

# Chapter 8

## “100% Expert!” Mastery and Equality in Darsha Hewitt’s *Sideman 5000 Adventure*



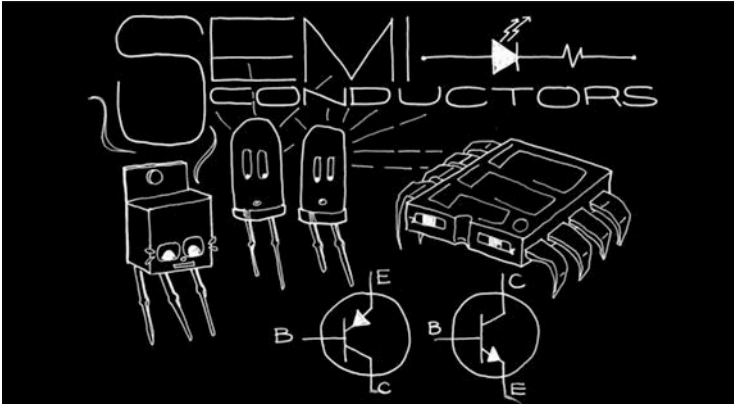
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**Abstract** This chapter examines the tutorial video series *A Sideman 5000 Adventure* (2015), in which Canadian-born artist Darsha Hewitt presents her research on early drum machine technology in a format that brings together for the first time her unique didactic and aesthetic interests. The work is presented in the context of Hewitt’s immediate concerns as an artist and educator, with an emphasis on her staging of the creative encounter with obsolete hardware and her critical confrontation with normative standards of technical expertise. A concluding section then considers Hewitt’s approach in relation to the pedagogical problems of equality and emancipation, bringing her work into dialogue with the educational philosophies of Pierre Bourdieu and Jacques Rancière.

In a 2015 series of videos documenting her restoration of a Wurlitzer Sideman 5000 drum machine, Berlin-based artist Darsha Hewitt blurs the lines between art, research, and education (Figs. 8.1 and 8.2). In one sense the project is archaeological, excavating a meticulously crafted, semi-mechanical ancestor of the sequencers and rhythm computers which structure so much of the music we hear today. The drum machine is effectively an instrument of control: it automatically measures out interconnected units of time, materializing a musical order beyond the limits of human precision. It is neither the musical function nor the sound of the machine that captures our attention, however. Adopting a persona reminiscent of online tutorial videos meting out instruction in everything from eye-liner application to astrophysics, Hewitt invites us to read the Sideman as a map to a lost set of assumptions about sound, music, and craft. She also poses some challenging questions about education as a component of artistic practice. What happens when the educational encounter is the form of the artwork rather than simply a device with which to mediate its effects? Should such artworks inculcate particular ways of thinking and acting, or should they leave their audience free to interpret anew?

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**Fig. 8.1** Title card drawn by Darsha Hewitt, from her video *A Sideman 5000 Adventure* (2015) (Used with permission)



**Fig. 8.2** Darsha Hewitt and the Wurlitzer Sideman 5000 drum machine, from her video *A Sideman 5000 Adventure* (2015) (Used with permission)

The staging of the didactic exchange in the Sideman videos invites the viewer to reconsider the significance of artistic and technical skills for the reproduction of social order. The idea that aesthetic expression should disclose knowledge or feeling in some way is often articulated on the basis of a semiotics of skill (Gell 1992). The selection and acquisition of particular skills for creative expression is also a cultural responsibility constrained by one’s place in the social order with respect to class, race, or gender. In his *Politics*, Aristotle explicitly links the value of music education with the need for general moral discipline. Music for Aristotle imitated the natural forms of moral sentiments and qualities of feeling. Learning to make and appreciate music should enable one to acquire the right character while also honing one’s ability to judge the dispositions of others (Aristotle 2007: 248–270). Many of the more

abstract and pluralistic forms of experimental music and art-making which have emerged since the late twentieth century still share this didactic fervor. The work of John Cage, for example, was guided by a clear project of political education. Central to the experimental and systems work that Cage’s thinking catalyzed during the Cold War was the goal of improving the experimental listener: challenging her intellectually, expanding her range of cultural and scientific expertises, training her both perceptually and physically (Piekut 2012; Turner 2013). While many artists during this period took up teaching and theoretical production as a central part of their practice, however, relatively few featured pedagogy as the form or material of their work. Teaching and learning took place off-stage: a matter for books or classrooms, but not an essential part of the artwork or its reception.

The “circuit-bending” and hardware hacking movements which have emerged in recent decades turn this dynamic inside-out, promoting radical transparency in design, the principles of which are imparted to audiences through public workshops, open access publications, and social media (Ghazala 2004; Collins 2006; Richards 2013). Like their cybernetic forebears (Turner 2006; Halpern 2014) and their contemporaries in the open source software movement (Kely 2005), contemporary open hardware activists regard democratic access to technological resources as an unconditional right. The convergence of Hewitt’s creative and didactic projects is rooted in similar concerns, but also sets up a departure, enacting a formal challenge to the transparent, universal access of hacker ideology. The videos cast a new light on Hewitt’s previous work, clarify long-standing influences, and pose new challenges for critics and audiences.

In one sense, Hewitt’s *Sideman* videos seem to denaturalize the educational exchange, mounting it in a hyperaesthetic frame which amplifies its social undercurrents. As John Richards (2013) has written, the act of placing aesthetic attention on the experience of the electronics workshop rather than the object to be taken home brings such educational practices closer to the domain of relational art. Circuit benders might in this sense hail or coerce workshop publics into subject positions intrinsic to the form of a particular site-specific intervention (Bourriaud 2001). Richards’ approach recalls classics in the genre such as the 2004 event *Swiss Swiss Democracy* by Thomas Hirschhorn, in which lectures, plays, and texts produced inside an installation elaborated upon and generated confrontations with its political content. Here and in similarly encounter-based artworks the political message is unambiguous and the audience is implicated in a participatory critique of current affairs or institutional norms (Hirschhorn 2013). The blur Richards allows between the form and content of his electronics workshops also sets up the kind of provisional recursive relationship that David Novak finds structuring the practice of noisicians in Japan. Zooming out from the technical construction of their performance setups, Novak extends the notion of feedback into a master metaphor for the Noise ethos, tracing its link to concepts of reciprocity and exchange in the late twentieth-century social sciences, and to noisicians’ ongoing negotiations of their creative identities (Novak 2013: 140).

Hewitt takes a more heterogeneous approach, refusing to melt the ethical and the aesthetic into a single conceptual object. Instead of moving the encounter into the

gallery, her work contributes constructively to the normal forms of participation and learning already used by the hacking and making communities in which her practice has its roots. The Sideman videos undermine the performances of mastery typical of sound engineering cultures not by quibbling with their content but by appropriating and revising their form. They model a style of learning in which technical expertise is not transferred from expert to novice, but emerges out of an egalitarian encounter with technological objects and systems. As such they also model a way past the gendered exclusions which so often structure the acquisition of technical skills, especially in musical contexts (Green 1997; McCartney 2006).

The candid, disarming approach to instruction is consistent with Hewitt's own teaching practice. Since her 2014 move from Canada to Germany, where she has held a series of academic positions in Weimar, Kassel, Karlsruhe and most recently Berlin, teaching has shifted to the center of Hewitt's professional life. Her interest in education can be traced back as far as her early contributions to the open source software projects Pure Data and Gridflow as a student of Alexandre Castonguay at the University of Ottawa. Hewitt's fascination with recycling and restoring obsolete technologies works in parallel with her focus on training and documentation. The pattern begins with the 2007 installation *Rotarian Choir*, produced in collaboration with Alexandre Quessy. Appliances are gathered into groups to play out cryptic choreographies. Hewitt finds the simplest imaginable ways of giving her objects voice—the mechanism of which is almost always transparent to the audience—and then lets them sing together as equals. In *Electrostatic Bell Choir* (2012) the result nearly approaches Nam June Paik's aesthetic, gesturing toward the grand psychedelic arrangements of meditating video screens by which he hoped to usher in a new electronic consciousness. In general, however, Hewitt's assemblages suggest starker interpretations. There are tangible parallels with the work of fellow Ottawa-born duo The User (Emmanuel Madan and Thomas McIntosh), for whom Hewitt once worked as a technician. From the *Coincidence Engine* installations (2008–2010) back to the first *Symphony for Dot Matrix Printers* (1998), The User has shown a similar fascination with chorusing as a way of accentuating the grain of the obsolete. But the mood here is distinctly dystopian. Choirs of clocks and office printers connote an unconsensual order. Their sounds harass us into compliance with generalized flows of power.

In contrast, the sites of Hewitt's interventions have always been much more personal. Nowhere is this more evident than in her *Feedback Babies* of 2014, which features a yawning, somnambulant chorus of Fisher-Price Nursery Monitors. Like the television and telephone installations, *Feedback Babies* refers to the scale and the concerns of the home, and in this sense Hewitt harks back to a long tradition of feminist critique. It is a penchant that connects her work thematically to that of Montreal-based performance art group Women With Kitchen Appliances, with whom Hewitt performed for a brief period in 2011. Their generic, faceless costumes and noisy reappropriations of cooking and cleaning devices impart a distinct sense of rage in the face of unequal domestication.

The Sideman 5000 was never a ubiquitous household object, to be sure. But the way Hewitt handles it draws attention to its intimate, furniture-like aesthetic appeal.

It is an accompanist, a buddy. It is endearing because of its idiosyncrasies. At times, she seems to be selling it to her viewers. She brings it down to a domestic scale and shows it to be banal, practical, and accessible. Her performance inhabits the same affective overlap between teaching and advertising you might detect in an “unboxing.” The deflationary impulse originates in Hewitt’s drawing: both her copious notebooks and the illustrations she uses in teaching (Fig. 8.1). These clearly betray the influence of Cold War popular science magazines and instructional guides such as those of Forrest Mims, with their bold, decorative lettering and fantastically anthropomorphized semiconductors (Mims 1986). If Hewitt’s illustrations borrow heavily from this era of technological optimism, however, they also enact a revision of its social forms. Where mid-century hobbyist culture primarily addressed a public of white, suburban American men and boys, Hewitt’s vision of the cybernetic era highlights its experiments in social organization and democracy. Viewed through a feminine historiographical lens, the canonical Foucauldian account of cybernetics as an “ontology of the enemy” (Galison 1994) breaks down to reveal a distinctly utopian tradition of artists and teachers inspired by the thought of themselves and their students as open systems. Hewitt herself has pointed to the American artist Sonya Landy Sheridan, whose “Generative Systems” courses at the Art Institute of Chicago in the 1960s challenged students to unlock the creative potential of basic office machines (Sheridan 2006). The generation of composer-educators who began their careers during the Cold War, among them Pauline Oliveros (1984) in the United States and Marcelle Deschênes (Valiquet 2017) in Canada, played a crucial role in institutionalizing electronic music pedagogies with a focus on receptivity, interdependence, and play rather than pure technical efficiency.

In her introduction to the 2010 book of interviews *Pink Noises*, Tara Rodgers weighs an essentialized femininity highlighting soft, irrational, or fuzzy qualities of experience against the possibility of a positive feminist historiography of audio engineering. She notes how many women “stake out philosophical positions that run counter to using dominant technoscientific priorities of precision and control as ends in themselves” (Rodgers 2010: 8), and thus invites us to look more closely at “how electronic music can (or has failed to) express possibilities for more imaginative and ethical encounters with technology and difference now and in the future” (ibid.: 10). We must keep in mind, however, that the same qualities have been used to implicitly devalue women’s work in relation to dominant masculine norms of competition and creativity. Thinking of women in terms of “passivity, receptivity and maternity,” writes Rodgers, traps them in a logic of “reproduction” which can become an obstacle to valorizing their work as “producers” (ibid.: 12). Reproductive technologies and technical practices, such as teaching, are generally ignored by audiences and critics. The standards of representation used to evaluate sound technologies in science and industry often perpetuate patriarchal assumptions about masculine originality and feminine transparency.

One of the opportunities for intervention, according to Rodgers, is to “account for reproductive sounds in all their temporal depth” and thus to “challenge the patrilineal lines of descent and the universalizing male claims to creation that have thus far characterized dominant discourses in electronic music” (ibid.: 15). This attention to

the historically and culturally situated gendering of sounds does not originate in Rodgers' project, of course, but has been a shared strategy for feminist music scholars for decades. It links Zoe Sophia's (2000) study of "container technologies," Rebecca Leydon's (2001) work on the relationship between gendered listening positions and the use of "soft-focus" reverberation effects in certain "easy-listening" genres, and Andra McCartney's (2006) survey of the concepts of objectivity, modernity, and accuracy that help maintain gender boundaries in the electroacoustic studio. In Germany, it has informed interventions like Meike Jansen's (2005) anthology *Gendertronics*, which aims to enhance inclusion by privileging the body as both site of reception and as the means for productive action in electronic music, as well as advocacy and awareness-raising groups such as *female:pressure*. Insofar as the goal is to amplify feminine voices in the present, these strategies can be enormously helpful.

From a historiographical perspective, however, the implications are more complex. The main risk of this strategic essentialism is that it reinforces a "head and hands" division of labor in electronic music practice, separating the supposed abstractions produced by engineers and scientists from the emotional labor performed by listeners, players, and dancers, and thereby dissuading non-technicians from contributing as theorists or thinkers. The concentration of women in relatively invisible, "reproductive" professions like education, care, and administration may indeed echo ancient European cultural tropes identifying men with active reason and women with passive reception and affection (Lloyd 1985). The situation only seems so dire, however, to the extent that scholars and critics insist on excluding para-artistic practices like teaching and administration from the canon in the first place. The form of the category "artist" is exclusive all on its own, before we decide how to fill it with content. As teachers and administrators, women were of course never absent from electronic music production at all. Asking why they were excluded from positions of power can certainly be important from the perspective of restorative justice, but it is equally important to recognize their achievements in the positions they did hold. The relative importance of being recognized as a "producer" depends on the same gendered matrix that makes it seem like nothing special to be a secretary. As historian Marie Hicks (2017) has recently shown in her account of the retrospective defeminization of the British computing industry, there can be a reciprocal relationship between the value a profession is perceived to have for society and the value of the people perceived to be suited to performing it. As computer programming became more prestigious, it became more masculine; and as it became more masculine, it became more prestigious.

Pierre Bourdieu's sociological analysis of education gives some attention to the functions of grooming and gatekeeping associated with feminized roles, but adopts notions of care and reproduction different from those Rodgers seeks to reclaim. Although not explicitly linking education to the gendering of artistic professions, Bourdieu groups education with kinship and familial relations as ways of preserving existing orders of social and economic difference. Reproduction for Bourdieu is not undertaken intentionally, but rather animated by the subconscious, often



mis-recognized *doxa* which bind together social groups across generations (Bourdieu 1977). The aesthetic and social forms that reproduction strategies take in cultural life are not experienced as coercive, but rather as freely enhancing feelings of pleasure and privilege (Bourdieu and Passeron 1964). Bourdieu’s critique hinges upon the assumption that, whether one is undergoing or performing these educational or familial selection procedures, one is always in a sense consenting to one’s own deception.

These soft relations of exploitation only work if they are soft. They are relations of symbolic violence which can only be established with the complicity of those who suffer from it, like intradomestic relations. The dominated collaborate in their own exploitation through affection or admiration. (Bourdieu 1998: 111)

The emphasis here on the “soft” and “receptive” character of social reproduction underscores the uneasiness that has characterized most feminist readings of Bourdieu. As Terry Lovell puts it, Bourdieu is “bleakly pessimistic” when it comes to the sources of change available to those seeking equality (Lovell 2000: 27). He echoes structuralist forebears like Claude Lévi-Strauss in concentrating his thinking about women on their production as objects to be exchanged for social status or put to work in maintaining class boundaries through the accumulation of symbolic capital. This approach “rarely considers women as subjects with capital-accumulating strategies of their own which may be at odds with those of their family and kin” (Lovell 2000: 21). The challenge for critics has thus been to find value in Bourdieu’s attention to the many constraints on gendered performance while also holding open the possibility of transformative social agency (McLeod 2005). Without assuming that subversions should be possible in all cases, it is still crucial to discover when and how gendered positionings *can* be consciously mobilized against a dispositionally determined *habitus*, and to whom such constructive boundary crossings are allowed within a given field.

Lovell illustrates the gap between reproduction and transformation by comparing the degree of subjective agency afforded by Bourdieu’s theory of class with that presumed in Judith Butler’s accounts of gender and sexuality (Butler 1990, 1993). Butler and Bourdieu develop contrasting readings of J. L. Austin’s linguistic notion of “performativity.” Butler argues that performative utterances can be “dislodged” in order to transgress authority structures, while for Bourdieu the degrees of freedom experienced by social actors are always “profoundly rooted” in authority, ironically perpetuating it by taking it for granted. Effectively, Butler locates agency in the act of performance, and thus finds all performances as equally fluid and potentially transgressive of the existing order, whereas Bourdieu locates agency in the underlying structure of economic domination, lamenting the fundamental inequality of access to transgressive actions and the inevitable condemnation of those without power to powerless forms of expression (Lovell 2000: 14–16). Readers like Lovell claim to seek a middle ground between the two: a critical performativity that is actively engaged in altering the social order which makes it possible.

A similar concern with recovering the potential for critical agency from Bourdieu’s theory of social reproduction can be found in the work of French political

theorist Jacques Rancière. Taking issue with the way Bourdieu reduces education to class reproduction, Rancière argues that the presumption of inequality as the starting point for education is in fact “the very means by which the actualization of equality is infinitely deferred” (Pelletier 2009: 148). In order to aim their critique at the “ineluctable reproduction” of domination, sociologists must presuppose a distinction between the capacities of the dominant and those of the dominated, dismissing the latter as “objects of study rather than intellectual subjects” (Pelletier 2009: 138; Rancière 2007). By characterizing social actors as incapable of recognizing their subordination to an immobile hierarchy, Rancière argues, Bourdieuan sociologists exclude the possibility of political change. The alternative, from this perspective, is to create forms of education in which critique from below is not only possible but essential for progress. Turning the tables on social reproduction means recognizing that, as Rancière argues, “the dominated do not remain in subordination because they misunderstand the existing state of affairs but because they lack confidence in their capacity to transform it” (Rancière 2004: 65). Equalizing actions are equally possible only in a social order which engenders equality, one where actors are presumed to be equal as a condition of possibility for their being actors at all. This presumption opens the door to what Rancière calls “dissensus,” a term which encompasses not just direct “agonism” (Laclau and Mouffe 1985), but “an action taken by people declaring their capacity to alter the calculus of inclusion and exclusion that constitutes the formation to which they belong” (Moreno and Steingo 2012: 489).

In the 1987 book *Le maître ignorant* (The Ignorant Schoolmaster), Rancière makes this notion of dissensus the basis for an emancipatory philosophy of education, affirming the freedom of learners by shifting equality from the goal position to the starting point (Pelletier 2009: 142). Using historical allegory he challenges the educator to make equality a basic fact of pedagogical practice, rather than a reward promised only to the winners of an essentially unequal competition (Ross 1991: xix). Rather than presuming the student to be starting from the point of relative stupidity, and thus instructing from a position of superiority, the teacher in Rancière’s allegory renounces his authority over the course of the students’ explorations. Rancière’s teacher—a French speaker in a Flemish classroom—is unable to communicate with the students about his own understanding of the material, so he lets them explore it for themselves and learn whatever they can. The shared text, in this case a bilingual edition of the eighteenth century didactic novel *Télémaque*, itself an important manifesto for equality through education, ceases to be a tool of distinction between them, one which the students must “absorb” in order to gain the symbolic capital appropriate to their position in society; instead, it becomes something that teacher and student can hold in common and learn from differently according to their interests. Allowed to “speak for itself,” the text becomes the “egalitarian intellectual link between the master and the student” (Rancière 1987: 25). Mastery resides not in pressuring the student to follow a single “correct” path, but rather in empowering the student to invent a path of her own (ibid.: 58).

Rancière is not alone in imagining an ethos of pedagogy beyond the reproduction of structural inequality and the tragedy of Bourdieuan misrecognition. His allegory picks up long-established threads in the American pragmatist tradition, itself a



considerable repository of feminist thought. Freedom in this perspective is not an inalienable property of human subjects that flourishes only when constraints are removed; in fact, without a generative matrix of social constraints, individual freedoms dissolve into unreflective habits and appetites (Addams 2002). Reproductive labor—the labor of people like teachers and administrators—should be recognized as the glue that holds our strategies for emancipation together. For theorists and historians, then, the challenge does not stop at valorizing the hidden work of women as “producers.” The crux of the problem lies in breaking down the assumption that production has any value at all outside of reproduction. This is the question that gives critical power to Hewitt’s engagement with education.

The friction between this outlook and the normal run of engineering education is obvious. Expertise ceases to depend upon rising in a preconceived social order and becomes a question of contingent needs and purposes unique to each individual. What may not be obvious is that the removal of the professional hierarchy also changes the meaning of the objects to which our expertise is applied. Nostalgic and dystopian uses of obsolete technologies—often boiled down to some version of the millennial turn toward an “aesthetics of failure” (Cascone 2000)—frame the old and inefficient as an ironic critique of technological progress. The obsolete machine stands as a reminder of technology’s inevitable decay into uselessness: as faults accumulate over time, our everyday intentions and interactions break down to reveal their interdependency. As Hewitt explains early in the *Sideman* video series, however, this work is not about nostalgia. The contingency and interdependency of technological knowledge is not a crisis to be solved by some more universal form of mastery in the future. The challenges that this idiosyncratic machine presents to the student are still alive with possibility. Our tour through the inner workings of the *Sideman* is not about coming to terms with its original condition, nor is it about restoring it to perfection. Rather, it demonstrates that solving technical problems and becoming an “expert” is often simply a matter of opening the case and paying attention to what one finds inside.

Instead of struggling to expand the distribution of the dominant form of electronics mastery, or on the contrary trying to escape mastery altogether, Hewitt proposes an equal starting point from which each student can develop an expertise corresponding to her own concerns. The drum machine becomes a platform for what Donna Haraway (1991) has called “situated knowledges,” shedding its aura of decaying order. Recall again the innocent, harmonious choreography of works like *Feedback Babies* and *Electrostatic Bell Choir*: the affective tone of these assemblages evokes not dismay or failure but calm, care and concern. Like the ignorant schoolmaster’s bilingual volume of *Télémaque*, Hewitt’s *Sideman* is a text in which multiple dissenting ideas and methods await anyone empowered to search for them.

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With their numerous module plates mounted next to each other in huge locker-like racks, connected by wires and with their control knobs and switches, their look appeared to fit into the common picture of a classical musical instrument quite oddly. Naturally their sounds were associated with the sphere of science fiction, and several synthesizer sounds were used in film and radio broadcasts. But they also opened up new sound dimensions in music, for example as Pink Floyd or Tangerine Dream explored in their music. In addition, the progressive rock music band Emerson, Lake & Palmer used the sounds of their Moog synthesizer very extensively to substitute acoustic instruments and to create new timbres for their album *Pictures at an Exhibition* (1971).

In the first half of the 1970s, a new version of synthesizers appeared and presented a counterpoint to the development of huge synth-racks on stage. Moog and Buchla as well as EMS—a London-based synthesizer-company founded by Peter Zinnovieff in 1969—developed small transportable and much cheaper devices. Soon the so-called Minimoog gained some fame with its prefixed modules, filter banks, and integrated keyboard, and most likely influenced future synthesizer designs (Feser 2017: 30). A new way of connecting and at the same time avoiding cable clutter was introduced by EMS (Electronic Music Studios) with the VCS-3. A patch matrix enabled the player to connect modules and a small joystick enabled operating within a selected parameter. Buchla presented his Music Easel, a suitcase with an integrated keyboard. The new and infinite potential of creating sounds that are provided by a huge modular synthesizer creates a problem in conjunction with that freedom: the problem of controlling. Without the option to somehow save the preset for one special sound, the infinite potential remained locked behind the time-consuming (at least in terms of live-performance) need to change wiring or switches. Against this background, it is no surprise that Pink Floyd did not buy one but sixteen Minimoogs (Supper and Ungeheuer 1995: 1760).

Next to the commonly known development of synthesizers, instruments like the Wurlitzer Sideman, ancestor of drum machines, or the Clavioline only played a small role in the world of music during the 1960s. However, another instrument for providing musicians with a range of timbre turned out to be quite successful. In the way of its process of creating sound and timbre, it represents an antipode to the synthesizer design and philosophy. Synthesizers indeed produce sounds and timbres by means of oscillators in combination with filters, other oscillators, a sequencer, and so on. The Mellotron, however, was not a synthesizer. It could not produce and alter waves, but it could reproduce recorded sounds by using short parts of audiotape. Therefore it is a sample-based instrument—in short, a sampler.

By taking a look at the big radio-broadcast studios which emerged after the war, the synthesizer and the sampler can be seen as representatives of two different and very popular ways of making music. The more synthesizer-like approach can be seen in the work of the Cologne-based Studio für elektronische Musik (Studio for Electronic Music), founded and led by Herbert Eimert in 1951. The studio was originally equipped with a Melochord built by Harald Bode (also a Berlin-based pioneer in the late 1920s and 1930s) and an electronic Monochord by Trautwein. But only 2 years later, those instruments were not in use by Karlheinz Stockhausen

because he specifically demanded a sine wave generator for his work (Supper and Ungeheuer 1995: 1755). Instead of having an instrument doing all the timbre work, he experimented in the field of timbre design with the use of (recorded) sine waves. The Paris-based Club d'Essai, founded by Pierre Schaeffer as Studio d'Essai in 1943, worked under very different esthetic premises. Recorded sounds were the original material for his *Musique concrète*, the actual process of composing started only after the recordings were finished by altering tape speed as well as cutting (Supper and Ungeheuer 1995: 1753). Of course, both esthetic concepts used tape, but the main focus lay on the creation and nature of the original material. In Cologne this is realized by wave oscillators for creating sine waves, just like the synthesizer does. In Paris the original materials were real-life audible events, which were processed by using a state-of-the-art tape recorder. For that reason the Mellotron, in comparison to the synthesizer, can be seen as an antipode in providing a musician with the potential of playing in a different timbre.

Of course, the Mellotron has an ancestor: the instruments by Harry Chamberlin, who built and sold his instruments from the end of the 1940s onward in the United States. Chamberlin's idea came to Great Britain, where a producer of high-quality audiotapes started to build Mellotrons in the 1960s. It could be equipped with different audiotape cartridges, containing three different timbres on short tapes, one tape for each key. In fact we all know the Mellotron, even if we are not aware of it—if you ever listened to the song *Strawberry Fields* by The Beatles you heard the flute intro, which Paul McCartney played on his Mellotron. In the following years, the sampler turned out to be an important tool for music studios.

Beside those two groups of electronic musical instruments, synthesizers and samplers, a third and highly specialized group made its step onto the stage of music and music production. Today this third group is known as drum machines and is widely disseminated in different subgenres of electronic (dance) music. The group's ancestor, the Sideman, has already been mentioned, but it was more than one decade later that drum machines were used in recordings, while on stage they had to wait until the 1980s. Probably the first recording of a studio LP that contained sounds of a drum machine was *There's a Riot Goin' On* by Sly and The Family Stone in 1971 (Pelleter 2017: 42), where a Rhythm King by Maestro was used. Later—and now for the first time we get to EDM—the connection of an instrument to a location (drum machines and dancefloors) will turn out to be style forming, especially for the genres of house and techno. Here we can think of the legendary drum machines like the Roland company's TR-808 and TR-909 because of their characteristic sound. At first those analogue sounds were not able to withstand the competition that came with the first digitally working devices. “‘Eight-Oh-Eight’ and ‘Nine-Oh-Nine’ owe the techno, house and HipHop DJs that the initial failure could be overcome and meanwhile be turned into legendary status” (Pelleter 2017: 42).

Drum machines play preprogrammed or live-programmed rhythm patterns instead of melodies or harmonies and create their sounds either by means of analog circuitries or digitally sampled sounds. The sole role of substituting drum sets led to completely new interfaces on which musicians were able to use those instruments for their artistic ideas. For that reason, drum machines as well as synthesizers