acuff-Rose Music, Inc.*, 510 US 569, 114 S. Ct. 1164 (1994), a much stronger defence comes from demonstrating the lack of negative affect they have on the marketability of the primary works. This conclusion was found in *Campbell v. Acuff-Rose Music, Inc.*, 510 US 571, 114 S. Ct. 1167 (1994), *Newton v. Diamond*, 349 F.3d 591 (2003), as well as in *Jarvis v. A & M Records*, 827 F. Supp. 293 (1993), even though in the latter case other fair use factors were found in the negative.

Considering the hypothetical case of Burton’s “The Grey Album”, it is likely that the licence marketability of work by The Beatles has been negatively affected for creating derivative works since Burton’s work has become so popular (Bergman, 2005, p. 637). Other music

producers, aware of Burton’s work, could be less inclined to seek and pay for permission to use the same material. Though Oswald also sampled The Beatles without authorization, his work probably has no negative affect on the market for the originals since it is much less widespread and not in a popular and profit-driven music genre.

Being music of the “academic type”, CVM is quite unlikely to have any affect at all on the markets for the primary works. As long as there is no confusion of authorship, e.g. someone thinking “Highway to Heaven, Stairway to Hell” is a long anticipated collaboration between Led Zeppelin and AC/DC, as long as there is no defamation of character, e.g. asserting Sir Georg Solti conducts a band of gorillas, and as long as there is no significant income resulting from the work, CVM can rest easy from the examples afforded by Biz Markie, Negativland, and Oswald. It could even be safe to say that CVM can be released to the public, on the Internet, and on a CD for sale.

This is not to say though that any output of CSS represents fair use. If “Highway to Heaven, Stairway to Hell” became popular, authorization would have to be obtained for the use of the copyright-protected material. Of course one can attempt to take a safe path and licence all copyright-protected work used. But unlike written music, licencing is not mandatory for sound recordings in current US Code (Norek, 2004, p. 84). Owners can altogether refuse requests for permission, as was the case for Biz Markie (Vaidhyanathan, 2001, p. 142), and would certainly have been the case for Negativland, Burton, and perhaps Oswald.

All pedantry aside, as long as it remains in the academic sphere, CSS and its output can be considered fair use because they are aspects of research—an aim of copyright law in the first place. It is stated directly in US Code that “the fair use of a copyrighted work . . . for purposes such as . . . research, is not an infringement of copyright”, 17 USC § 107 (2005). Having to seek permission takes time and capital, and thus retards progress. While this is not a problem in music research, it has become a significant one in IP-laden industries such as pharmaceuticals (Coombe, 2001; McLeod, 2005).

As research then, since the advancement of CSS greatly benefits from large databases of sound, unrestricted access to all sound materials is necessary and defensible, and is encouraged by the fundamental purposes of copyright. Uncertainty arises only when the output begins to cross the wide boundary into identifiable expression, and moves from the ivory tower to the Top 40 hour.

5. Conclusion

“If sampling were performed solely by amateur musicians or computer hobbyists intending only to perform

their sampled recordings privately in their own homes, there would be no controversy” (Kohn & Kohn, 1996, p. 1289). What a sad, boring world this would then be! IP is big business, and the extent of its abuse throughout world markets have created an environment in which rights holders are fighting hard to control the use of their property. In the eyes of copyright law however, the bottom-line is adequately analysing the compatibility of a disputed use with the fundamental aims of copyright: the encouragement of learning and enriching of culture. If a use detracts from this tenet, it harms the very incentives for creating new work.

The application of these principles in the practice of law in the USA to music and sound recording copyrights has by and large been consistent. With only a few odd cases and inconsistencies, these precedents lend themselves to testing the legal waters of CSS and its output. Through the doctrines of *de minimis* and fair use, copyright-protected work may be used without fear of punishment in researching and developing CSS. The creation of rich databases from copyright-protected work is defensible since their compilation serves a completely different function than the originals. And when the output transforms this corpus material to such an extent that the test of the lay listener test is passed, the new work transcends being derivative and is entirely protectable as a new expression.

Above all else, as a fertile field of research, the most important requirement for advancing the creative applications of CSS is a diverse database of sound from which to quarry samples. For now, the world’s library of recorded sound is indeed freely available for enriching these sound repositories.

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