Copyright in music: a role for the principles of reverse engineering

James Griffin
Lecturer, University of Exeter

The rise of popular music in the twentieth century has raised questions about the appropriateness of the current system of copyright law. Copyright law is based around the notion of the individual ‘romantic’ author, an individual who creates with his own innate thoughts. Copyright law provides an exploitable property right to authors – a right, in rem, which may be exercised against the rest of the world. It is a right that may be sold and transferred, a right to which fiscal value may be placed. The property paradigm of copyright is one that is exclusionary. Popular music reveals that copyright works may be collaborative in nature, and this can bring into question whether an exclusionary property-based model is appropriate. Historically, copyright has not always been based around the property paradigm; some early cases highlighted the ‘merit’ of the potentially infringing work, and they focused on the manner of creation of that potentially infringing work. Some later cases have also emphasised the manner of creation of a copyright work. These are cases that concern what is termed ‘reverse engineering’ – a modern term that encapsulates how an earlier work is used in a later work. Paradigmatically, to focus on reverse engineering is to mark a move away from the property paradigm of copyright. This paper argues that to institute such a methodological approach would lead to a more accurate ontology and would thus lead to more efficient legal regulation.

INTRODUCTION

In May 2005, Lionel Sawkins¹ won his case against Hyperion Records.² Sawkins was a musicologist and he had prepared performing editions of works by baroque composer Lalande. Hyperion Records had used four of Sawkins’ performing editions when they made and sold sound recordings on compact disc. Mummery LJ, in the Court of Appeal,³ found that copyright subsisted in the performing editions and that Sawkins’ copyright had been infringed.

The case was met with controversy. For instance, Rahmatian⁴ argued that the interests of small recording studios such as Hyperion Records were not sufficiently taken into account. There were arguments that the approach of Mummery LJ was

1. For details see the website available at http://www.lionelsawkins.co.uk/Export2.htm.

© 2010 The Author. Legal Studies © 2010 The Society of Legal Scholars. Published by Blackwell Publishing, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA
expanding copyright in new and undesirable ways. Sawkins’ case is an excellent elucidation of how copyright law has become obsessed with constructing a property paradigm of the ‘work’. The method and manner by which the copyright work was created and distributed was overlooked in the desire to propertise and assess the fiscal value of a work.

Copyright, in revolving around the property paradigm, has adopted a methodological ontology which no longer bears sufficient resemblance to the underlying content. The rise of remixing and sampling, both quantitatively and qualitatively, has meant that the notion of intellectual works as property is no longer ontologically appropriate. The law could be reformed, to move away from the property paradigm and embrace a paradigm that fully considers the notion of remixing. This could be a system which fully explores the intricacies and details of re-use, and this paper argues that a nascent system of that type can be found in cases dealing with reverse engineering.

AN INTRODUCTION TO THE BASIC PRINCIPLES OF COPYRIGHT IN MUSIC

Copyright is defined as a ‘property right’ in s 1(1) of the Copyright, Designs and Patent Act (CDPA) 1988:

‘Copyright is a property right which subsists in accordance with this Part in the following descriptions of work –

(a) original literary, dramatic, musical or artistic works,
(b) sound recordings, films [or broadcasts] and
(c) the typographical arrangement of published editions.’

Copyright in relation to a piece of music may involve copyright over the musical work itself and, in addition to this, there can be copyright over the lyrics. There may also be a copyright over the sound recording. These works should be fixed at some stage and have sufficient originality (though a sound recording does not need to be original). A ‘musical work’ is a work ‘consisting of music, exclusive of any words or action intended to be sung, spoken or performed with the music’. It is not further defined, but following Sawkins, a broad definition may be supposed:

5. E Vulliamy ‘£1m legal bill rocks a musical institution’ The Guardian 23 December 2005, available at http://www.guardian.co.uk/uk/2005/dec/23/arts.artsnews. Note also the following taken from Hyperion Records website: ‘The collateral damage caused by this decision not only will affect the prosperity of the company but also the dozens of artists and groups, producers, engineers, composers, music publishers, and musical editors but most importantly the record-buying public whose access to rare and collectable repertoire served by Hyperion, and perhaps many of the other record labels, will be severely diminished’; from A Robinson ‘Hyperion Records Ltd v Dr Lionel Sawkins: it’s like that and that’s the way it is’ (2005) 16 Entertainment Law Review 191 at 191.
8. CDPA 1988, ss 1(1) and 3(2).
9. Ibid, s 3(1).
‘In principle, there is no reason for regarding the actual notes of music as the only matter covered by musical copyright, any more than, in the case of a dramatic work, only the words to be spoken by the actors are covered by dramatic copyright. Added stage directions may affect the performance of the play on the stage or on the screen and have an impact on the performance seen by the audience. Stage directions are as much part of a dramatic work as plot, character and dialogue.’

Mummery LJ, following a long line of authority, emphasised the labour, skill and effort of the author. He stated that performing indicators, tempo and performance practice indicators could all be capable of obtaining copyright protection, due to the low threshold of originality. The subsistence of copyright has served to carve up pieces of music into various component proprietary parts and, as Horn has identified, this has come to mean that some of the copyrights works are more valuable than others. For instance, musicians will prefer to gain certain copyrights in order to gain more royalties, as in the case of Hayes, where vocalist Aniff Akinola sought a 10% share over several copyrights in the musical works rather than confining his royalties to copyrights in the lyrics.

Once the copyrights over aspects of a piece of music have been identified and established, the copyright in question may take many forms. There are, for instance, rights over reproduction, distribution and adaptation. In relation to the reproduction right for a musical work, there has to be derivation from the original work and the taking of a substantial part. In relation to the latter part of the test, for music it has been held that the court should focus on ‘aural similarity’. It will be argued in detail immediately below that the tests utilised for infringement sideline the nature of the creative process involved in musical works and, again, emphasise proprietary control over copyright works. By parcelling up pieces of music into proprietary parcels, there is insufficient regard to the impact on future music creation.

In sum, the current approach of the law is to discourage content recipients and musical authors in re-using certain elements of copyright works. This is not principally due to a nuanced balancing exercise, but the proprietary notions that copyright has proposed. The paper will now investigate how that property paradigm has become established; how the development of music runs counter to that property paradigm in case-law; and, finally, how a new approach could be established which moves away from the property paradigm and more accurately reflects the process of making musical works.

10. Sawkins v Hyperion, above n 2, at 3295.
12. Sawkins v Hyperion, above n 2, at 3295.
16. CDPA 1988, s 16.
COPYRIGHT AS A PROPERTY RIGHT

Copyright came to be developed as a property right because of historical circumstance. Three hundred years ago, at the time of the Statute of Anne, it was common practice for authors to assign their copyrights to publishers, just as they would assign ownership of any other chattel. Concurrently, publishers would use the names of authors as a form of categorisation, to aid the public in deciding which types of works they would like to buy. A similar development occurred in relation to music, namely that those behind the distribution of music used the names of composers to make identification easier to achieve. Distributors then utilised proprietary notions to control dissemination and performance of works such as music.

Today, the consequence of this is clear. As Horn noted, the music industry often uses the term ‘work’ in relation to music, reflecting the wording of the CDPA 1988 that music is a copyright work. However, those who produce the music do not tend to use such a term – the reality is that music is comprised of a number of earlier pieces, and they tend to treat music as more fluid than a set object. The phrase ‘work’ denotes specific boundaries, boundaries which are not present as viewed from the vantage of the musician.

In addition, recording studios and right holders prefer clearance on the re-use of any of their own copyright works. Permitting re-use could reduce professional valuation of their proprietary interests. This is particularly important when drawing up contracts, when there needs to be the division of profits. The reality of the music industry today is that there are many bodies dependent on the division of profits: distributors, record labels, managers, radio stations, collecting societies and so forth.

The music industry itself sees ‘property’ as a critical tool in the way in which it runs its business. Without the property concept, it argues, how can it exploit music? However, there are many instances where the music industry has utilised the property concept to its considerable disadvantage. For instance, the insistence on focusing on individual musicians meant that the industry failed to foretell the coming of age of

19. Statute of Anne 1710, 8 Anne Ch 19, the long title of which is ‘An Act for the Encouragement of Learning, by vesting the Copies of Printed Books in the Authors or purchasers of such Copies, during the Times therein mentioned’ (the Statute of Anne).
20. B Kaplan An Unhurried View of Copyright (New York: Columbia University Press, 1967) pp 8–9: ‘I think it nearer the truth to say that publishers saw the tactical advantage of putting forward authors’ interests together with their own, and this tactic produced some effect on the tone of the statute’.
22. D Brackett ‘Music’ in Horner and Swiss, ibid, p 129.
24. CDPA 1988, s 1(1).
25. Horn, above n 13, p 14.
27. R Middleton ‘Work-in(g)-practice: configurations of the popular music intertext’ in Talbot, above n 13, p 77.

© 2010 The Author
Legal Studies © 2010 The Society of Legal Scholars
more collaborative rap music – even though it had a long and detailed history. Likewise, the music industry has been very slow to adapt to the development and rise of online music, particularly with regard to sampling and remixing.

If the law were to take a more ontologically correct stance, it would enable the music industry to exploit new forms of distribution rather than having to rely on ontologically unsound property paradigms. It is not that the music industry automatically dislikes adapting itself to new technology – it is because the ontological structure of the law is a property-based one, which is not so applicable for newer technologies or musical formats. Landes and Posner, in their attempts to establish the optimal level of copyright protection, have suggested that protection should not involve too many costs for re-users of copyright content, nor that protection should be so light so as to dissuade future investment. What was not identified, however, was how legal ontology related to their study.

THE ONTOLOGY

For law to hold the ‘correct’ ontology for copyright works (such as music) would increase the likelihood that the legal system would permit, and encourage, optimal levels of exploitation – regardless of technical change. This raises the issue of what the ‘correct’ ontology should be. A law that has a correct ontology would be one which responds without unexpected side effects, such as unexpected injustice or unintended consequences. The question of how to build up a correct ontology in relation to music has often led to debate as to how to classify the ways in which different types of music are created. Thus, Davies in _Musical Works and Performances_ divides music into five distinct types. The divisions, which he refers to as a ‘slice [of] the continuum’, separate out types of music based on ‘places where there is change in the criteria on which we base our understanding and evaluation of what is happening’. Likewise, Horn has devised nine categories by which a listener may classify music. However, such an ontological construction merely seeks to place proprietary labels over certain genres of works. A correct ontology of musical work would focus on how the music itself is created and the stages involved.

The main concern with copyright law is its ready acceptance of the notion of the romantic author. This has obscured how many copyright works are made, and the role that earlier works play in this. In relation to music, Straw makes the point that musical creation is often more devolved than many other types of copyright works –

30. Brackett, above n 22, p 137.
32. Ibid, at 332.
35. Ibid.
36. Ibid.
37. Horn, above n 13, p 18.
like cinema, he suggests, ‘the problem of isolating authorship within it is no more easily resolved’.\textsuperscript{40} Paintings and novels lend themselves more to the concept of the single, inventive romantic author than music does. They are not so overtly collaborative in nature.

Middleton implicitly supports Barthes’ work ‘The death of an author’,\textsuperscript{41} particularly in relation to synthesis and electro music.\textsuperscript{42} Straw suggests that practices such as sampling mark the end of authorship,\textsuperscript{43} in conjunction with comments by musician Brian Eno who has suggested that there is a need to shift focus away from the concept of a single ‘genius’ to a group ‘scenius’.\textsuperscript{44} He believes that individual collaborations are ‘minor and transitory’.\textsuperscript{45} Case-law is also littered with situations where one author seeks to apportion royalties, and cases such as \textit{Hadley}\textsuperscript{46} dealing with Spandau Ballet’s music merely serve to emphasise how complex the relationships between the various artists can be.\textsuperscript{47}

Whilst these views indicate that music is a highly collaborative endeavour, there is no clear answer as to how to build up an ontology that explicitly takes into account how music is created. However, the aforementioned analysis does suggest that the complex issue of collaboration needs to be assessed on a case-by-case basis. There would not be an automatic allocation of proprietary rights, but rather a continual assessment of how one work is utilised in a later work.

\section*{THE CONSEQUENCE OF AN INCORRECT ONTOLOGY}

The issue with the current copyright system is that it does not sufficiently take into account collaborative creative endeavour. Whilst copyright law does have rules that set out how to deal with collaborative works, the issue is that these rules are still based around proprietary notions. The cases reveal the difficulty in establishing proprietary boundaries of musical works.

The consequence of the emphasis of the law upon ownership and control over aspects of musical works reveals itself in the use of samples by musicians. For instance, it is generally believed that music should consist of short and not long samples.\textsuperscript{48} Certain types of copyright are fought for more strongly than others – ‘Because contributions to music and lyrics are rewarded with longest and strongest rights, with corresponding financial flows, the division prompts contests between contributors to the sound artefact who created those aspects’.\textsuperscript{49} The case of \textit{Williamson}\textsuperscript{50} also identifies an issue with the test for infringement of musical copyright. Once

\textsuperscript{40}. Straw, above n 21, p 1.
\textsuperscript{42}. Middleton, above n 27, p 63.
\textsuperscript{43}. Straw, above n 21, p 206.
\textsuperscript{44}. Ibid.
\textsuperscript{45}. Ibid.
\textsuperscript{46}. \textit{Hadley v Kemp} [1999] EMLR 589.
\textsuperscript{47}. R Arnold ‘Case comment: are performers authors?’ [1999] \textit{European Intellectual Property Review} 464.
\textsuperscript{48}. Eg ‘the prevalent assumption that sampling a 35 second saxophone solo would infringe copyright in a musical work of six minutes length’: Bently, above n 26, at 192.
\textsuperscript{49}. Ibid, at 195.
\textsuperscript{50}. \textit{Williamson v Pearson} [1987] FSR 97.
the taking of a substantial part has been established, the issue of similarity is assessed in relation to the two final works. The test is what is heard by the ear, and not a note-by-note comparison.51 ‘As Mr Pumfrey said, you look at it as a whole and ask not how the effect is produced, but what is the effect’.52 Whist this helps to identify particular themes, it does not help to detail the manner in which the music was created. For instance, it might be possible for a later piece of music to be substantially based on an earlier piece, yet not sound similar to the ear. This is particularly relevant in an era where pieces of music can be easily digitally edited and adapted.

The failure to acknowledge sufficiently the manner in which musical works are created has led to accusations that the law reinforces old methods of distribution, rather than encouraging new methods. This has led to widespread breaches of copyright law in the field of p2p (peer-to-peer) networking. There has been an increasing trend for content recipients to take copyrighted music and to edit and remix it, and then to upload these edited versions via p2p networks. As a result of this, those services that permit the uploading of such music to others have been found liable under the rules relating to secondary liability, or a breach of the right of authorisation. For instance, in the United States, services such as Napster53 have been found liable of secondary liability, and Grokster54 was found liable for inducing copyright infringement. Although there are no UK cases on the issue, in Australia, Sharman Networks were found liable for infringing the right of authorisation.55 In addition, those who use these services to download infringing files can be identified through court orders56 and others have been sued.57 Nonetheless, online infringement continues in large numbers – and of musical copyright it has been said that ‘Youth culture has forced the hand of tradition, it’s forced aristocracy to retreat. Aristocracy says. “You can’t do that with these machines”, but youth culture finds a loophole. There are no rules! The barbarians are taking over’.58

Putting to one side for a moment the issue of law enforcement, such a statement is the consequence of a mismatched ontology. The subsistence of, and infringement of, musical copyrights obscures the manner of creation with proprietary conceptualisations. It is not the case, per Middleton, that there might need to be changes in society at large to permit a ‘broader re-evaluation of “individualism” and “ownership” ’.59 It is simply that the law needs to adapt to an ontologically correct state.

Part of the problem stems from the narrow judicial focus on the argument of the parties and not on the wider purposes of copyright and narrow discussion of legal rules without considering the broader issues which such discussion raises. Cases which have looked at joint authorship are particularly instructive. Discussion that concerns

51. Ibid, at 108.
52. Ibid, at 111.
55. Universal Music Australia Pty Ltd v Sharman License Holdings Ltd [2005] FCA 1242.
57. See, inter alia, the website available at http://www.theregister.co.uk/2010/01/05/tenenbaum_files_for_retrial/.
59. Ibid, p 86.
originality in joint authorship, for instance, revolves around the degree of originality required. Godfrey v Lees\(^6\) indicates that less originality is required for establishing joint authorship than there is for copyright subsistence. Should this difference exist? The property paradigm is not ontologically correct. Authorship, notwithstanding the model of romantic authorship, has always involved some re-use of what has gone before. The boundary of originality has always remained low rather than being abolished, because, to do otherwise, would accept the invalidity of the romantic model of authorship.

A similar level of artificiality lies around those cases that look at the relevant contributions of the various parties involved. At first glance, the discussion in these cases appears to be detailing precisely the steps involved in creating a particular piece of music. In Hayes\(^6\) for instance, there is a detailed discussion going through the initial stages of creation, namely how one artist contributed some of the lyrics for some versions of the song and not others; in Bamgboye\(^6\) the manner in which the BlueBells music was influenced by the violin is discussed in considerable detail. However, whilst that discussion has merit, as indicated earlier, artists prefer to try to establish control over certain copyrights in order to protect their revenue flow. This skews the discussion somewhat\(^6\).

Copyright infringement cases, such as Sawkins\(^6\), have extremely limited detail in relation to how earlier works are used in later works. Once copyright subsistence is established over a particular ‘work’, the question is whether there has been taking of a substantial part. The next test is then to ask whether there is substantial similarity\(^6\). Whether or not this paradigmatic partitioning of works in parcels of property reflects the creative process is overlooked – and this is in stark contrast to those cases of joint authorship where the creative process is at least considered.

It has been suggested by Bently that the issue of authors competing over different types of copyrights could be overcome by the creation of another proprietary copyright over sounds\(^6\). However, this would not resolve the wider issue that the law, in creating a property paradigm, has been led down an avenue which no longer accurately maps onto the manner in which creative music (or works in general) are produced.

This naturally raises the question of what an appropriate ontology would be, and then the question of how this ontology would be applied in practice. It will involve a move away from property conceptions and require the development of a system which emphasises the creative processes. The move need not be so radical. It merely requires the courts to consider in more depth the creative processes involved in a work, and a manner through which creativity can be evaluated and valued.

THE NEW APPROACH

The Statute of Anne embodied the notion of the romantic author, an individual who created works in isolation without recourse to earlier works. Some musicologists have

\(^{61}\) Hayes v Phonogram, above n 14.
\(^{62}\) Bamgboye v Reed [2004] EMLR 5.
\(^{63}\) Bently, above n 26, at 195.
\(^{64}\) Sawkins v Hyperion, above n 2.
\(^{65}\) Designers Guild v Williams, above n 17.
\(^{66}\) Bently, above n 26.
suggested that this is consistent with the notion of classical music, where a composer would be creating his works as a single genius. By contrast, ‘copyright law doesn’t mesh with the practice of popular music’. It has been suggested that modern popular music is more of a communal work, which is less reliant on the contribution of particular individuals. To quote Straw, ‘...we might consider Brian Eno’s claim that creativity now operates at the macro-level of whole genres, not at the micro-levels of individual artists. In place of “genius”, Eno awkwardly suggests, we must speak of “scenius”’. If this view is accepted, then it follows that, for the law to be correctly ontologically founded, then there should be greater consideration of how earlier works are re-used. However, the notion of the romantic author developed as a device to identify authors, and to make those authors’ works more valued as an asset. To accept that romantic authorship is of less relevance, as in popular music, endangers the use of the concept of authorship and copyright to enhance the value of assets. The property paradigm of copyright, consequently, is less likely to be a paradigm that will encourage deeper consideration of the steps involved in the making of music.

The bluntness of a property-based notion of copyright is demonstrated in the approach of the recording industry to remixes. For instance, rather than seeking to encourage the re-use of their works, they would prefer to utilise copyright law to either restrict re-use or increase revenue income on specific samples. A system of copyright which moves away from the property paradigm could be one which would lead to more emphasis on the origin and manner of making a work or piece of music.

The development of copyright as a propertised right was not a given. One historical branch of copyright cases which dealt with abridgements and translations emphasised the ‘merit’ of a potentially infringing work. In *Gyles v Wilcox*, Lord Chancellor Hardwicke, having briefly referred to the stated aims of the Statute of Anne, stated that the ‘...Act is not to be construed strictly, but according to the Intention of the Legislature: However, the intention must be formed from the words of the Statute’. What this resulted in was a specific shift of focus – the question became ‘Whether the second Book has been the same Book with the former?’, though, in this case, it boiled down to a specific question of whether the abridgement was ‘a Work of Judgment’.

There were also judicial attacks on the use of theoretical property principles being applied to intellectual works, these criticisms being led by Willes J in *Millar v Taylor*:

> ‘Metaphysical reasoning is too subtile; and arguments from the supposed modes of acquiring the property of acorns, or a vacant piece of ground in an imaginary state of nature, are too remote. Besides, the comparison does not hold between things which have a physical existence, and incorporeal rights.’

---

68. Straw, above n 21, p 206.
69. Ibid.
70. Lessig, above n 29, p 285.
71. *Gyles v Wilcox* Barn C 368 (1741).
72. Ibid, at 368.
73. Ibid, at 369.
74. Ibid.
76. Ibid, at 218.
However, the system that ultimately prevailed was the one based around, and which encouraged, a property-based way of thinking. The ‘merit’ approach had become moribund by the Copyright Act 1911. Nonetheless, in the 1990s, a defence of reverse engineering for digital works developed, where, once again, the property paradigm was dispatched in favour of a system espousing the details of how earlier works are re-used in later works.

A system that develops those principles of re-use, and moulds them into a legal system which shifts away from the property paradigm, would embrace a more ontologically accurate understanding of how works are made and created. To do so would lead to a system of regulation that embodies the changes made possible by technology, for the technology is relevant principally in relation to the way in which it is utilised in re-use.

RESTRICTING THE PROPERTY PARADIGM

The development of the property paradigm of copyright has been encouraged through the notion of the romantic, individualist author. This would suggest that a starting point for a restricted system would be to focus upon how an author (or composer) utilises their surroundings, and possibly earlier works (or musical pieces) to make ‘new’ works.

The works of Davies, Straw and Middleton et al\(^77\) all refer to the fact that earlier musical works play a role in the creation of later musical works. Nonetheless, there is little clarification as to the mechanisms by which this is achieved. One would also expect works that consider the wider notion of ‘creativity’ to make some reference to the mechanisms of how earlier works are influential. However, they focus on the use of knowledge after it is obtained.\(^78\) One exception is the work of Csikszentmihalyi,\(^79\) but even his work does not detail the actual process of how information in one work is abstracted and then re-used.

An approach which does detail how existing knowledge and works are re-used can be found through study of the historical judgments which favour focusing on the merit of the potentially infringing work.\(^80\) It can also be found by considering the cases that concern digital reverse engineering. Both approaches make reference to how an earlier work may be re-used as part of the process in creating a subsequent work. Both approaches eschew property paradigm thinking.

The approach of the earlier cases can be seen to mirror closely some of the work of philosopher John Locke. This is particularly true of Lord Camden’s judgment in Donaldson v Beckett,\(^81\) which, although not citing Locke as his fellow judges do in

\(^77\) Stras, above n 21; Middleton, above n 27, and Davies, above n 34.
\(^79\) Csikszentmihalyi, above n 78.
\(^80\) See the previous section.
relation to Locke’s Second Treatise, closely mirrors Locke’s work in the Essay on Human Understanding. Locke argued ideas arise from the combination of existing thoughts. These thoughts arise from the observation of events. A thought can be created that is greater than the combination of its parts.

Locke details the process by which individuals may perceive and understand the operation of things around them. Locke gives an example concerning gold. He states that we know that fire can melt gold, and, likewise, from this we know that gold may be melted. We thus learn from our surroundings by observation, and we then apply what we learn when we perform an act in the future. Locke develops this further by reference to ‘passive’ and ‘active’ powers, ‘passive’ powers being those such as observation and listening, and ‘active’ powers being the re-use of the information gleaned. Locke provides an example of billiards, where if a ball is hit with a cue, an ‘active’ power is at work moving the ball. The observer may, in turn, learn how to carry out that ‘active’ power. To apply this to music, someone listening to it may ‘passively’ listen to the music, but then ‘actively’ re-use what has been learnt in either making a new piece of music, or in reproducing that music using the knowledge gained. That knowledge which is reproduced may contain copyright elements. An ‘active’ power may thus result in an infringement of copyright. However, Locke’s notion of powers is only intended as a description of how objects relate to one another – Locke is not advocating that all ‘active’ powers be legally possible or desirable.

Lockean conceptions of knowledge are essentially representing that which is known today as reverse engineering – ‘starting with a known product and working backward to divine the process which aided its development or manufacture’. In the context of modern day copyright, reverse engineering is a term exclusively used in relation to digital technology. However, reverse engineering is not a new concept. Reverse engineering is a process that individuals use in everyday thought. When seeking solutions to problems, individuals will ‘deconstruct’ them, in order to construct an appropriate solution. There are a number of examples. For instance, a medical doctor will research how a particular medicine works before administering it to a patient. The same is true of mechanics solving problems with cars, and chefs assessing what a recipe might be for a type of food. ‘What it means, broadly

84. Ibid, Book IV, ch I at §8.
85. Ibid, Book II, ch XXI, at §1.
86. Ibid.
87. Ibid, at §2.
89. Ibid, at §4.
90. Ibid, at §73.
91. Kewanee Oil Co v Bicron Corp 416 US 470 (1974) at 476, and EJ Chikofsky and JH Cross II ‘Reverse engineering and design recovery: a taxonomy in IEEE software’ (1990) 7(1) IEEE Software 13 at 15 who state that reverse engineering is ‘... the process of analyzing a subject system to identify the system’s components and their interrelationships and create representations of the system in another form or at a higher level of abstraction’.
speaking, is the process of extracting know-how or knowledge from a human made artefact. In the context of music, it has been described as part of the learning process:

‘it’s my role to model how to learn and practice each piece of music. Just like working through a reverse engineering problem, my son and I first break each piece down into its individual phrases. We then experiment with different strategies for learning each phrase, often further breaking a phrase down into smaller parts. We finally “solve” a piece by slowly putting its parts and phrases back together.’

As a result of this, it is suggested that any reformed copyright system that accepts the notion of re-use and which moves away from the property paradigm should take into account how creators such as musicians (a) understand earlier works and (b) re-use the knowledge obtained.

DIGITAL REVERSE ENGINEERING

Reverse engineering has developed as a ‘hot topic’ in the digital sphere because of the additional information that a digital copyright work, such as a digital recording of music, may hold. In relation to music, digital reverse engineering can ‘help to quickly identify, select and isolate interesting features in a mix, such as individual notes, instruments and voice’. The difference between reverse engineering a non-digital work and a digital work is apparent when considering musical works. For example, if, in the non-digital context, a listener wishes to ‘reverse engineer’ a piece of music, the listener can study the piece closely and then, perhaps, imitate it or make a transcription of it. Although a listener may learn a lot from this, it does not reveal the underlying processes used. ‘Hidden’ information, such as the specific types of instruments used, can only be guessed at through listening to the music.

In contrast, the reverse engineering of digital music may reveal ‘hidden’ information. This will depend on the type of file used to save the music. If it is merely an MP3 recording, there is only the final product, as with a standard analogue recording. However, if it is music saved in a rich computer format, then there could be a lot of information available. Above and beyond the information gleaned from merely listening to the music, it may be possible to load the music into the original program that created it, or in which it was composed. This will reveal precise information as to the instruments used, tempo and so on. If it is not possible to load the music into a program, then a reverse engineer could look at the code that makes up the music. By looking at the hex decimal code, it may be possible to identify the program used to create the work, and it could reveal what sort of plug-ins might be running. To the skilled user, it might also reveal how these plug-ins operate. Reverse engineering reveals most information when the music is

94. Samuelson and Scotchmer, above n 92.
created within software engines, because the skilled user can identify any additional code which has been used for specific effects.

REVERSE ENGINEERING PRINCIPLES IN COPYRIGHT CASE-LAW

The failure of UK courts to consider adequately the process of reverse engineering is clear in cases dealing with copyright infringement. One of the key cases is Sawkins, particularly in regard to the reasoning employed by Mummery LJ. As was noted at the start of the paper, in relation to copyright infringement in music he states that, 'The test of substantial reproduction is not a note-by-note textual comparison of the scores. It involves listening to and comparing the sounds of the copyright work and of the infringing work.'

Why should similarity of sound play a role (and visual similarity if appropriate)? A work that sounds dissimilar could still have made as much use of an earlier work — and the flaw of this can be seen in earlier cases such as Hawkes and Son, where an amount taken may be so small that it may be impossible to recognise the earlier work.

There were particular complaints addressed against some further dicta of Mummery LJ, for, in a subsequent paragraph, he argued that:

'It is wrong in principle to single out the notes as uniquely significant for copyright purposes and to proceed to deny copyright to the other elements that make some contribution to the sound of the music when performed, such as performing indications, tempo and performance practice indicators, if they are the product of a person’s effort, skill and time, bearing in mind, of course, the “relatively modest” level of the threshold for a work to qualify for protection.'

By permitting copyright over elements such as performing indicators and tempo, it has been suggested that copyright protection has extended to a level that is not taking into account the consequences upon future musical works. This has been a criticism particularly aimed at popular music, especially in relation to sampling. This contrasts strongly with those cases which are not focusing on infringement but on issues of joint authorship. In those cases, there is much debate as to the processes used in the creation of a piece of, say, music. However, in relation to infringement cases, the discussion is much less developed. In Sawkins, there is discussion of how Sawkins took the original pieces by Lalande and mixed in his own labour, skill and effort, but the argument is more focused on establishing copyright in the plaintiff’s work rather than in the wider processes of creation. Furthermore, somewhat critically, the issue of subsistence is being decided in relation to the plaintiff’s work and not that of the defendants.

Notwithstanding this lack of consideration, there are various principles through which courts may permit certain non-infringing acts. However, these do not sufficiently consider how and why authors and musicians may re-use earlier works.

98. For example, the Quake 3 engine called idTech3; see the website available at http://www.moddb.com/engines/id-tech-3.
99. Sawkins v Hyperion, above n 2, at 3295.
101. Hawkes & Son (London) Ltd v Paramount Film Service Ltd [1934] Ch 593.
102. Sawkins v Hyperion, above n 2, at 3295.
103. See above n 4.
Insufficient originality in the original work remains a concept which focuses on the plaintiff’s and not the defendant’s work. The same is true of the concept of the non-protection of ideas – focus is not on how these are re-used, but on what has been taken from the plaintiff’s work. Independent creation, for instance, will not merit a finding of infringement, but this is essentially irrelevant where there has been re-use.

In order to ensure that courts consider how creative re-use may be being affected in any given copyright dispute, every court should be required to ask itself two main questions:
1. What reverse engineering has taken place?
2. Will it be impeded by the decision?

However, the degree to which reverse engineering should be allowed has not yet been discussed. If there were no limits, it would leave the issue of infringement moot. Consequently, we will now proceed to consider how far the law has permitted reverse engineering and what its limits are. Discussion of reverse engineering in the UK and USA is limited to the digital environment, but we will draw out principles which may be considered within the context of analogue works.

THE LAW ON DIGITAL REVERSE ENGINEERING – THE UK APPROACH

The UK law concerning digital reverse engineering encourages some consideration of the processes involved in making a copyright work, such as that involved in writing a piece of music. However, the focus of the law is not on works such as music per se – it is instead on decompilation, principally of computer software. Decompilation describes the process whereby code of low level abstraction is turned into a higher level of abstraction, in order to make it readable for humans. Decompilation is not an infringement of UK copyright under s 50B of the CDPA 1988 if:

‘(2) (a) it is necessary to decompile the program to obtain the information necessary to create an independent program which can be operated with the program decompiled, or with another program (the “permitted objective”), and

(b) the information obtained is not used for any purpose other than the permitted objective.’

The decompilation provision, s 50B, is relatively broad in that it permits decompilation for the purposes of interoperability with another computer program other than that which is decompiled. Thus, it would be possible to decompile a file format for use

104. Davies et al, above n 7, at 3–128.
105. Ibid, at 2–06.
107. CDPA 1988, s 50B. The section is implementing Directive 91/250/EC on the Legal Protection of Computer Software, OJ L122/42. This section should be read in conjunction with s 50BA. That section permits certain acts for the observation, study and testing of computer programs: ‘(1) It is not an infringement of copyright for a lawful user of a copy of a computer program to observe, study or test the functioning of the program in order to determine the ideas and principles which underlie any element of the program if he does so while performing any of the acts of loading, displaying, running, transmitting or storing the program which he is entitled to do’.

© 2010 The Author
Legal Studies © 2010 The Society of Legal Scholars
in another program, or to decompile one program in order to obtain interoperability with another. In opening up a program in this manner, a re-user can more easily understand how the work operates. This is consistent with encouraging certain re-uses, because content recipients will be able to obtain more access to content. It thus has some general applicability in terms of musical copyright, although this is clearly somewhat abstract. What this demonstrates more is that, for the reverse engineering approach to succeed in relation to music, it must have more general principles rather than such specific rules. For this reason, we now turn to US law.

US REVERSE ENGINEERING CASE LAW UNDER §107

US law has developed around the general fair use provision in the US Code\(^{108}\) and the more recent equivalent provision under the Digital Millennium Copyright Act (DMCA).\(^{109}\) The principles that have developed under US law are of more direct relevance in the field of musical copyright. We will begin by assessing case-law based around the US Code. In the Ninth Circuit case of *Sega v Accolade*,\(^ {110}\) Accolade had reproduced elements of Sega’s code in order that their computer games could be played on the Sega ‘Genesis’ games console. Near the start of the judgment, Circuit Judge Reinhardt wrote that:

‘Accolade used a two-step process to render its video games compatible with the Genesis console. First, it “reverse engineered” Sega’s video game programs in order to discover the requirements for compatibility with the Genesis console. As part of the reverse engineering process, Accolade transformed the machine-readable object code contained in commercially available copies of Sega’s game cartridges into human-readable source code using a process called “disassembly” or “decompilation”.’\(^ {111}\)

*Lexmark v Static Control*\(^ {112}\) and *Atari v Nintendo*\(^ {113}\) follow a similar route – of assessing the notion of reverse engineering toward the start of the judgment,\(^ {114}\) and then the reason for performing the reverse engineering. They consider how the reverse engineering was achieved and what steps were involved, and then how the knowledge gained was used to create a subsequent work.

The manner here in which the court focuses on how earlier works are re-used in later works has clear applicability to the re-use of musical works. As noted earlier in the paper, in many copyright infringement cases concerning music there has been limited attention paid to the creative processes involved. Actions for copyright infringement focus on the final musical *products* of reverse engineering, whereas cases of digital reverse engineering are looking at the creative *process*.

---

\(^{108}\) 17 USC §107.


\(^{110}\) *Sega v Accolade* 977 F.2d 1510 (9th Circuit, 1992).

\(^{111}\) Ibid, at 1514.

\(^{112}\) *Lexmark v Static Control* 387 F.3d 522 (6th Circuit, 2004).

\(^{113}\) *Atari Games Corp v Nintendo of America Inc* 975 F.2d 832 (Federal Circuit, 1992).

\(^{114}\) *Lexmark v Static Control*, above n 112, at 529; *Atari v Nintendo*, ibid, at 836.

© 2010 The Author

Legal Studies © 2010 The Society of Legal Scholars
THE US TEST OF ‘NECESSITY’

When individuals do manage to reverse engineer a work such as a piece of music, they have to be extremely careful to re-use only the knowledge necessary. In *Nintendo v Atari*, Judge Reader of the US Court of Appeals, Second Circuit, wrote that, in addition, the grounds of breaching Copyright Office rules, an action by Nintendo against Atari was possible because:

‘Fair use did not give Atari more than the right to understand the 10 NES program and to distinguish the protected from the unprotected elements of the 10 NES program. Any copying beyond that necessary to understand the 10 NES program was an infringement.’

According to Judge Reader, the test of necessity in *Nintendo* was adapted from *Computer Associates v Altai* (another Second Circuit case) where the court was to filter out as unprotectable the ideas, unoriginal expression, expression incident to the idea and expression already in the public domain. ‘Necessity’ is a potentially narrow test, limiting the scope of any reverse engineering – thus, an individual reverse engineering a protected (ie encrypted) piece of music should only do so as far as necessary to gain access to unprotected elements. However, Circuit Judge Reinhardt in *Sega v Accolade* maintained a more restrictive approach towards reverse engineering, by referring to the 1879 case of *Baker v Selden*. Circuit Judge Reinhardt cited a part of *Baker* which considered the reproduction of elements of a housekeeping text. Justice Bradley had stated that:

‘Where 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; not given for the purpose of publication in other works explanatory of the art, but for the purpose of practical application.’

By referring to *Baker* in this way, Circuit Judge Reinhardt highlighted that the ‘necessity’ test should be treated as meaning ‘necessary incidents to the art’. In the main text of his judgment he went further:

‘The unprotected aspects of most functional works are readily accessible to the human eye. The systems described in accounting textbooks or the basic structural concepts embodied in architectural plans, to give two examples, can be easily copied without also copying any of the protected, expressive aspects of original works. Computer programs, however, are typically distributed for public use in object code form... [which ordinarily cannot be read by humans].”

---

115. *Atari v Nintendo*, ibid, at 844.
116. Note that in the UK CDPA 1988, s 50B uses the word ‘necessary’, but there is no case-law on its interpretation.
121. Ibid, at 103, cited by *Sega v Accolade*, above n 110, at 1524 but in reference to *Baker v Selden* at 104 (103 introduces the argument at 104).
122. *Sega v Accolade*, ibid, at 1524.
123. Ibid, at 1525.
The implication from this is that digital works should be capable of being reverse engineered up to the level of analogue works. However, digital reverse engineering may go further than this. Code may contain more information, for instance, as to how a piece of music was constructed, or particular intimate details, and these may not be copyrightable. Consequently, a test is suggested that should require the courts to consider whether reverse engineering is being impeded and then whether it is being impeded to an undesirable degree. The first two parts of this test were highlighted earlier:

1. What reverse engineering has taken place?
2. Will it be impeded by the decision?

However, an additional third part would ensure that these provisions are kept within some discretionary limits:

3. Has reverse engineering been permitted so far as is necessary for the re-use in relation to non-copyright elements?

By having a test that should be followed by the courts in any case of copyright infringement, it is hoped that sufficient regard will be given to the factors that influence the creative re-use of copyright content such as music. Such a test is not without possible issues, most notably that certain re-uses may become favoured.

DOES REVERSE ENGINEERING FAVOUR CERTAIN RE-USERS OF COPYRIGHTED MUSIC?

It has been suggested that reverse engineering provides a sound basis upon which an understanding of the re-use of copyright works such as music could be based. This basis may then be used for reform of the law when considering how right holders could be compensated for the re-use of their works. Reverse engineering laws avoid the shortcomings of many aspects of the property paradigm. They help to encourage the courts to focus upon the creative processes involved in making works, rather than to focus too heavily upon existing financial interests of right holders.

The growth in digital technology has meant that there is increasingly the possibility to reverse engineer digital music. However, dominant right holders, because of their resources, can develop digital rights management (DRM) mechanisms at a sufficient pace to make circumstances difficult. For instance, Microsoft invested considerable money into the DRM mechanisms for Windows Media Player (which can concern musical works) and used various obfuscation techniques to disguise how it worked. As noted by the hacker ‘Beale Screamer’ who partly reverse engineered the system in 2001, these were complex.124 At present, there are still (!) no programs available that can fully imitate that Media Player DRM system.125

The application of reverse engineering is not without its issues. The current rules of reverse engineering favour those who have the resources (or skills) to reverse

---

125. Ibid. The closest nearest success is detailed at http://www.mydigitallife.info/2006/09/09/crack-remove-and-disable-windows-media-player-drm-license-acquisition-and-music-copy-protection-with-fairuse4wm/ but this only works on content that is already licensed.
engineer DRM mechanisms. The system places at an advantage those who have skills related to the breaking of mechanisms designed to defeat reverse engineering, rather than those whose skills may be concerned with other creative re-uses of copyright music. Those who cannot circumvent DRM mechanisms are at a disadvantage. This means that more technical uses are favoured. An additional issue is that the legal conception of reverse engineering tends to favour those coders who have the resources (or skills) to develop more complicated mechanisms. It was noted earlier, for instance, that Microsoft has only had its DRM in Windows Media Player partially hacked.

To deal with these issues, the proposed test of necessity, when considered by a court, should be broken down into two component stages. The first is the stage at which the DRM mechanism is circumvented. The second stage is the actual analysis and re-use of content. By way of example, a reverse engineer of a computer program needs skills to be able to access compiled source code. The reverse engineer can then make this code human readable, which will involve de-compilation of the object code. Once this is done, different skills can be employed to understand that human readable code and this may be done by other individuals. Any application of the test of necessity therefore needs to bear in mind that access to aspects of musical works may be dependent on circumventing the DRM mechanism, which may be difficult to break.

RECENT US DMCA ACCESS ISSUES

Reverse engineering of music may arise wherever an individual is listening to music. However, in the digital context, in order to gain access to hidden digital information, it may be necessary to break an access mechanism. When access is granted to a work it is now invariably protected by a licence and a DRM mechanism.

The DMCA has limited the applicability of the reverse engineering defence when a DRM mechanism is involved. The issue is important in relation to music because music is often protected by DRM mechanisms. Reverse engineering is then governed by §1201(f):

'(f) REVERSE ENGINEERING – (1) Notwithstanding the provisions of subsection (a)(1)(A), a person who has lawfully obtained the right to use a copy of a computer program may circumvent a technological measure that effectively controls access to a particular portion of that program for the sole purpose of identifying and analyzing those elements of the program that are necessary to achieve interoperability of an independently created computer program with other programs, and that have not previously been readily available to the person engaging in the circumvention, to the extent any such acts of identification and analysis do not constitute infringement under this title.'


127. Additional parts are: '(3) The information acquired through the acts permitted under paragraph (1), and the means permitted under paragraph (2), may be made available to others if the person referred to in paragraph (1) or (2), as the case may be, provides such information or means solely for the purpose of enabling interoperability of an independently created computer program with other programs, and to the extent that doing so does not constitute infringement under this title or violate applicable law other than this section. (4) For purposes of this subsection, the term “interoperability” means the ability of computer programs to
The importance of §1201(f) is that it permits only program-to-program interoperability, which is much narrower than that of the pre-DMCA case-law just discussed, and it therefore renders the applicability of reverse engineering to music somewhat moot. It would limit the applicability of the proposed ‘necessity’ test. Nonetheless, the scope of §1201(f) is somewhat complicated by §1201(c)(1) which states:

‘(c) OTHER RIGHTS, ETC., NOT AFFECTED – (1) Nothing in this section shall affect rights, remedies, limitations, or defenses to copyright infringement, including fair use, under this title.’

However, it has to be questioned what the point of §1201(c)(1) would be if §1201(f) were strictly followed, for it would render §1201(c)(1) of little use. Subsequent case-law has indeed placed emphasis on §1201(c)(1). The Sixth Circuit of Appeals in *Lexmark v Static Control* stated that the defence would:

‘Apply only when traditional copyright infringement does not occur and only when the challenged actions (in the case of the third provision) would not violate other “applicable law[s]”’.

In other words, §1201(f) applies primarily when there is a breach of access controls under the DMCA. The Sixth Circuit Court of Appeals judgment suggests that if an action for copyright infringement is alleged, then the pre-DMCA case-law would apply. However, the importance of this is limited because a right holder simply need not attack on grounds of infringement of, say, a musical copyright, but on the ground that an access control was broken. The stricter DMCA approach would then apply. This is an undesirable position. It means that a party bringing a case can restrict the situations in which reverse engineering will apply. It is suggested that the DMCA provision should not apply to any copyright works such as musical works protected by DRM.

**CONCLUDING COMMENTS**

The current legal system of digital reverse engineering provides many advantages, notably in providing a structure through which courts could consider the re-use of existing copyright works, such as music, free from the property paradigm. However, there is the risk that the DMCA could curtail such an approach, particularly as many musical works are protected by DRM. Any future reforms need to expand considerably the scope of the analysis of pre-DMCA reverse engineering case-law.

The application of reverse engineering principles to all instances of re-use of copyright music would help at a number of levels. It would ensure that courts would consider the impact of their judgments upon re-use, and mark a move away from the heavy emphasis on the proprietary interests of existing right holders. In implementing the system, there are a number of questions that courts should be required to ask in order to resolve any copyright disputes:

1. What reverse engineering has taken place?
2. Will it be impeded by the decision?

exchange information, and of such programs mutually to use the information which has been exchanged’.

3. Has reverse engineering been permitted so far as is necessary for the re-use in relation to non-copyright elements?

Parts (1) and (2) are designed only to raise the issues involved, but in relation to (3), the court should not impede reverse engineering that is ‘necessary for a creative re-use’. The proposed system will work in both the analogue and digital context. For example, if there is a case of infringement of analogue music (as in Sawkins), the test will work as follows:

1. What reverse engineering has taken place when the defendant altered the existing music?
2. Is the judgment of the court likely to impede this in the present case? This could involve consideration of the techniques used in producing music, in terms of how content is re-used and also how it is accessed, eg to what degree are p2p networks required as a part of this process?
3. If there is sufficient evidence that the judgment would impede certain re-uses of music (or other works), then these should be permitted so far as necessary for a re-use of non-copyright elements.

In the context of a digital copyright case, for instance in relation to DVDs (such as Reimerdes) rather than music per se, the principles would operate as follows:

1. What reverse engineering was involved in breaking the DRM mechanism?
2. Will that be impeded in the present case?
3. What re-uses might be impeded? In Reimerdes, musical remixes could have been considered in terms of the level of copyright protection provided to the samples.

The proposed system is a move away from the current system and its emphasis upon the proprietary interests of right holders. The system will focus much more on the potential future uses of a copyright work. It is a retreat from the notion of romantic authorship, to an acceptance of the collaborative notion of authorship. In so doing, the proposed system will be more ontologically accurate and, in turn, creative industries such as the music industry will gain a legal system that reflects the creative processes of its creators. As the musician Brian Eno commented at the Sydney Luminous Festival:

'I was an art student and, like all art students, I was encouraged to believe that there were a few great figures like Picasso and Kandinsky, Rembrandt and Giotto and so on who sort-of appeared out of nowhere and produced artistic revolution.

As I looked at art more and more, I discovered that that wasn’t really a true picture.

What really happened was that there was sometimes very fertile scenes involving lots and lots of people – some of them artists, some of them collectors, some of them curators, thinkers, theorists, people who were fashionable and knew what the hip things were – all sorts of people who created a kind of ecology of talent. And out of that ecology arose some wonderful work.'

The proposed system will require that courts take into account the nature of creativity, and will signal a shift away from the property paradigm that has dominated copyright cases. It will be a system that, in Eno’s words, is able to acknowledge and effectively regulate ‘an ecology of talent’.