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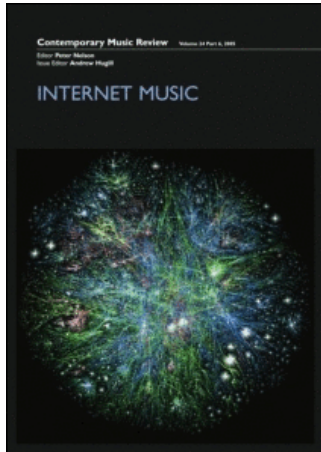
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# Internet Music: An Introduction

Andrew Hugill

*This article provides a summary and overview of the key aspects of Internet music, as well as an introduction to the issue of Contemporary Music Review on the subject. It examines popular conceptions of Internet music and seeks to define the topic by exploring some music that draws inspiration from networking without actually being Internet music itself. This article describes some basic Internet music concepts and attempts to classify it into various types: music that uses the network to connect physical spaces or instruments; music that is created or performed in virtual environments, or uses virtual instruments; music that translates into sound aspects of the network itself; music that uses the Internet to enable collaborative composition or performance; and music that is delivered via the Internet, with varying degrees of user interactivity. Finally, this article briefly describes the various contributions to the special issue and gives a general editorial context for the subsequent discussions.*

*Keywords: Internet; Music; Network*

## Introduction

To most people, 'Internet music' means 'music on (or off!) the Internet'. This, in turn, usually means downloadable mp3 files for iPod or mobile phone. This kind of Internet music is of course a cultural phenomenon, with an associated lifestyle that triumphantly asserts the ephemerality of the music itself by substituting for the tedious visit to the record store and the purchase of an unattractively packaged CDs, an act of personal choice in which the playlist discards the unwanted musical padding of so many albums and homes in on those 'killer' tracks that add up to the individual's real or imagined cultural identity. Not only that, but the whole process has the thrilling whiff of illegality (and hence authenticity?), thanks to the well-documented rise of file-sharing networks (e.g., Napster) and the record industry's apparently leaden attempts to keep pace with changes in technology. The fact that most Internet music consumers seem to perceive this as 'just desserts' for the industry suggests that the relationship between record company, artists and their public is rather more complex than might at first appear.

All this cultural activity should not, however, distract us from the fact that mp3 downloads constitute not a new form of music, but *alternatively disseminated* music that one could obtain just as easily in some other way. The Internet's role here is simply as a conduit, and in many ways a rather degraded one since the format itself discards much musical information in order to speed download times. Nevertheless, we should not underestimate the effect that this method of dissemination is having on music. For the home listener, it can be quicker to download a track than to search through a compact disc collection, and if one is listening while working at a computer it saves one the bother of having to stand up! The range of available music online is vast and expanding all the time, and it offers a direct route for young or unknown artists to attempt to reach a public. The instantaneity of the medium means that even traditional concerts must show at least an awareness of the way in which today's listener consumes the music. So we have downloadable 'previews' on websites, CDs on sale immediately after a concert, and follow-up discussion forums and email lists. As the 'tags' that accompany mp3 files subdivide music by genre, so Internet radio stations appear to supply exactly those genres to a specific listening community. The user-definition of the mp3 playlist extends to these radio stations, whose own content seeks to develop their listeners' knowledge base incrementally rather than arbitrarily in the manner of, say, the BBC. All this Internet culture surrounds music without purporting to have any effect upon it, and yet its influence is profound. The most successful music will be that which adapts to the new environment, and we are already seeing whole genres emerge that are embracing and exploiting the technological characteristics of the Internet without apparently *being* Internet music.

An interesting example is 'lowercase' music, which does not seem to derive from the Internet at all, whilst simultaneously evoking it. It generally comprises extremely quiet recordings of small or overlooked sounds<sup>1</sup> and is related to the genres of 'glitch' (made from unwanted and defective sounds) and 'microsound' (made from sounds of extremely short—up to 100 milliseconds—duration). These are all types of 'electronica' and rely on computers for their production. However, lowercase music, with its Fine Art background and extreme attention to detail, seems to prefer compact disc or, better still, live performance for its dissemination. Even though it is possible to download lowercase tracks, the Internet does not seem to be an ideal medium for this music.

In spite of all this, the genre itself is coloured by what we might call an 'Internet aesthetic'. This is partly due to the name, which reminds one of the lowercase typing that characterizes real-time Internet interaction, but also because of the somewhat disproportionate importance afforded to Deleuze and Guattari's *A Thousand Plateaus*,<sup>2</sup> which presents a vision of society as a rhizome, a flat network of interconnected tubers. This text has become a primary reference for Internet culture since the vision it elaborates resembles the binary world of the digital network in which each terminal is worth exactly 1. It has also given its name to an important German record label and websites such as [rhizome.org](http://rhizome.org) that explore the artistic possibilities of networks.

A key characteristic of this aesthetic is the difficulty of transcendence in a rhizome.<sup>3</sup> If the world is a flat network, then a transcendental aesthetic is a theoretical impossibility. Genres such as lowercase make a virtue of this necessity by flaunting their relative anonymity, their lack of pretension, their incorporation of the unnoticed and their reliance on that network. Despite this, I would argue that lowercase music is *not* Internet music. It is rather music that evokes and metaphorically expresses the Internet, but does so mostly away from the network itself. It is a contemporary music that reflects an aspect of its own culture. This then leads to a first attempt at a definition of Internet music: *music in which the Internet is integral either to its composition, or dissemination, or both*. This definition is not without problems, as we shall see, but it does cover both relevant aspects of the mp3 download culture and 'net-music', while excluding lowercase as appropriate, given that the Internet is not generally *integral* to its composition or dissemination.

### Basic Ideas and Terminologies

This may be a good moment to clarify a few terminologies for the benefit of readers less familiar with the jargon of networks and 'net-artists'. The first important distinction to bear in mind is between 'the Internet', which is a network of networks, a physical connection of numerous computers, and 'the World Wide Web', which is one way of sharing information across this network. Confusion often arises because the media and press indiscriminately refer to the World Wide Web as 'the Internet'. This is particularly important for the present discussion because many types of Internet music do not use the World Wide Web, but choose to exploit the network in other ways.

The history of the Internet's development falls outside the scope of this article,<sup>4</sup> but certain key ideas need to be understood if 'Internet music' is to make sense as a term. The Internet developed out of a need to interconnect a collection of smaller networks, each with its own 'protocol' or language. The result is a vast collection of physical and wireless connections of varying speeds and efficiencies that share certain protocols in order to enable users' machines to 'speak' to one another. A typical protocol is TCP/IP, or 'Transmission Control Protocol/Internet Protocol', and another is HTTP or 'HyperText Transfer Protocol', which is one of the main protocols used by the World Wide Web. There are many other protocols to allow email, online chat and so on. The networks themselves may be server-client (many users connected to a single server machine) or peer-to-peer (individual machines connected to one another), but all enable some kind of file sharing or upload/download process.

The Opte Project (<http://opte.prolexic.com/>) has for several years been mapping and producing graphical images of the Internet. These can be helpful in reaching an understanding of how the Internet is configured, but the most important idea is that it is the *biggest* example of a network. Network theory categorises networks in various ways, such as by geographical extent (local area network (LAN), metropolitan area network (MAN), wide area network (WAN) and so on) or by protocols used. The

phrase 'Internet music', therefore, is intended to encompass all kinds of musical activity on all kinds of network, without necessarily implying that the music in question uses the entire Internet (if, indeed, that is possible). Many examples of Internet music use only limited types of network and would not be accessible to users of, say, the World Wide Web, although the results of their activity are often published on the Web in some form or other.

Discussions of Internet music often focus upon the technical characteristics of the network. The merits and limitations of the various audio file formats<sup>5</sup> and the variability of the user's listening environment are significant constraining factors. The lack of ability on the part of the notional creator of the music to control the listening experience of the notional consumer has led to a blurring of the distinction between composer, performer and listener. Numerous inventive solutions to these constraints have been developed, many of which are described in this publication. Perhaps even more significant is the issue of latency: the amount of time required for a message to travel across the network. As Álvaro Barbosa has pointed out:

For the human ear to perceive two sounds as simultaneous, the sounds should not be displaced in time more than 20 msec, which means that for mutual awareness to be supported in a bilateral performance, the maximum threshold would be around 40 msec (the time it would take a performer to perceive a second performer's reaction to his or her action). It should be noted that the perception of two different sounds performed simultaneously is strongly dependent on sound characteristics (timbre, pitch and loudness), musical style and other types of feedback such as visual or physical stimuli. Nevertheless, a 20-msec threshold should be adequate. If we consider the smallest possible peer-to-peer connection between two opposite points on the planet, we have an approximate distance of 20,004.5 km (half the distance of earth's perimeter: 40,009 km). Even with data transfer at the speed of light (approximately 300,000 km per sec) and unlimited bandwidth, bidirectional latency would reach approximately 133.4 msec, which is much higher than the tolerable threshold.<sup>6</sup>

All these constraints taken together tend to make Internet music asynchronous, often leaning towards some kind of improvisation or open form, and frequently avoiding traditional modes of musical performance. The nature of the interaction between this music and its consumers is often unexpected and at times quite disconcerting. The aesthetic merits of these characteristics are at the heart of the debate about the artistic and cultural value of this kind of music.

What is emerging from this discussion is the existence of a new kind of music making that sets out to explore and exploit the characteristics of the network for musical and artistic ends. This creative activity is very different in character to the download culture described above (although it sometimes makes reference to it) and has had a brief history, beginning in the early 1990s. For many of the principal artists, musicians and composers involved in this kind of work, this difference is crucial, and partly for that reason the phrase 'net-music' or 'net-art' is preferred to 'Internet music'. At a 2001 conference entitled 'Music without Walls? Music without

Instruments?’ at De Montfort University, Leicester, I was surprised by the vehemence of the rejection of this kind of music, probably resulting from the perceived limitations of the various constraints mentioned above, but also possibly because of the generally degraded associations of the Internet itself (which, according to the media, is probably responsible for terrorism and anarchy, piracy and paedophilia, and pretty much every other form of threatening or illegal behaviour). Whatever the reason, the amount of original and creative music being made in this medium and using this technology is still relatively small and we are in a pioneering phase of development.

The importance of this music, however, should not be underestimated. We are witnessing nothing less than the growth of new musical forms and new means of musical expression. These will not survive on novelty value alone, but rather through the power of the work that is done within them. In this respect, we can expect great things and Internet music is at the forefront of developments, exploring interactivity, communication, shared musical experience, and collaborative or devised composition, as well as new means of creating digital and computer music.

### **Types of Internet Music**

We may attempt to classify Internet music into the following broad (and sometimes overlapping) types: music that uses the network to connect physical spaces or instruments; music that is created or performed in virtual environments, or uses virtual instruments; music that translates into sound aspects of *the network itself*; music that uses the Internet to enable collaborative composition or performance; and music that is delivered via the Internet, with varying degrees of user interactivity.

#### *Music that Uses the Network to Connect Physical Spaces or Instruments*

This was the initial motivation for many early experiments in Internet music. Online jamming, plug-in-and-play, international multi-musician bands, were and perhaps still are a pipe-dream of the network. The main challenge facing this kind of interconnection was and remains technical: network latency, replicating visual cues, achieving a homogenised sound and so on. Undaunted, various artists, scientists and engineers have come up with solutions to these problems (which are described in the articles that follow) that include live performance events across a small local network (often wireless), often using laptops, in which a range of controllers and software (such as Max/MSP and its derivatives) are used to enable real-time manipulation of sonic materials. One particular solution that has evolved separately is to create a networked sound installation, rather than trying to replicate a conventional rehearsal or recording studio setup. This practice seems to have more in common with ‘fine art’ than ‘music’ (although the results are often highly musical) and is consequently often seen as a branch of ‘sonic art’ or ‘multimedia’. Some of the most successful examples of ‘Internet music’ fall into this category. Whether the term is useful in that context will doubtless become clear over time and through usage. For the purposes of this edition

of *Contemporary Music Review*, we will use 'Internet music' to encompass that kind of work, in the full knowledge that this may prove to some extent unsatisfactory.

*Music that is Created or Performed in Virtual Environments,  
or Uses Virtual Instruments*

Virtual instruments in a virtual world would seem to make sense, and there are numerous examples, ranging from the single virtual instrument that can be manipulated by multiple users, to the multi-user environment in which each user has their own virtual instrument. To a great extent, this kind of Internet music bypasses many of the technical issues described above by giving the virtual environment its own peculiar characteristics that take into account latency and so on. Sometimes this involves a considered and wilful acceptance of degraded sound quality, or highly constrained musical practice. Often it involves virtual agents, with the result that this area of Internet music is of particular interest to computer scientists working in Artificial Intelligence and Robotics. The biggest musical challenge in a virtual world is to establish what *kind* of interaction will take place between the various human and virtual agents, and how this translates into sound.

*Music that Translates into Sound Aspects of the Network Itself*

A different solution to the same problem is to avoid simulacra of conventional musical interaction altogether and treat the Internet purely as data traffic that can be rendered as digital sound, using a process that computer scientists would call 'data mining'. In many respects, this is the most honest form of Internet music since that, of course, is exactly what the Internet *is*. However, digital data may be obtained in many ways, so the major questions facing musicians working in this area are: why use a network at all, and how to translate it successfully into sound? Most examples of this kind of Internet music therefore contain some metaphorical or semiotic content that evokes the network, and rely for their existence on being connected to the network. This then means an acceptance of the arbitrariness of data traffic and sometimes a certain imperviousness on the part of the artists to the actual sounding result.

*Music that Uses the Internet to Enable Collaborative  
Composition or Performance*

In this kind of work, the Internet is integral to the process of creation of the work, but may not be evident at all in the final outcome. The asynchronicity of the medium is here embraced as a positive virtue, and the creative process is given time and space for critical reflection, which tends towards a more formalistic and less improvisatory approach than is the case in many other types of Internet music. The challenge here is to what extent the use of the network becomes apparent to the listener. Just as the phrase 'I met my husband/wife/partner on the Internet' has a tendency to make

people smile in a slightly pitying way, as if this extraordinary and wonderful event were diminished by the (initial) absence of physicality, so 'we composed this piece using the Internet' would appear to be no more than an anecdotal curiosity, just like 'John Cage used chance to compose this piece' or even 'Wagner wrote all his music wearing a silk dressing gown'. In fact, the profundity of the difference in working method of this kind of Internet music from that of the conventional single composer/author working through the imagination to a finished statement is so great as to deserve special consideration. It is only the musical outcome that will demand this.

*Music that is Delivered via the Internet, with Varying Degrees of User Interactivity*

This is currently the most widespread form of Internet music, incorporating Flash soundtoys, online music games, educational websites, Internet radio and much more. Attention usually focuses on the degree of interactivity available to the user, ranging from complete passivity (they log on and the music automatically plays) to a large variety of 'point-and-click'-type interaction, which can be extended to keyboard (computer or music) and other game-like controllers. The ludic quality of much of this Internet music is attractive, but also tends to make it rather short-lived in terms of user attention span. This results in a high rate of turnover of these activities, which is by no means a bad thing. Since much of this Internet music is multimedia, often with primacy given to the visual element, its expressive potential seems quite limited. However, it has the great merit of opening up previously obscure or difficult areas of repertoire and its educational potential is considerable.<sup>7</sup>

**This Issue of *Contemporary Music Review***

This issue sets out to be a primary source for all aspects of this subject. Internet music is, almost by definition, international and interdisciplinary, so the authors from several countries include: composers and musicians, computer scientists and cultural theorists, experts in intellectual property and ideas, multimedia artists and educationalists. The range of topics reflects the diversity and complexity of the Internet itself, and the contents cover the entire spectrum from the highly technical to the highly descriptive. As editor, I saw it as my job to utterly fail to present a unified, neat, coherent picture of Internet music. To do any less would be to misrepresent the field. Nevertheless, several key themes do emerge.

Golo Foellmer (Germany), Helen Thorington (United States/Australia) and Peter Traub (United States) combine to present a thorough survey of both historical and present-day developments in Internet music. These include interviews with artists, supported by Web appendices, critical discussion of individual works and the drawing-out of various lines. Randall Packer (United States) is one of the foremost multimedia artists whose work has a strong musical base. It is really impossible to divorce 'net-music' from 'net-art', and multimedia is a fact of life on the Internet.

However, many artists begin from a visual starting-point and add the sound later. Packer is the reverse, beginning from a musical concept, and exploring the notion of composing with media by applying techniques of music composition to visual media.

Andy Harrower (United Kingdom) deals with a major issue to emerge from Internet music culture: copyright and intellectual property. This is a complex area, and plainly any statement is subject to future developments. Nevertheless, it is a vital topic for digital music and Internet music, in particular, since the source materials of the music, and indeed the music itself, are so mutable that we are driven to reconsider our ideas of plagiarism and ownership. Michael Casey (United Kingdom) is a key figure in the development of technologies that enable the creation of Internet music. His work with the MPEG7 framework has led to a new means of recognising the content of audio files, enabling rapid and efficient searching of sounds using the properties of *the sounds themselves*. This technological innovation significantly expands the potential for Internet music.

My own contribution and that of Dante Tanzi (Italy) are concerned more with the social and cultural aspects of Internet music. Tanzi explores the way in which people relate musically in cyberspace and in virtual environments, and my article looks at a number of creative and musical education projects that exploit social and musical interaction online. These include discussion of MUDs (Multi-User Domains) and MOOs (Object-Oriented MUDs). Finally, I felt that it was very important to temper the natural enthusiasm exhibited by all those involved in Internet music with some very timely and appropriate 'caveats' offered by a critical friend. Rosemary Mountain (Canada) has, despite some initial reservations, gallantly accepted the role, and given a balanced picture of some of the major issues that confront the development and acceptance of this kind of music. I am very grateful to all the contributors for their fascinating work.

## Notes

- [1] See [http://www.ears.dmu.ac.uk/rubrique.php?id\\_rubrique=141](http://www.ears.dmu.ac.uk/rubrique.php?id_rubrique=141) for a complete definition.
- [2] G. Deleuze & F. Guattari (1980). *Capitalisme et Schizophrénie 2. Mille Plateaux [A Thousand Plateaus: Capitalism and Schizophrenia]*. Paris: Minuit.
- [3] I am grateful to Dr Simon Atkinson of the De Montfort University Music, Technology and Innovation Research Centre for numerous valuable discussions on this subject.
- [4] For a full account, see K. Hafner & M. Lyon (1996). *Where Wizards Stay Up Late: The Origins of the Internet*. New York: Simon & Schuster.
- [5] For a complete summary, the novice reader is recommended to visit the Wikipedia site at: [http://en.wikipedia.org/wiki/Audio\\_file\\_format](http://en.wikipedia.org/wiki/Audio_file_format).
- [6] Á. Barbosa (2003). Displaced Soundscapes: A Survey of Network Systems for Music and Sonic Art Creation. *Leonardo Music Journal*, 13, 53–59.
- [7] An illustrative story from my own experience will emphasize this point. As a student I became very interested in the music of Harry Partch, whose microtonal tuning systems and homemade instruments seemed to suggest a real alternative to the world of music I knew at the time. The problem was that the instruments were unique and locked in a room in the United States. Given Partch's insistence on the corporeality, or physical action, of playing,

the available recordings seemed a poor substitute. Nowadays, though, I can log on to the American Mavericks website and download an interactive version of the Zymo-Xyl, the Chromelodeon and all the rest, and actually play them on my laptop computer to the point where I can even develop a kind of technique!