

2 'Pump Up the Volume'

Music and technology

The history of music is, in part, one of a shift from oral performance to notation, then to music being recorded and stored and disseminated utilizing various media of sound (and, later, audiovisual) transmission. These are hardly discrete stages, but they do offer an organizing logic for the overview here. Any new medium of communication or technological form changes the way in which we experience music and this has implications for how we relate to and consume music. It is important to acknowledge that the impact of technology on music is not solely a twentieth-century phenomenon, associated with the advent of recorded sound. Prior to this, print was central to the transmission of music, with the circulation of hand-written songs and scores. The printing press facilitated the circulation of broadside ballads from the early sixteenth century, along with sheet music, which peaked at the end of the nineteenth century.

Technological changes in recording equipment pose both constraints and opportunities in terms of the organization of production, while developments in musical instrumentation allowed the emergence of 'new' sounds. New recording formats and modes of transmission and dissemination alter the process of musical production and consumption and raise questions about authorship and the legal status of music as property. It is not possible here to cover all aspects of these topics, which have been the subject of intensive study (see Further reading). Rather, I have attempted to signpost some of their cultural implications, with brief examples to illustrate the interaction of technological, musical and cultural change. As Paul Théberge observes, 'technology' is not to be thought of simply in terms of 'machines', but rather in terms of practice, the uses to which sound recording and playback devices, recording formats, and radio, computers and the internet are put: 'in a more general sense, the organization of production and consumption' (1999: 216–17). My discussion covers sound production, the influence of new instruments on music making, sound recording and sound formats, sound reproduction and sound dissemination.

Sound production

New technologies of sound production are democratizing, opening up performance opportunities to musicians and creating new social spaces for listening to

music. However, these opportunities and spaces are selectively available and exploited by particular social groups. New instruments and modifications to instruments initiate debates around their legitimacy and place within musical culture. For instance: 'the arrival of the pianoforte into a musical culture that revered the harpsichord was for some an unwarranted intrusion by a mechanical device' (Pinch and Bijsterveld, 2003: 537). Further examples of this process are the impact of nineteenth-century brass band instruments; the microphone in the 1930s; the electric guitar in the early 1950s; the Moog synthesizer in the 1960s; and the MIDI (musical instrumental digital interface) since the late 1980s.

Victorian England saw an unprecedented expansion in participative music, with brass bands a major part of this. Trevor Herbert (1998) examines how and why brass bands developed, their distribution and adoption, and the nature and significance of their impact. In doing so, he illustrates the complex intersection of technology, urbanization and musical forms at work in shaping the brass band movement. The first half of the nineteenth century was the most important period in the history of brass bands. They emerged as a new form of leisure activity, with the development of new brass instruments made possible by the invention of the piston valve: 'Suddenly brass instruments possessed a new musical facility, and potentially a new social identity' (Herbert, 1998: 110). The advent of new instruments made possible new musical techniques and an expanded band repertoire.

The introduction of the microphone in the 1920s revolutionized the practice of popular singing, as vocalists could now address listeners with unprecedented intimacy. This led to new musical creativities and sites of authorship. Bruce Johnson traces the emergence of the microphone as a 'performance accessory' in Australia, showing how it was inscribed by gender politics. Masculine resistance to this 'artificial' aid left it primarily to women singers to exploit its possibilities in the 1930s. 'In particular, they experimented with projection, timbre and sensibility in a way that placed the intimate "grain of the voice" in the public arena, laying the foundations for the distinctive vocalisation of rock/pop' (Johnson, 2000: Chapter 4; see also Chanan, 1995: Chapter 7).

In a similar manner, the amplification of the guitar transformed popular musicianship: 'amplification allowed guitarists to play fluid and hornlike solos, while the country and jump blues genres popular in the late Forties encouraged them to elaborate a more percussive and riffing style' (Miller, 1999: 41). The Fender Esquire in 1950, the first mass-produced solid body electric guitar, changed the range and variety of people who could play, reducing the importance of controlling each string's resonance precisely, covering fingering mistakes. The electric guitar made it possible to play for much larger audiences, in bigger venues, creating new musical styles in the process. 'Chicago' or electric blues developed when black people from the south moved to urban centres such as Chicago, Memphis and New Orleans post-World War II, looking for work and better lifestyle opportunities. Performers such as Muddy Waters and John Lee Hooker 'plugged in' to entertain them (Waksman, 1996: Chapter 4).

The electronic synthesizer, developed in the late 1960s and early 1970s, became 'the most successful electronic instrument of the twentieth century' (Pinch and Bijsterveld, 2003: 546). Moog became the dominant manufacturer, in part because he made his machine available to as many musicians as possible and worked closely with them to constantly modify his design. His synthesizer became a keyboard device, providing an appealing feature of Moog advertising material: 'Whenever someone wanted to take a picture, for some reason or other it looks good if you're playing a keyboard. People understand then that you're making music' (Moog). The acceptance of a keyboard synthesizer reflected the influence of the wider culture and the historical status of the piano and organ.

Walter Carlos, a skilled studio engineer and composer of electronic music, formed a close relationship with Moog, exchanging advice for custom-built modules. In 1968, with Rachel Elkind, he produced *Switched On Bach*, an album of Bach's 'greatest hits' performed on the Moog synthesizer. The critical and commercial success of the album helped popularize the synthesizer. Psychedelic musicians, already fascinated with unusual instruments such as the sitar and theremin, took up the synthesizer. (For example, the Byrds on *The Notorious Byrd Brothers*, Columbia, 1968; and the Beatles on later albums such as *Revolver*, Parlophone, 1966). The production of the first portable keyboard, the cheaper and easier to use Minimoog, which became an essential part of progressive rock in the early 1970s, consolidated this popularity: 'It was the first synthesizer to have mass appeal and was sold in a new way, through retail music stores, thus laying the foundation for a retail market in synthesizers' (Pinch and Bijsterveld, 2003: 554). The Minimoog's portability, ease of use, reliability and hardwired sound, made it an important precursor to later digital instruments, notably the Yamaha DX7 (1983) with its wide array of presets.

The advent of MIDI (musical instrument digital interface) and digital electronics completely restructured music production from 1983 onwards, representing a paradigm shift in the history of popular music. The new generation of instruments and software created fresh sound possibilities, expanded style, techniques and concepts of production and raised the status of producers (see Chapter 3).

Sound recording

Sound recording is the process of transferring 'live' musical performance onto a physical product (the recording). The history of sound recording is one of technical advances leading to changes in the nature of the process and the shifts in tasks and status of those working with these technologies. Such changes are not narrowly technical, as different recording technologies and their associated working practices (e.g. multi-tracking, overdubbing, tape delay) enable and sustain different aesthetics (for a detailed history, see Cunningham, 1996; for a concise overview, see Millard, 2005: Chapter 14). In the recording studio, the work of the sound mixer, or sound engineer, was where music and modern technology met. Initially designated as 'technicians', sound mixers have converted a craft into an

art, with consequent higher status and rewards. Zak refers to them as 'both craftsmen and shamans' (2001: 165), who are now responsible for much of what we hear on a recording, acting as a kind of translator for musicians and the other members of the recording team.

Particular recordings illustrate advances in sound recording, at times accompanied by greatly increased use of studio time. Approaching the history of popular music from this perspective creates quite a different picture of artistic high points and auteur figures, in comparison with the conventional chronologies. Compare, for example, the following recordings:

- 1 Les Paul and Mary Ford, 'How High is the Moon', which occupied the no. 1 position on the American chart for nine weeks in spring 1951, launched the concept of sound-on-sound recording, coupled with Paul's discovery of tape delay. The technique for recording Ford's voice was also innovative, as Paul recalls:

'The unwritten rules stated that a vocalist should be placed no closer than two feet from the microphone, but I wanted to capture every little breath and nuance in Mary's voice. So I had her stand right on the mic, just a couple of inches away. Then, what happened? Everybody started to record vocals that way!

(Cunningham, 1996: 25)

- 2 Elvis Presley, 'That's Alright Mama' (Sun, 1956), was recorded at the session in which producer Sam Philips introduced the slap-back delay sound, used on Presley's other Sun singles and the label's recordings by other rockabilly artists.
- 3 The Beach Boys, 'Good Vibrations' (Capitol, 1966), Brian Wilson's 'pocket symphony', utilized a huge range of instruments, including a theremin (a pre-synthesizer electronic gadget), made possible partly by his extensive use of overdubs.
- 4 Pink Floyd, *Dark Side of the Moon* (Capitol, 1973), set a new precedent in sound recording techniques; for example, in its use of noise gates, devices that allow audio signals to be heard once they rise above a predetermined volume threshold and an extensive use of synthesizers.
- 5 Danger Mouse, *The Grey Album* (2001), took an a cappella version of rapper Jay-Z's *The Black Album* and coupled it with samples from the Beatles' *The White Album*. The resultant 'mash-up' was widely distributed over the internet and was both popular and controversial (see the discussion of it in Chapter 5).

The profound changes wrought by samplers, MIDI and other new technological phenomena are credited with giving new life to a moribund music industry in the 1980s. Sampling can be viewed as part of music's historic tendency to constantly 'eat itself', while also exemplifying its postmodern tendencies:

The willful acts of disintegration necessary in sampling are, like cubism, designed to find a way ahead by taking the whole business to pieces, reducing

it to its constituent components. It's also an attempt to look to a past tradition and to try and move forward by placing that tradition in a new context.

(Beadle, 1993: 24)

Through the 1990s and into the 2000s, new recording technologies have continued to open up creative possibilities and underpinned the emergence of new genres, notably the variants of techno and hip-hop. Most recently, technology has enabled the creation of 'mash-ups': recordings combining two existing recordings, usually illegally and from radically different musical styles and performers, to create a new text (as just seen with *The Creep Album*).

Digital sampling allows sounds to be recorded, manipulated and subsequently played back from a keyboard or other musical device. Introduced in the late 1970s and subsequently widely used, digital sampling illustrates the debates surrounding musical technologies. Its use is seen variously as restricting the employment of session musicians and as enabling the production of new sounds, e.g. the use of previously recorded music in the creation of rhythm tracks for use in rap and dance remixes. The increasing emphasis on new such technologies is significantly changing the process of producing popular music: 'As pop becomes more and more a producer's and programmer's medium, so it increasingly is a sphere of composition, as opposed to performance' (Goodwin, 1998: 130).

Sound formats

With the advent of sound recording, music became a 'thing', as recording technology in the late nineteenth century enabled its development in commodity form, independent of its 'live' performance aspects. Subsequent shifts in the popularity of various recording formats are important in explaining the historical evolution of popular music. Each new recording format offered fresh recording and marketing opportunities and affected the nature of consumption. Historically, these constitute a procession of formats, although some are never totally superseded and become the preserve of collectors: the wax cylinder; the shellac 78, the vinyl 45, the EP and the LP, cassette audio tape, the compact disc, digital audio tape, the erasable compact disc and MP3 downloads.

The shifting discourse surrounding formats reflects a search for realism, fidelity and portability, along with the ease of access and the associated cost. Changing formats usually appeal to consumers wanting better sound (although what constitutes 'better' is debated) or greater convenience and to those who possess a 'must have' consumerist orientation to such new technologies. New markets are created as older consumers upgrade both their hardware and their record collections. The balance sheet with regard to the declining status of the vinyl single and album, versus the ascendancy of the CD, is a mixed one. There were opportunities in this even for those still emotionally tied to vinyl, as the early 1990s saw a boom in the used record store business as CD converts sold off their record collections on their way to buying their first disk

player. The current dematerialization of the sound recording, with MP3 downloads, represents another revolutionary cultural shift. I shall have more to say on this later.

A short history of the single

A history of the vinyl single and its digital successor is an example of the relationship between music making, marketing and consumption in relation to a format. The introduction of the virtually unbreakable vinyl single (historically often referred to as a 45 – the rpm) in the early 1950s was an important factor in the emergence of a proliferation of smaller independent record labels, which were significant in popularizing rock 'n' roll. The single was originally a 7" vinyl format, with an 'A' side, the recording considered most likely to receive radio airplay and chart 'action', and a 'B' side, usually seen as a recording of less appeal. Also important was the EP, an 'extended play' single, a vinyl 7", usually with four songs on it. In the UK, the EP represented an early form of 'greatest hits' package, with attractive record covers, and outsold albums until the early 1960s.

In the early 1950s the vinyl single overtook its shellac 78 counterpart as the dominant music industry marketing vehicle. Singles became the major selling format, the basis for radio and television programming and the most important chart listing, with these in an apparently symbiotic relationship. Singles appealed to young people with limited disposable income, wanting to keep up with the latest chart hits. For the record companies, singles were cheaper to produce than an album and acted as market 'testers'. While singles success was important for performers and the record companies, it was also important as a means of drawing attention to the accompanying, or subsequent album, with the release of both being closely related. With a few significant exceptions (for example Led Zeppelin), performers generally relied on the single to promote their album release. This approach became the 'traditional' construction of record marketing through the 1960s and 1970s. Album compilations of singles, either by one performer or from a genre or style of music, also became an important market. While some performers with high charting singles were 'one hit wonders', singles success frequently launched careers, leading to an album deal and moves from independent to major labels.

In the 1980s new single formats gained an increasingly significant market share. There was a massive increase in sales of cassette singles in America and Swedish band Roxette's 'Listen to Your Heart' (1990) became the first single to hit no. 1 in the US without being released as a vinyl 45. Twelve-inch singles, including remixes, became an important part of the dance music scene (see Straw, 2001), and, accompanying the general rise of the CD format, the CD single also began to emerge as a popular marketing form and consumer preference. Negus (1992: 65) documents the consequent decline of the vinyl single through the 1980s. In the US, sales of singles between 1979 and 1990 declined by 86 per cent, from 195.5 million to 27.6 million units, and despite the

growth of new formats, total sales of singles declined by 41 per cent. In Britain, the single's decline was less dramatic, with total sales falling by 21 per cent, from 77.8 million in 1980 to 61.1 million in 1989. This reflected the continued industry practice in the UK of releasing one or two singles prior to the issue of an album. The relative decline of the single reflected the higher costs of the new formats and the pressure to produce a video to accompany a single, a practice that was regarded as necessary for supporting radio airplay and chart success (see Chapter 7).

Performers were affected by the shift to the CD format. Whatever the aesthetic status of the rock/pop single, its material significance lay in its availability to artists with limited resources. The 7" 45 and the 12" dance single, with their specialist market tied to the club scene, offered such performers only a partial substitute. Linked to this, is the point that many of the independent record companies could not initially afford to produce CDs, restricting the market options available to their artists.

In the 1990s the overall life of the single in the charts, due to radio airplay, remained important for drawing attention to the album. The single is now less important, with sales in all formats having continued to decline in the past decade. Nevertheless, it remains crucial to commodifying pop music for the teen market. The appeal of particular singles is primarily assessed by the placing achieved on the charts, as well as longevity there. (It should be noted that these are not quite the same; sustainability indicates a broader market appeal, following initial sales to a performer's niche market or cult support.) Making subsequent assessments of the commercial, and thereby presumed cultural, impact of a single on the basis of total sales and the length of time spent in the charts, a common practice.

The physical nature of the single, and its relation to promotion and the charts, underwent a radical change during 2005–2006 as the music market moved online. In the UK, by early 2006, digital singles made up some 80 per cent of the singles market as a whole, up from 23 per cent in 2004. Music megastores, such as Virgin on London's Oxford Street, moved their 'singles wall' to the rear of the shop and only featured the 'Top 20' singles; other record shops stopped stocking the format. This initially produced a strange situation in the weekly charts, with downloads only counting for one week before a CD single was released and two weeks after the CD is deleted. However, many singles were available to download several weeks before their CD release, often increasing in popularity as the recording's release date approached. Recognizing this situation, the Entertainment Retailers Association began to allow all digital sales to count, so that the singles chart would remain definitive of popularity. The availability of downloads transformed the way in which consumers obtained music, giving them greater direct input into the charts and at much less cost. A striking example of this occurred in the UK in late 2009, when a campaign on Facebook encouraged people to download Rage Against the Machine's single 'Killing in the Name' (originally released in 1992), to successfully get it to the prestigious no. 1 chart placing ahead of the *X Factor* winner.

Sound reproduction and dissemination

The historical development of the phonograph and various subsequent sound systems (hi-fi; home stereo; the transistor radio; audio tape players; the Walkman; the CD player; the iPod; the personal computer) is more than simply a succession of 'technical' triumphs. Reflecting changes in the technologies of sound recording and production, each new form of sound reproduction has been accompanied by significant changes in how, when and where we listen to music.

A talking machine

Edison invented the phonograph, a 'talking machine', in November 1877. The phonograph represented the true beginning of the reproduction of recorded sound, replacing 'the shared Victorian pleasures of bandstand and music hall with the solitary delight of a private world of sound' (Millard, 2005: 1). Edison's phonograph used cylinders and was able to record and reproduce sound. Other researchers developed the new technology further: Berliner's gramophone (1888), used a disc instead of a cylinder, while Edison considerably improved on his original in 1887.

Various commentators have identified a succession of phases in the technological history of the phonograph: an acoustic one from 1877 to the 1920s; the use of electrical/magnetic tape, from the 1920s; and the digital age, with the CD, from 1982. 'The industry built on the phonograph was driven forward by the constant disruption of innovation: new systems of recording, new kinds of machine, and newer types of recorded music' (Millard, 2005: 5–6; see also Steffen, 2005). The question is the cultural significance of such developments. For example, the domestic relocation of music consumption, facilitated by the phonograph, raised questions of the nature of the listening process:

Anyone, living no matter where, has only to turn a knob or put on a record to hear what he likes. Indeed it is just in this incredible facility, this lack of necessity for any effort, that the evil of this so-called process lies. For one can listen without hearing, just as one can look without seeing. The absence of active effort and the liking acquired for this facility make for laziness. Listeners fall into a kind of torpor.

(Stravinsky, in Eisenberg, 1988)

The phonograph was originally intended primarily as a business tool, but moved into entertainment initially through coin-operated phonographs (from 1889). With the development of prerecorded cylinders in the early 1900s, the phonographic industry took off. While in 1897 only about 500,000 records had been sold in the US, by 1899 this number had reached 2.8 million and it continued to rise. The impact of the talking machine was international. Gerry Farrell's discussion of the early days of the gramophone in India presents a fascinating story of the intersections between commerce and technological innovation and their impact on traditional Indian modes of music patronage and music

making. Economics underpinned the move of GLT (Gramophone and Typewriter Ltd) into the Indian subcontinent. As John Watson Hawf, its agent in Calcutta, put it: 'The native music is to me worse than Turkish but as long as it suits them and sells well what do we care?' (Farrell, 1998: 59). For the first time Indian musicians entered the world of Western media, as photography and recorded sound turned 'native' music into a saleable commodity.

The gramophone arrived in India only a few years after its invention in the West and recorded sound brought many forms of classical Indian music out of the obscurity of performance settings such as the courtesans' quarter and onto the mass market. Recording these was a formidable exercise: the visits to various parts of India in the early 1900s were quite correctly termed 'expeditions', involving complex logistical problems. For the emergent Indian middle class, the gramophone was both a technological novelty and a status symbol. The images in the company catalogues, reproduced by Farrell, illustrate this, along with the use of traditional images of Hindu deities to add to the appeal of the new medium. The constraints and possibilities of the new technology affected the style and structure of the music recorded. While Farrell is cautious not to generalize from the one detailed example he presents, he suggests that one possible limitation of the brief duration of the early recordings 'was to lead artists to give greater weight to the composed or fixed parts of the performance than they would normally have done in live recitals' (Farrell, 1998: 78).

Stereo

Stereophonic sound was first developed for use in film theatres in the 1930s, with home stereo systems as scaled-down versions. In 1931 the first three-way speaker systems were introduced. The sound was divided into high, middle and low frequencies, with each band sent to three different transducers in the loud speaker, each designed to best facilitate that part of the sound spectrum: the large 'woofer' for the bass, a mid-range driver and the smaller 'tweeter' for the treble. Due to the Depression, and the difficulty of reaching agreement on a common stereo standard (compared with the battle over recording formats), this system was not turned into a commercial product until the late 1950s. In the 1950s tape was the format to first introduce stereo sound into the home. The increased sales of magnetic tape recorders and prerecorded tape forced the record companies to develop a competing stereo product, particularly for the classical music audiophile. By the 1960s, stereo sound was incorporated into the loudspeakers used in home stereos. December 1957 saw the first stereo records introduced to the market. These were not intended for the mass market and sales were initially not high, but home stereos became popularized during the 1960s.

Going mobile

Mobile forms of sound reproduction have been important for decentring the listening process and for being identified with particular lifestyles and social

groups. Compact cassette audio tape and cassette tape players, developed in the mid-1960s, appealed because of their small size and associated portability. Initially a low-fidelity medium, a steady improvement of the sound, through modifications to magnetic tape and the introduction of the Dolby noise reduction system, enhanced the appeal of cassettes. The transistor radio (made possible by the invention of the transistor in 1948) and the audio cassette had become associated technologies by the 1970s, with widely popular cheap radio cassette players and the cassette player incorporated into high-fidelity home stereos.

An efficient format for the expansion into remote markets, tape cassettes became the main sound carriers in 'developing' countries and, by the end of the 1980s, cassettes were outselling other formats three to one. As a portable recording technology, the tape cassette was used in the production, duplication and dissemination of local music and the creation of new musical styles, most notably punk and rap, thus tending to decentralize control over production and consumption. Home taping is individual copying (to audio or video tape) from existing recordings or off-air; it was made possible by the development of cassette audio tape and the cassette tape player. The term 'cassette culture' has been applied to the 'do-it-yourself' ethic that underlies such practices and the network of musicians and listeners it embraces. Such practices were seen as a threat by the music industry, with their perceived violation of copyright, a stance echoed in the later controversy over digital downloads.

The development of powerful portable stereo players (boom boxes), associated with inner-city African-American youth, created a new form of social identification and a new level of noise nuisance. The Jamaican 'sound system', large, heavily amplified mobile discos and their surrounding reggae culture, had a similar impact. These first emerged in Jamaica, from the 1950s onwards, and were transplanted to Britain with the influx of Caribbean immigrants:

The basic description of a sound system as a large mobile hi-fi or disco does little justice to the specificities of the form. The sound that they generate has its own characteristics, particularly an emphasis on the reproduction of bass frequencies, its own aesthetics and a unique mode of consumption.

(Gilroy, 1987, in Gelder and Thornton, 1997: 342)

Another mobile form of sound system, the Walkman, had a major impact when it was introduced during the 1980s, enabling the listener to maintain an individual private experience in public settings (see Gay *et al.*, 1997). 'Walkman', although a Sony Corporation trademark, became a popular generic term for what Michael Bull terms 'personal stereos' (Bull, 2000). As he documents, personal stereos allow their users to reappropriate place and time, with listeners regaining control of their auditory environments by blocking out undesirable surrounding noise (and people!). They also rearrange user's experience of time, especially while waiting or during travel. Both these factors were part of the appeal of later personal stereos, but with added refinements enabled by the availability of digital music. MP3 players created practices that were not

possible with earlier personal stereos, such as the Walkman and the Discman, which were tied to physical music formats. The first portable MP3 player released in the US was the Rio, from Diamond Multimedia in 1998. Since then many more have appeared on the market, but the most successful and ubiquitous is the Sony iPod from Apple Computer, launched in October 2001.

The iPod has become the sound carrier and fashion accessory of the day, a cross between the Walkman and a hard drive used to store files on a computer. The iPod does not play music from physical formats such as cassettes or CDs, but holds it internally as digital data. The iPod is not the only digital music player, but it is the most popular of the brands now on the market. In terms of use, the advantages of the iPod are presented by its marketers and supporters as threefold. First, it can store a huge quantity of music (how much depends on the capacity of the model) and all you need to carry with you is a small, self-contained device; second, 'you can listen to whatever you want, wherever you are'; and, third, it can be connected up to home stereos or car stereos: 'you can have your entire music collection instantly accessible at home, at friends' houses, when you're driving – even on holiday' (Buckley and Clarke, 2005: 4–5). In addition, using the associated iTunes, the iPod opens up access to a huge range of music:

You can play tracks downloaded from the Internet without having the hassle of burning a CD. You can instantly compile playlists of selected songs or albums. Or have your player select your music for you, picking tracks randomly from across your whole collection or just from albums of a particular genre.

(ibid.)

The extensive popular and academic discussion surrounding the iPod is reminiscent of that which accompanied the music video in the 1980s. The iPod raises questions of marketing and design, mobility and agency, consumerism and the continued validity of the album format and associated notions of a musical canon (see Chapter 6 on this last point). The control associated with the Walkman is refined by the iPod, as the ability to create customized playlists enables listeners to create their own soundtracks. These can be used to accompany routine activities, with the selections geared to the activity, in terms of both mood generation and required duration. In his quirky take on Descartes, *iPod Therefore I Am*, Dylan Jones (2005) celebrates the ability of his portable device to connect his past musical experiences and to thereby construct a personal musical history. Large parts of the book are made up of song lists and fictional constructions of meetings with pop and rock stars that influenced his formative tastes – along with those of many of his readers. There are now a number of books offering guides to the construction of song lists of artists, styles, lyrical themes, etc., and many music magazines feature lists of the latest 'essential downloads'.

The iPod has collapsed the musical text with its production and consumption. Along with digital music more generally, it has made the ownership of a huge and eclectic music collection commonplace.

Further into the digital realm

As indicated in Chapter 1, digital music and the internet have had a revolutionary impact on popular music culture. Several key new technologies contributed to this: the advent of the MP3; a steady improvement (primarily through increased broadband) in the speed of personal computers to download/stream music, and the improved quality of this; and, as already discussed, new portable sound carriers, most notably the iPod. Together, these have enabled new modes of disseminating and storing music, along with new sites for accessing it on: social network sites; cloud services; YouTube. Collectively, these have created new practices of consumption (I shall return to these in more detail in Chapter 10).

MP3

A digital encoding format which became an international standard in 1991, MP3 is the standard encoding for the transfer (P2P) and playback of music on computer hard drives and on portable digital audio players, such as the iPod. The MP3 was designed for ease of use, universal compatibility and freedom of movement: it is a 'container technology' for recorded sound, whose shape and function are, by design, oriented toward free circulation (Sterne, 2006). MP3 files are small enough to make it practical to transfer (download) high-quality music files over the internet and store them: CD-quality tracks downloadable in minutes, with audio quality dependent on the size of the file. Hardly surprisingly, MP3 rapidly became very popular as a way in which to distribute and access music. By the end of the 1990s, it was widely claimed that 'MP3' had become the word most searched for on web search engines.

For consumers, MP3 enabled access to a great variety of music and they can selectively compile their own collections of songs by combining various tracks without having to download entire albums. For artists, MP3 meant they could distribute their music to a global audience without the mediation of the established music industry. Yet MP3 also raised concerns about potential loss of income and led to heated debates around copyright and access (see Chapter 1).

Downloading and P2P (file sharing)

Matthew David (2010: 2) defines file sharing as 'the circulation of compressed digital computer files over the Internet using an array of location and exchange software'. In his comprehensive and nuanced study of the phenomenon, he provides a historical and contemporary account of the issues (in the fields of law, technology and culture), associated with the ongoing conflict over file sharing, emphasizing 'the contradictions and conflicts within established economic relation, and the possible alternatives that are prefigured in the present' (164). The list include the promise of sharing the world's culture, 'making mediated

reproduction truly universal' (168). By encouraging a de-commodification of informational goods, peer-to-peer file sharing took network technology in a radical new direction.

Cloud music services

Cloud music services are split into two categories: 'digital lockers', such as iTunes Match, Google Music and Amazon Cloud, which allow users to store their digital collections online and stream them to any computer or mobile device; and subscription services, such as Spotify, which provide unlimited streaming for just about any song ever made (Knopper, 2011–12). In Europe, Spotify charges a monthly fee of £4.99 (Spotify Unlimited) or £9.99 (Spotify Premium) for unlimited access to its catalogue of 15 million songs, with charges depending on the sound quality and features members require. You can also listen to Spotify for free for up to 10 hours per month, if you are prepared to listen to advertisements before each song. Spotify's royalty payments to artists are small and, as a result, some recordings are not available on the service, including those of the Beatles, Led Zeppelin and Bob Dylan. Other artists only release their albums to Spotify after they have been out for a certain period of time.

Conclusion

The discourse surrounding music and technology embrace divergent views about creativity and musicianship, artistic freedom and property rights (copyright). New technologies can be seen as democratizing music production and consumption or consolidating established music industry hierarchies; disruptive of traditional distribution processes or rationalizing them; challenging or confirming legal definitions of music as property; and enabling or inhibiting new forms of creativity and authorship. These transcend national boundaries, separating music from the time, place and social context of its production.

Further reading

- Ghanan, M. (1995) *Repeated Takes: A Short History of Recording and its Effects on Music*, London: Verso.
- Cunningham, M. (1996) *Good Vibrations: A History of Record Production*, Chessington: Castle Communications.
- David, M. (2010) *Peer to Peer and the Criminalization of Sharing*, Los Angeles, London: Sage.
- Eisenberg, E. (1988) *The Recording Angel: Music, Records and Culture From Aristotle to Zappa*, London: Pan Books.
- Millard, A.J. (2005) *America on Record: A History of Recorded Sound*, 2nd edn. Cambridge: Cambridge University Press.
- Sterne, J. (2006) 'The MP3 as Cultural Artifact', *New Media & Society*, 8, 5: 425–42.

Waksman, S. (1996) *Instrument of Desire: The Electric Guitar and the Shaping of Musical Experience*, Cambridge, MA: Harvard University Press.

Major recording studios are historically identified with particular producers, house bands and sounds; see:

Cogan, J. and Clark, W. (2003) *Temples of Sound. Inside the Great Recording Studios*, San Francisco: Chronicle Books.

Documentary series: Howard Goodall, Big Bang; episode summaries and press reviews www/howardgoodall.co.uk/presenting/20centurygts.htm