Old Instruments, New Agendas:
The Chemical Brothers and the ARP 2600

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Abstract

A preference for old vintage music equipment is widespread in electronic dance music. My point of departure for a discussion of this phenomenon is an interview from Keyboard magazine in which the members of the production duo the Chemical Brothers proclaim their fascination with an old analogue synthesizer. Two rather diverse theoretical approaches will inform and nuance my narrative here. Wiebe E. Bijker's sociotechnical approach to the development of technology will highlight stages and processes in the transition from analogue to digital technology. In addition, Sarah Thornton's concept of subcultural capital will direct attention to the old instrument as a prestige item that serves to maintain power structures within the music culture.

Keywords: vintage music equipment, analogue synthesizers, sociotechnical approach, subcultural capital, Chicago house, Detroit techno

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In an interview for *Keyboard* magazine, June 1997, Tom Rowlands and Ed Simons of the Chemical Brothers pontificate about digital synthesizers that emulate analogue technology:

> I remember speaking to Underworld a while ago, and they had just gotten one of the [Clavia] Nord Leads. They were saying how amazing it was. But we haven't bought any of those things yet. No [Korg] Prophecy or Nord or any of those, and I don't know quite why that is, because I'm sure if I did buy one I'd be quite impressed. Part of it is me being wary of mass-produced . . . Everyone is going out and buying the Prophecy, and everyone is going out and buying the Nord Lead. It's cool, and I'm sure I'm hearing those noises on records and thinking they're good, but I suppose I'm more interested at the moment in . . . The most exciting piece of equipment we've got is the ARP 2600. We're really getting into that. It's not very controllable, but some of the things you can come up with are wicked (Rule 1997: 33).

The ARP 2600 is a rather small, monophonic, analogue synthesizer from the early 1970s that appears regularly on stage during performances of electronic music. Surpassed possibly only be the Minimoog, it is a highly acclaimed instrument for its era, and many musicians seem to prefer it despite the inherent deficiencies of its rather old technology. The other two synthesizers mentioned above—the Nord Lead and the Korg Prophecy—are both from 1995 and were among the first of many new models that arrived in the late 1990s to accommodate the rapidly growing electronic dance music scene and its interest in old vintage equipment. Made specifically with the synthesizers of the early 1970s in mind, these instruments boasted the capabilities of the old analogue technology along with all of the advantages of the digital era. Still, as the Chemical Brothers' interview attests, many musicians continued to favor the original instruments. Why might this be so?

We like to think of the development of technology as a relatively linear path, where new discoveries rightfully replace older equipment. The most recent version of the iPhone, then, is seen as the latest model in a long developmental line of telephones that have been used and eventually discarded. The newest model is, of course, also typically held to be the one that best serves our present needs.

The development of the commercial synthesizer can be represented using a similar linearity, leading up to the newest models that are manufactured today. The most radical amendment in this development was the change from analogue to digital technology at the beginning of the 1980s. Fully analogue synthesizers had several deficiencies that needed to be fixed: the oscillators were unstable and tended to go out of tune, for example, and they lacked the capacity to store sounds. Their parameters were also set using continuous controllers, so it was difficult for the musician to relocate to the exact settings used earlier. Digital technology addressed these problems and also introduced MIDI, which, together with hard-disk recording, revolutionized the production and recording practices of the succeeding decades. So why would anyone favor a monophonic instrument developed

before this essential conversion to digital technology? To consider this question, I will draw upon two theoretical perspectives: Wiebe E. Bijker's sociotechnical approach to the development of technology and Sarah Thornton's concept of *subcultural capital*. Taken together, they will nuance my engagement with an issue that certainly has relevance beyond the case presented here. It concerns other music genres and many other types of instruments and music equipment as well (tube-driven pre-amps, compressors and microphones, ribbon microphones, tape distortion and even vinyl records).

A Theory of Sociotechnical Change

Bijker is connected to a group of researchers that pursues social-constructionist perspectives within the field of science and technology studies (Bijker, Hughes and Pinch 1987). He rejects an approach to technology that locates the meaning of the artifact within the technology itself. Instead, he favors an approach that encompasses "how technologies are shaped and acquire their meanings in the heterogeneity of social interactions" (Bijker 1995: 6). Such an approach, of course, eschews the assumption of a linear development of technological innovations. In his book *Of Bicycles, Bakelites, and Bulbs* (1995), Bijker develops this approach through three specific case stories, one of which involves the development of the bicycle.

During the nineteenth century, the bicycle advanced from a model with two wheels of approximately the same size (the *boneshaker*), to a model with two wheels of considerably different sizes (the *high wheeler*),[1] and then back again to a model with two wheels of the same size (the *safety bicycle*). Bijker's arguments are schematized as a combination of theoretical topics and chronological steps, including, importantly, inventions relevant to the development of the object in question. An important step for Bijker is to consider all the different groups (*relevant social groups*) that in some way are connected to the artifact, elucidating their overall perspectives and bringing forth their views on specific problems and possible solutions. He further identifies and describes two specific stages in a developmental technological process. The first stage is characterized by *interpretive flexibility*—the relevant social groups may compete among themselves regarding their suggestions as to how to proceed. The next stage Bijker calls *closure and stabilization*; here the participants have reached a final consensus among the various possible ways forward. After such a *closure* has occurred, it becomes much more difficult to propose new directions that violate the consensus: "It is in principle always possible—although in practice very difficult—to reopen up a controversy once closure is reached" (1995: 85).

Bijker's theoretical approach illuminates certain stages in the development of the commercial synthesizer that may explain aspects of the seemingly "backward" preference of the Chemical Brothers. His story of the bicycle has particularly interesting parallels in this regard, and I will therefore return to it in what follows.

THE TRANSITION FROM ANALOGUE TO DIGITAL SYNTHESIZERS

Bijker starts with a prehistory of the main developmental period in question. Here he presents the *boneshaker*, which had two wheels of the same size, but offered, as its name implies, a rather unpleasant ride. The prehistory of the ARP 2600 would be found in the large modular synthesizers of the 1960s, which consisted of separate units that had to be wired together (Buchla 100 series, Moog Modular). The size of these instruments, as well as their complexity, likely represented hindrances for the performing musicians of the era, and the smaller, portable models that arrived at the beginning of the 1970s (Synthi A, Minimoog, ARP 2600, EML-101) would have been intended to address them. These synthesizers were cheaper, their possibilities were more straightforward, and they displayed a relatively pedagogical design, making them much more accessible to many musicians who sought to understand and appreciate synthesizers.

The vibration problem of the *boneshaker* was solved by the *high wheeler*, but this bicycle introduced a significant safety issue. Through his discussion of *relevant social groups*, Bijker next stresses that those groups that choose *not* to use an artifact can be just as relevant to its development as those groups that embrace it. The *high wheeler* was a demanding and unsafe vehicle for the majority of its potential users, while for a smaller group of young, upper-class men, those very aspects were an asset, making them look athletic and daring. The *high wheeler*, then, was a sort of *macho bicycle*—a tool for showing off—and for this latter group it served a particular purpose. Thus, Bijker concludes, whether an artifact is seen as "working" or "non-working" derives less from its intrinsic properties than from certain "socially constructed assessments" (1995: 75). In terms of the (keyboard-controlled) synthesizer, relevant social groups could view it in two ways: as a piano-type instrument, it could be played in the absence of any knowledge regarding how the sound is produced; it would therefore be available to the professional as well as the amateur; and it could be used in a large range of musical genres. As an organ-type instrument, on the other hand, the synthesizer would apply to a more limited number of musical genres and appeal mostly to the educated specialist, adept at shaping its sound by positioning its drawbars and knobs. The former interpretation frames the synthesizer as a "working" artifact for many musicians; the latter, as a prestigious, more exclusive artifact.

Synthesizer manufacturing grew exponentially during the 1970s; Paul Théberge notes in this regard that engineers and inventors decided to favor and support performing musicians within the popular music field over another relevant social group: the avant-garde composers who had up to that time been at the center of innovation in electronic music (1997: 55).[2] Still, while this new group of performing musicians, especially those connected to genres like progressive rock, found these smaller and more accessible synthesizers to be "working" artifacts, they remained "non-working" for most other pop musicians, and for a much larger group of amateur musicians. The manufacturers of synthesizers had taken an important step toward a piano-type instrument, in other words, but like the producers of bicycles a century before, they probably saw that an even broader market awaited them if they went several steps further. They needed a model, in the end, that did not require any knowledge

of sound synthesis, that could just be turned on and played, that had stable pitch oscillators, and, maybe most important of all, that had sounds that suited a greater range of pop and rock genres.

Disco dance music was mainly recorded using traditional electric and acoustic instruments, certain notable exceptions aside, such as the productions of Giorgio Moroder. Most celebrated among these is Donna Summer's "I Feel Love" (1977), whose sounds are almost entirely created with a Moog synthesizer (Lawrence 2003: 253–54). In many ways, this track anticipates the needs of 1990s dance music producers like the Chemical Brothers, especially through its combination of short, rhythmic, unaltered sounds and floating, sustained sounds with continuously modified filter settings and volumes. Nevertheless, dance music producers like Moroder were not considered an important user group until the 1990s and did not manage to influence the electronic music instrument industry until that era.

In terms of Bijker's bicycle history, his description of the various solutions to the safety problem of the *high wheeler* concerns itself as much with societal changes as with technical specifications. The period before *closure*, then, is characterized by *interpretative flexibility*, though certain processes will favor certain stages of development over others. The rise and fall in popularity of various music genres is one process that impacted the development of the synthesizer in the 1970s. The keyboardists from the groups that were most strongly associated with synthesizers around 1975 (Pink Floyd, Emerson, Lake and Palmer, Yes) used a large palette of sounds and often altered various parameters while playing. Five years later, a different genre was connected to the instrument in its name as well. *Synth-pop* evolved in the aftermath of the punk movement; while it took up the instruments of progressive rock, it was also, to a certain extent, influenced by punk's "do-it-yourself" approach and rejection of oversized stage performances and symphonic pop-song formats. Groups and artists like Gary Numan, Ultravox, Orchestral Manoeuvres in the Dark and Depeche Mode, then, fit their analogue synthesizers into much more straightforward pop structures. The conventional acoustic instruments of much 1970s pop were replaced by synthesizer sounds, often via the combination of short, percussive sounds and sustained, string-like sounds. Compared to the progressive rock bands or Giorgio Moroder's productions, for example, these songs seldom demanded any knob adjustment at all, and a new musical landscape took shape that favored small, inexpensive instruments with fewer outboard controllers. During the early 1980s, the use of synthesizers became more and more common in all popular music, and the demand for this instrument spread from the professional keyboard player to a much larger amateur market.

Apparently unrelated inventions that prove to be somehow connected to the artifact in question, lastly, may also impact the viability of some technological solutions over others. The air tire, for example, was essential to the ultimate *closure* of the bicycle. Developers who chose this solution struggled at first with tires that got punctured and were difficult to repair, but eventually perfected models with smaller wheels that provided a faster, safer and altogether more pleasant ride (Bijker 1995: 77–84). The development of the microprocessor

was equally crucial in relation to the transition from analogue to digital synthesizers. At first, microprocessors were used to control the analogue components, but thanks to increases in both the microprocessor's price and its processing power, all components were ultimately replaced by digital equivalents. Théberge recognizes this era as the beginning of the electronic musical instrument industry's dependence upon the computer industry (1997: 58).

Closure and Stabilization: the Yamaha DX7

If one instrument symbolizes the climactic transition from analogue to digital synthesizers, the Yamaha DX7, which arrived in 1983, is the inevitable choice. It was an immediate success, both in how it influenced the very sound of pop music in its time and how it expanded the market for the instrument. The most famous analogue synthesizer from the 1970s, the Minimoog, sold about twelve thousand units over the entire decade, while the Yamaha DX7 sold over two hundred thousand units in the first three years of its release (Théberge 1997: 73–74).

While most of the major deficiencies of analogue technology had already been addressed through digitally controlled oscillators and storage systems, the DX7 introduced a completely new form of sound synthesis. Analogue synthesizers from the 1970s and the hybrid instruments that were produced around 1980 used *subtractive* synthesis to produce sounds. With a basic understanding of the major components, many performers found this technology to be quite intuitive; one chose a certain type of sound wave for the oscillator(s) and simply filtered out (subtracted) the unwanted overtones. The Yamaha DX7, on the other hand, used *FM* (frequency modulation) synthesis. It employed six oscillators to generate sine waves that could be arranged into different algorithms to modulate each other and together produce quite complex results (see Chadabe 1997: 251; Roads 1996: 224–50). Compared to subtractive synthesis, the connections between the algorithms and the final sound waves they produced were much more difficult to grasp. The only outboard controllers it had were a pitch wheel and a modulation wheel; all other sound changes had to be programmed with membrane buttons, a data slider and a small LCD display. Thus, most DX7 users, both those with analogue-instrument experience and newcomers to synthesizers, elected to work with the available prefabricated programs rather than learn to make new sounds themselves. The fact that the DX7 could thus be played without any knowledge of programming featured prominently in advertisements for the instrument as well (Théberge 1997: 76). The crystal-clear digital sound of the DX7 was also crucial to its success. It boasted a range of presets that were much more faithful to the acoustic instruments they imitated than anything the analogue synthesizers could produce. The flute sound of the DX7, for example, was particularly hailed at the time for its verity. By the mid-1980s, then, the Yamaha DX7 was a marker of pop music sound in general.

The success of the DX7 led in many ways to a *closure* in the electronic musical instrument industry. While new hybrid instruments combining digital and analogue components were manufactured until at least 1986, fully digital synthesizers dominated the market by the

end of the decade. These instruments generally had few knobs and buttons to program or control sounds, and were sold with banks filled with prefabricated sounds that mainly perpetuated a sound aesthetics that relied upon the simulation of acoustic instruments. Thanks to the digital sampling technology that was implemented into these instruments' sound-synthesis processes, these simulations grew more and more convincing.

The Chemical Brothers belong to a group of synthesizer users that arose in the 1990s. Various genres of electronic dance music spread rapidly, as did its performers' renewed interest in the synthesizer as an instrument in and of itself. For this group, then, a typical synthesizer of the early 1990s was not especially attractive, due to both its prefabricated acoustic-instrument programs and its distinctive, bright, polished digital sound. These performers did not want presets that sounded like acoustic instruments; they wanted sounds that could provide a good front solo or a bass line in a dance mix. While the stable digital components were easier to control than their analogue counterparts, they also lacked the rugged side effects of the inherent instability of the analogue instruments. Furthermore, the lack of controllers to alter sounds while playing was a major drawback, both for performance purposes and for sound experiments in production. The developmental route that was sparked by the success of the Yamaha DX7 had resulted in an instrument that did *not* meet the demands of this new user group. The preference of the Chemical Brothers for an instrument from long before the transition to digital synthesizers like the DX7 therefore reintroduces the debates and developments that led to a *closure* in the first place.

Théberge claims an act of "double production" is going on in the relationship between the electronic music industry and musicians' magazines: "One industry produces technology, and the other produces consumers" (1997: 130). When *Keyboard* magazine has an interview in which significant role models argue for the benefits of an older instrument, of course, this symbiotic relationship is set aside. It is a threat to the industry that potential buyers might want to purchase old instruments instead of new ones. The Nord Lead and the Korg Prophecy represent attempts to control this situation by offering consumers instruments that have some of the same abilities as the old ones, but the Chemical Brothers do not see these instruments as fulfilling their needs. Why is this so? Does the digital emulation of analogue components sound inferior to the old technology? The Chemical Brothers claim that the ARP 2600 "sounds wicked", which might be interpreted as a statement of allegiance to a type of sound that these digital synthesizers could not produce. Furthermore, old analogue synthesizers have a number of outboard controllers that facilitate altering or modifying sounds while playing, and the instrument is housed in a wooden, not plastic, case, lending it both substance and a sense of history. Nevertheless, digital synthesizers feature extreme flexibility when it comes to programming parameter settings, and they are far more practical in a stage performance, thanks to their ability to store programs. We are left to wonder, then: to what extent is the older instrument in itself a symbol of something prestigious that the new instrument cannot emulate?

The Analogue Synthesizer as Subcultural Capital

Bijker's approach exposes the Chemical Brothers' dissatisfaction with a developmental direction. Moreover, it demonstrates the significance of societal processes: the *high wheeler* had an important purpose as a tool for showing off. The ARP 2600 may in similar ways have a specific role that connects it to the discourse of authenticity in popular music. Thornton's study of club culture supports this reading. She considers authenticity to be "arguably the most important value ascribed to popular music" (1995: 26) and describes the term in relation to how music is elevated "when it *rings true* or *feels real*, when it has *credibility* and comes across as *genuine* (1995: 26, emphasis in original). Richard Middleton observes that authenticity is used in discourses on popular music "to mark out the genuine from the counterfeit, the honest from the false, the original from the copy" (2006: 200), while Keir Keightley describes it as "the compass that orients rock culture in its navigation of the mainstream" (2001: 131). Keightley further notes that authenticity is not actually an audible feature in the music, but is "a value, a quality we ascribe to perceived relationships between music, socio-industrial practices, and listeners or audiences" (2001: 131). The issue of authenticity as a value is as divisive in dance music culture as it is in popular music writ large, though the rules for what is considered authentic in the former arise from somewhat unique idiosyncratic principles. A typical performance by the Chemical Brothers—the two artists simply turning knobs on a selection of machinery—violates the most fundamental rules of what is considered authentic within the rock genre. However, within dance music culture, it can be seen as authentic in relation to the ideal of a DJ who is genuinely focused on the music and the dance floor and not interested in drawing any attention to himself or herself as a person.[3]

Thornton's term *subcultural capital* derives from Pierre Bourdieu's concept of *cultural capital* (1984), which refers to human assets of a non-financial nature that matter in relation to positions and power structures in society. While Bourdieu's concept addresses a national cultural unity, Thornton's concept relates specifically to a smaller cultural group that deviates from the larger culture within which it exists. Her subculture, in fact, is defined as the culture of British dance clubs in the 1990s. During this decade, club culture spread throughout Europe and had become a global phenomenon with many local variants around the turn of the millennium. In her study, Thornton defines *hipness* as one form of subcultural capital. For the regular club-goer, hipness can be *objectified* through things like a record collection with cleverly chosen, "correct" albums or the right clothes or a trendy hairstyle, and it can be *embodied* through "being 'in the know,' using (but not over-using) current slang and looking as if you were born to perform the latest dance styles" (Thornton 1995: 11–12). In the case of the Chemical Brothers and the ARP 2600, the instrument itself can be seen as an objectified form of subcultural capital (or hipness): compared to a new digital synthesizer, for example, it is more difficult to acquire, and it is actually quite expensive, particularly in view of its deficiencies. The ARP 2600 as an embodied form of subcultural capital would imply both an awareness of the status that this specific instrument

carries with it and the more definite ability to operate it.

According to Thornton, the term *underground* is used within club culture to indicate a certain subcultural quality or value: "More than fashionable or trendy, 'underground' sounds and styles are 'authentic' and pitted against the mass-produced and mass-consumed" (1995: 117). This aligns with how authenticity is used by rock culture to distance itself from more commercial pop music (Keightley 2001). The Chemical Brothers indicate their disapproval of the fact that *everybody* can get their hands on new digital synthesizers (later in the interview, they also mention equipment made in very limited numbers by an esoteric German producer). This deliberate dissociation from the *mass-produced* and *mass-consumed* represents a means of maintaining certain power relations within a subculture. Electronic music instruments and production tools have become much more accessible since the early 1980s, and this democratization of music production has narrowed the distance between the professional music producer and the amateur. Thus, the Chemical Brothers likewise evoke the prestige of the ARP 2600 to maintain a certain position and declare that their craft demands more than just the newest equipment.

Chicago House Versus Detroit Techno

Théberge argues that musicians, following the advent of digital synthesizers and MIDI technology, became "consumers of prerecorded sounds" (1997: 3). The use of presets on synthesizers and CDs with sampled grooves and bass lines that facilitated the production of dance music in the 1990s validates his argument. By contrast, you must make all of the sounds from scratch on an ARP 2600, since there are no presets, prerecorded sounds or sample banks available. Andrew Goodwin wrote in 1988 that "authenticity is still very much present in the need for pop musicians to demonstrate musical competence" (1988: 44). To what extent, then, was the authenticity of producers of dance music in the late 1990s evaluated according to similar types of expertise? The answer may change depending upon the club genre in question. Even if the music at times sounds rather similar, different attitudes toward equipment characterized the various subgenres of dance music.

Early Chicago house music had links to the disco scene in New York through the influential DJ Frankie Knuckles who had learned his skills in New York clubs during the 1970s. He brought with him an attitude towards music where the dance floor and the dancers were the focal point of the night. After a visit with producers of house music in Chicago, journalist Sheryl Garratt described a production session "where everybody comes down to watch" and there was "a party going on in the control room" (1986). In the same article, DJ Marshall Jefferson locates the music directly within the club scene: "House music?...You have to go to the clubs and see how people react when they hear it. It's more like a feeling that runs through, like old-time religion in the way people jus' get happy and screamin'. It's happening! It's...House!" (Jefferson quoted in Garrat 1986). The central task, then, was about getting the crowd to dance, and probably the main focus of the production process as well. The reuse of bass lines or drum patterns was not uncommon. Steve "Silk"

Hurley uses, for example, a bass line from the last section of the Warehouse's classic "Let No Man Put Asunder (Shep Pettibone Remix)" (1983) by First Choice on his house famous track "Jack Your Body" (1986).

The music that came from Chicago to Britain in the late 1980s included a few contributions by producers from Detroit. This music was later promoted to the British audience via a special compilation called *Techno: The New Dance Sound of Detroit*. In contrast to the reputation of Chicago house music, this music was presented as much more rational and intellectual, as well as radically new. An influential Detroit producer, Jeff Mills described the Detroit techno sound as: "If you hear something that kind of sounds like you've heard it before, then it's not techno" (Mills quoted in Kempster 1996: 17). Renowned producer Juan Atkins had been inspired by Alvin Toffler's book *The Third Wave* to adapt a futuristic technology-oriented philosophy to his personal musical vision. To subordinate oneself, like a house DJ, to the interest of the crowd did not fit this picture. In a 1988 interview for the magazine *Music Technology*, he says: "The music is not for everybody. It's for certain people that want a little twist. Some people are perfectly content with everyday pop—they don't have an open enough mind to consider something new" (Atkins quoted in Trask 1988). This dichotomy gained a foothold in the discourses connected to the music as well. Chris Kempster writes:

> While house music was a post-modernist art form, ruthlessly eclectic to the point where some early house hits were simply thinly veiled rewrites of other songs, techno's driving force was innovation. In its purism, its emphasis on stepping into the unknown, it is as modernist as Cubism. Detroit pushed dance music into the abstract, built not upon the legacy of disco, but on the spaces of funk (1996: 17).

When British producers started to create their own electronic dance music tracks, the Detroit musicians became an important inspiration, both musically and intellectually. Techno gradually became one of the most dominant genres of the club-oriented dance music scene, signifying anything instrumental and electronic, whether intended for dancing or simply for listening. While producers of house undoubtedly made dance music, producers of techno were also exploring other directions, taking the music away from the dance floor.[4]

The Chemical Brothers are situated somewhere between house and techno. Their tracks are mostly electronic, but many of their most famous tracks include vocals and have very danceable grooves. They are partly a dance act and partly a more performance-oriented act, having performed both as DJs mixing other artists' tracks for dancing crowds and in giant stadiums and at festivals where many of the audience generally watch the stage to see what the musicians are doing. Hence they are faced with divergent expectations, depending upon the situation and the audience with whom they interact. In the *Keyboard* interview, then, they are communicating with readers who are probably especially interested in their production techniques, and one would suspect that the duo is trying to demonstrate a kind of hipness through their knowledge of what is considered a more respectable or prestigious way of working linked to the ARP 2600. In addition to having no preset sounds, the older

synthesizer is also considerably more difficult to introduce into a production with MIDI-sequencing, compared to the other synthesizers mentioned in the interview.

The Old Analogue Versus the New Digital

In his book *Rock Music in Performance* (2007), David Pattie examines how authenticity constructions are constantly adjusted. In the 1970s, the analogue synthesizer was seen to be violating the (unwritten) rules of rock music (see also Goodwin 1988: 41). In *The NME Encyclopedia of Rock* (1977), for example, the German electronica band Kraftwerk and their fans are condescendingly described as situated in an artificial, technology-ridden environment (Pattie 2007: 7). Following the synthesizer's widespread introduction into most forms of popular music during the 1980s, the instrument was no longer considered inauthentic (except within certain genres); a decade later, a new division between the old analogue and the new digital synthesizer emerged, redefining the former (at the expense of the latter) yet again. Pattie notes: "Digital instruments were now cold avatars of inhuman, inauthentic technology" (2007: 7). This notion was not especially prevalent within the popular music culture at large but did dominate several influential cultural groups. Joseph Auner wrote around the turn of the millennium of an "entire 'authentic instrument' subculture" (2000: 3), one that was deeply engaged with instruments like the Mellotron, the Clavinet, the Fender Rhodes, the Hammond B3 and, of course, the analogue synthesizers from the early 1970s, based upon a mixture of nostalgia and a true conviction regarding the perceived advantages of pre-digital technology.

In his discussion of digital sampling and analogue aesthetics, Tellef Kvifte claims, "The very concept 'digital' has for many people strong connotations in the direction of 'machine', 'automatic', 'not human', etc., while 'analogue' has a much more human and authentic feel" (2007: 120). Analogue electronic technology is based on an electric current, and all of its information is transferred in a continuous flow. In contrast, digital technology relies upon discrete digits, which certain cultural groups regard as less appropriate for the exchanges involved in human communication, particularly the more expressive and emotional types of communication, such as music. Kvifte points to the fact that traditional musical notation (and even our alphabet) is a type of digital communication, in that one must choose among certain specific entities; he also indicates that new types of digital music software actually enable communication of a traditionally more analogue type (2007). When music is converted from digital to analogue signals (with a standard bit resolution) and played on normal speakers, it is in fact impossible for the human ear to detect that it initially was digital. However, some people's resistance to mixing digital technology with human acts of communication is probably not rational and will remain strong in music cultures where technology by and large is rendered suspicious.

The preference for old instruments in general is a well-established tradition within popular music. It is most openly expressed in music styles like folk, blues, country and rock

and roll, all of which, according to Keightley, derive their authenticity from Romantic rather than modernist ideas (2001: 137).[5] Some musicians seem to see old guitars or amplifiers as a magical sonic gateway to the golden age of the music style in question (Théberge 1997: 120). This idea evokes the nostalgic yearning for the past found in the Romantic period as well as the European classical music tradition's tremendous admiration for historically superior instruments such as Stradivarius violins.

Of course, many old instruments are long forgotten and most types of old technology are obsolete. Those that acquire the requisite prestige likely have some sort of quality that makes them stand out in comparison to others. Bijker's sociotechnical approach makes it clear that the process through which certain artifacts survive are as intricate as any developmental progression. Furthermore, it explains the unique persistence of old instrument and technology despite direct competition from new, often superior products. When a *closure* has occurred—when a consensus concerning the ingenuity of the artifact has secured its position—it can be tremendously difficult to reopen the debate surrounding it and thereby announce its inferiority in comparison with newer technology. A study by Fritz and colleagues shows, for example, that violinists actually gave higher scores to new violin models than to the old Italian models in a blind test, and that a particular Stradivarius was actually the *least* preferred instrument. Nevertheless, they conclude their study with the no doubt accurate reassurance that the old Italian instruments, with their historic importance, will surely maintain their position (Fritz el al. 2012: 763). From a broader perspective, one can see similar processes and assumptions behind the persistence of the prestigious positions of old paintings, sculptures, buildings, works of literature, religious writings and, of course, musical compositions and musical styles.

Interestingly, *Keyboard* magazine reacted to the growing popularity of old analogue synthesizers in the 1990s by establishing a column dedicated to vintage instruments. Samantha Bennett claims these musicians' magazines have a dual identity, advertising for and bragging about new equipment while at the same time celebrating the mythical position of old equipment (2010). Most *Keyboard* magazine readers are musicians, and many probably combine an active interest in new equipment with a great respect for older instruments. The Chemical Brothers will undoubtedly gain approval among these readers for their choice of the old analogue synthesizer.

The preference of the ARP 2600, as mentioned, disrupts the idea of a linear development that favors the latest technological models over their generally flawed predecessors. Since the Nord Lead and Korg Prophecy were released in 1995, many new synthesizers have been manufactured, in some cases especially for the electronic dance music scene, with new and better emulations of analogue components, more outboard controllers and more suitable sounds. In addition, a couple of expensive, fully analogue synthesizers (also in wooden cases) have been introduced that should satisfy the needs of the Chemical Brothers and their peers. Computer software versions of the most famous analogue synthesizers have also given these models more attention, while at the same time making their sounds and controls more accessible (at least through a virtual version). It is hard to say if rejections by the likes

of the Chemical Brothers led directly to improvements of the first digital emulations of analogue synthesizers toward the truer analogue options available today. Yet the situation has certainly changed. While it was not very difficult to discern between the sound of an analogue and a digital synthesizer in a music production in the 1980s and 1990s, this is no longer the case. Producers have learned to tackle most of the challenges of digital technology and now rely upon devices and computer programs that emulate nearly all of the sounds and side effects of analogue technology. Nevertheless, the old vintage synthesizers retain their prestige, and the debate rages on about the deficiencies of even today's digital emulations. I believe Bijker and Thornton's approaches offer useful insights into the foundations of this debate. The use of an instrument like the ARP 2600 from the early 1970s may be seen as a reaction to the deficiencies of the current state of the art and an expression of dissatisfaction with the direction of the developmental process. Concurrently, it may be seen as a token of authenticity, arising from a mixture of elitist ideas and more straightforward motives. It may finally be seen to signal aloofness toward newer, mass-produced equipment and its users while at the same time symbolizing a connection to history and tradition. In any case, the vintage instrument inspires musicians today as it did in the past, less as a technological triumph, perhaps, than as an important driving force in a creative process.

Notes

1 The bicycle with a large front wheel and a much smaller rear wheel is known by many names, including the *ordinary*, the *high wheeler*, and the *penny-farthing* (from two contemporary British coins of different sizes). I will use the most descriptive term, *high wheeler*, throughout the article.

2 In *Any Sound You Can Imagine* (1997), Paul Théberge writes extensively about the first years of digital technology (from 1983 to 1988) in musical instruments. His approach is motivated by Raymond Williams's foundational work within cultural studies, and especially his perspectives on the role of technology as situated within society. Théberge draws upon studies of the musical instrument industry, the media and consumers in his analysis of the complex relationship between music making and the manufacturing of instruments. His work is highly relevant to my discussion of the development of the synthesizer, particularly given the many parallels between Bijker's approach to the study of technological artifacts and Williams's cultural sociology. However, Bijker's explicit focus on technology and developmental processes presents certain useful perspectives that are less emphasized by Théberge.

3 Even though the audience is supposed to dance or just enjoy the music, there are always those present who are interested in equipment and evaluate performances in light of very specific instrument choices. These people may comprise a small minority of fans but generally wield an outsized influence in relation to, for example, the choice of an old analogue synthesizer.

4 House and techno are music genres that may sound confusingly alike, with the same four-to-the-floor bass drum pattern often constituting an identical rhythmic foundation. Nevertheless, there are certain musical elements that signify the two genres. A typical house track usually has vocals, while techno tracks are more often purely instrumental. Electronic synthesizer sounds

are the main ingredient in techno, while house tracks may include instruments like electric guitar, electric piano and acoustic instruments as well. Samples are more common in house tracks, while extensive use of effect processing characterizes techno.

5   Keightley claims that popular music culture in general derives its authenticity notions from a mixture of Romantic and modernist ideas, but that certain genres are more influenced by one than the other. A fascination with old instruments would be a Romantic notion, for example, while an obsession with a completely new music (like that of the Detroit techno producers) would be a modernistic notion.

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