

## **Ursula Franklin, Daphne Oram, and the Practices of Music Technology**

**Hannah M. Brown**

Faculty of Music, University of Toronto  
hannah.brown@mail.utoronto.ca

### **Abstract**

Ursula Franklin's concept of the "real world of technology" focuses on the ways in which technologies are not simply artifacts, but "practices" which impact all aspects of everyday life, including social relationships and work (Franklin, 1999). In this article, I discuss how the work of cultural production is linked to Franklin's ideas about labour in a technocratic world. I focus on Daphne Oram, an electronic music composer and inventor who worked at the BBC Radiophonic Workshop from 1957-1959. Oram's work took place during a period of changing technological labour policies, reification of class and gender-based social norms, and attempts at implementing globally competitive technocratic systems in Britain (Hicks, 2018; Shafer, 2015). The socio-historical context of this era of technological labour development and music creation will inform my analysis of how these techno-cultural relationships operate today. In the current age of global new-mass-media, are music technologies prone to becoming increasingly profit- and efficiency-driven in the same ways they were in the past? Through examining the "practice" of music technologies, I will engage with the ways in which Franklin's idea of the "real world of technology" applies to cultural production both in this historical example and today.

## Introduction

Ursula Franklin's concept of the "real world of technology" focuses on the ways in which technologies are not simply artifacts, but "practices" that impact all aspects of everyday life, including social relationships and work (Franklin, 1999). She argues that the dominant progress narratives of technology as reducing the need for menial labour and thus freeing people from work are not reflected in real labour markets. Instead, technologies to make work easier are used to increase efficiencies and profits by reducing labour costs through deskilling and compartmentalizing tasks, which in turn further alienates the labour force from their products. She argues that instead of driving diverse innovation and creativity, the increasing prevalence of "prescriptive technologies,"—technologies in which the user does not have control over the entire process—facilitates standardization: the process by which a technology becomes so ingrained in a practice that the practice itself is shaped by patterns of use (Franklin, 1999). Though Franklin primarily uses examples of work technologies like typewriters and sewing machines, her arguments can also be fruitfully applied to cultural labour, particularly music.

In this paper, I discuss how the work of music production can be linked to Franklin's ideas about the real world of technology. I begin by discussing the ways in which Franklin's ideas of technology as practice, prescriptive versus holistic technologies, and standardization link to music labour, specifically in terms of human-machine interfaces and systems of musical control. I then apply these ideas to a historical example, focusing on Daphne Oram, a composer and inventor who worked at the BBC Radiophonic Workshop from 1957-1959. Oram's work took place during a period of changing technological labour policies, reification of cultural identity and gender-based social norms, and changing ideologies around electronic sound technologies and music itself. I end by linking these themes to modern computer music technologies which have revolutionized the ways electronic musicians learn skills and work. Through examining the machines, labour forces, and user interfaces of these music technologies and their sociohistorical environments, I will explore how Franklin's idea of the "real world of technology" applies to cultural production in electronic music both in its early days and, after generations of development, today.

In many cases, music technologies meet Franklin's definition of "prescriptive technologies" in varying degrees. Music is a highly collaborative art form that relies on a variety of technologies, their interfaces, and their associated skills and practices, and thus requires multiple levels of labour, many of which are relegated to the background (Vágnerová, 2017). A concert performed by a professional orchestra requires eighty or more classically (usually institutionally) trained performers, as well as administrators, venue workers, instrument manufacturing labourers, composers, music publishers, copyright officers, and more. Additionally, the inventors and designers of machines like musical instruments, as well as those who standardize and teach the skills required to use such instruments correctly, profoundly shape generations of performers,

composers, and listeners. A finished musical “product,” whether a live performance or recording, is always touched by many hands, often across vast swaths of time and space. Despite this deep level of collaboration, much of the Western art music tradition is steeped in individualistic nineteenth-century Romantic ideals which promote the idea of the genius individual artist whose work comes from within themselves (Niebur, 2010).

In large part due to these Romantic ideals, musical instruments and practices are treated and thought about very differently than the work-related technologies that Franklin discusses in *The Real World of Technology*. In fact, even describing musical practices in terms of labour can be contentious among musicians, who like many cultural workers, are often expected to produce work out of an *authentic* desire to do so, instead of simply to act as part of a larger capital-producing industry (Scharff, 2018). Despite this resistance, many parallels can be drawn between Franklin’s description of technology practices as they apply to labour and the establishment and continuation of musical practices. Thinking of technology as practice, as Franklin suggests, intrinsically links the former to cultural and social norms and thus illuminates the mutually shaping nature of musical ideologies and the machines and labour forces music relies upon. Additionally, practices of technology create and maintain social systems of self-identification and insider/outsider separation through establishment of norms of knowledge and skills associated with the use of technologies. Franklin explains that “the historical process of defining a group by their agreed practice and by their tools is a powerful one” which encompasses distinctions of race, ethnicity, class, and gender (Franklin, 1999, p.11).

### **Standardization, Work, and Music Technology**

Arguably the most important technology in Western music in terms of deeply impacting and shaping musical practices is the piano. The piano has been an integral part of Western music since its invention in the late-eighteenth century, and its standardization of practice has become deeply entrenched in music education (both formal and informal), composition, audio engineering, and music software development. As a technology, the piano has even profoundly impacted the entire sonic system of Western music (and beyond, through global influence) by significantly contributing to the standardization of the equal tempered tuning system, a tuning system that allows for an instrument to play in all keys (sets of fixed pitches) equally “in tune” (Lindley, 2009). This is important for keyboard instruments like the piano because the mechanisms they use for tuning pitches cannot be adjusted on the fly and a player cannot play “in between” the notes like they could on an instrument like the violin (Lindley, 2009). For most listeners of classical and popular music alike, the tuning system specifically designed to work with the piano’s shortcomings is expected, and deviations from this system often sound strange or “out of tune”.

The piano has been such an influential music technology that its human-machine interface, the keyboard, has become ubiquitous in music composition and performance, from electronic instruments to audio software. Music students in formal institutional programs are expected and often required to have a level of keyboard playing proficiency, and even outside of these settings, such as in casual music lessons or children's music programs in schools, where the piano is widely used as a pedagogical tool. Similar expectations are ingrained in many music software programs—the ability to read Western music notation is less necessary for the operation of many programs than a level of familiarity with the keyboard. Similar to Franklin's example of the development and subsequent standardization of the QWERTY keyboard to adjust typing practices to suit the mechanical limitations of typewriters, equal tempered tuning and the keyboard interface have become firmly entrenched in musical practices, even though current technology does have the same mechanical limitations as the piano (Franklin, 1999).

### **Daphne Oram, the BBC, and Electronic Music Ideologies**

Electronic music history is often portrayed as originating in the aesthetic and philosophical movements associated with two famous figures and their associated electronic music studios in mid-twentieth century Paris (Pierre Schaeffer and *musique concrete*) and Cologne (Karlheinz Stockhausen and *Elektronische Musik*). Embodying the Romantic ideals of individual genius of past classical composers, these creators and their followers saw themselves as continuing the linear progression of art music tradition and bringing it into a new era by using new technological tools. However, the history of electronic music technology leading up to today's prevalent computer music systems and peripheral technologies has many influences from beyond the art music world of Schaeffer and Stockhausen. Developments in military and communications technologies, the rise of audiovisual entertainment media such as television, and post-war pushes by governments to establish themselves globally as technological powers had huge impacts on the ways electronic music developed.

The work done at the BBC Radiophonic Workshop in the post-war period is one example of electronic sound developed in a context outside of the Continental electronic art music studios. Though the creators were familiar with these studios and their music, the work produced by the Radiophonic Workshop was primarily used for sound effects and audio accompaniment for dramatic media, particularly in psychological thrillers, comedies, and science fiction genres (Niebur, 2010). Though the Cologne and France schools had very different aesthetics and compositional philosophies, both positioned themselves against the growing use of electronic music in dramatic contexts in radio, television, and movies, as this undermined the seriousness and internal integrity of electronic music composition (Niebur, 2010). However, compared to the Continental studios, the BBC locus of electronic music creation has, according to Louis Niebur, been more influential to the ways in which general audiences think about electronic sound due to the impact of the Radiophonic Workshop's techniques on popular culture.

The BBC Radiophonic Workshop was founded by BBC employees Daphne Oram and Desmond Briscoe in 1957 to meet increasing demand for unique sound effects and atmospheric music for radio dramas (Hutton, 2003). For the most part, the work done at the BBC Radiophonic workshop during Oram's tenure was not considered *music*, but was instead created primarily to support and enhance dramatic media. Unlike classical and popular musicians of the time who were considered artists first and foremost, those employed at the Radiophonic Workshop were treated by the BBC primarily as technicians. In their request to the BBC to implement the Radiophonic Workshop, Oram and Briscoe never use the word "musicians," instead using "engineers," "tape editors," and "devisors of special effects" to describe the employees (Niebur, 2010, p. 36). Interestingly, these job titles relate more strongly to "craft" than "art," implying, based on Franklin's definition, a stronger link to holistic technological practices, where the user is in control from start to finish and is less (or not at all) reliant on an overarching organizational system to divide labour (Franklin, 1999). Though these workers certainly had constraints on what they produced, based on what the BBC wanted and what media they were producing sounds to support, they were not reliant on the strict structuring of existing musical systems of control.

Like many British women, Oram began working a technical job during World War II, where lack of availability of male workers and quickly accelerating technological advancement and reliance led to the hiring of women to fill technical roles (Hicks, 2018). Oram was hired by the BBC to work as a program engineer in 1943, where her job was working as a sound mixer on classical programs. Prior to her employment at the BBC, Oram had attended the Royal College of Music studying piano and composition, but sources differ on whether or not she completed her studies there prior to beginning her work as a sound engineer (Hutton, 2003; Manning, 2012). During her time working for the BBC, Oram became more interested in electronics and the work being done with electronic music in the studios of Schaeffer and Stockhausen, and by the early 1950s she had risen in the ranks to become a studio manager (Hutton, 2003).

In the postwar period, the British government aimed to reify British social norms after years of disruption due to wartime changes in the social order. Women who were employed in tech jobs during the war (many of whom were conscripted into the labour force) were often forced out of their jobs and denied veteran benefits and assistance under the new welfare plan in an effort to maintain the social ideal of the nuclear family (Hicks, 2018). Those who retained their jobs were subject to deskilling and the devaluation of their labour, and, as Franklin also notes, not credited for the reliance of technological advancement on their work and subsequently denied access to leadership roles and career advancement (Franklin, 1999; Hicks, 2018). The BBC was one vehicle for reifying British culture, and music was a key part of the strategy to define and maintain a British identity. The BBC music department at the time was musically conservative, focusing almost solely on the "great music" of the European classical canon. The mandate of the BBC

included performance excellence, promoting cultural education, and teaching music appreciation of these “great works” to the British public (Niebur, 2010). These musical values meant that new technological advances in sound technologies (such as new recording and mixing techniques) were utilized primarily to support the already ingrained practices of technology of classical instrumental musicianship (Niebur, 2010). As Franklin (1999) pointed out, “the technology of doing something defines the activity itself, and, by doing so, precludes the emergence of other ways of doing it” (p. 12). Because the work of the Radiophonic Workshop on electronic sound was *not* considered music by the institution, and was primarily utilized in a way that “great music” was not, the strictly defined standards of musical composition and performance were largely ignored, allowing for multitudes of differing techniques and aesthetics to flourish.

Though Oram was fortunate enough to be one of the women who maintained work in technical fields post-war, and was even able to rise in rank, she came up against significant resistance when she attempted to initiate change within the BBC institution and when finding support for her own creative work. When she approached the BBC for assistance in funding her research and development of new electronic music instruments and techniques, Oram was turned down with the explanation that the BBC had its symphony, and that was all it needed to make music (Manning, 2012). Wishing to pursue her own projects, Oram left the BBC in the late 1950s and subsequently began working out of her own studio, continuing to produce sound effects, jingles, and soundtracks, as well as pursuing her more experimental projects (Manning, 2012).

At the time of Oram’s departure from the BBC, electronic music equipment was still prohibitively expensive, rare, and space-consuming for those working outside of institutional contexts, which were generally able to justify the expense of these tools for scientific research programs. The work for which Oram is most well known (and generally the only reference made to her work in electronic music histories), the Oramics machine, was produced at her home with the help of several colleagues and funding from Gulbenkian Foundation grants (Hutton, 2003). Instead of using a keyboard, the input for the Oramics machine involved drawing waveforms onto tape by hand. One of Oram’s goals in creating this visual interface was both to make the machine more useful for those without previous musical knowledge (reading notation and keyboard skills), and to allow for a greater range of possible sounds and pitches that do not necessarily “exist” in the Western musical system. She considered being able to see the soundwave represented visually as easier to conceptualize and understand than reading notes on a staff: “we wish to design this machine-with-humanising factors so that the composer can instruct it by means of a direct and simple language. He will want to transduce his thoughts as quickly as possible, via a channel that is logical” (Oram, 2016, p. 131). This “direct and simple language” allowed for exploration of sound, particularly focused on timbre (the character of a sound, distinct from its pitch and volume), free from the strict frameworks of WAM notation. It

also allowed the user control over almost the entirety of the sound production process, making the Oramics machine what Franklin would call a holistic technology (1999). By removing some layers of abstraction from the sound creation process (i.e., notation) the user can theoretically transmit their sonic ideas directly into the machine via a “logical” visual system that is easy to learn. Oram also believed that the Oramics machine had potential outside of music composition and could be used as a tool for scientific research into sound and perception and as an educational tool in British classrooms to teach children about such subjects (Hutton, 2003).

As is discussed at length in her book, *An Individual Note*, Oram believed that electronic sound production and study could help people better understand themselves and each other. With this book, Oram aimed to create an accessible basic guide to electronic music, both technically and philosophically. She opens the book by explicitly stating, “Music, sound and electronics...each of these subjects has been covered recently by sober academic textbooks; I am certainly not going to write another of those! This book is for amusement” (Oram, 2016, p. 17). Like Franklin, Oram saw technology (and music) as a practice with complex implications and impacts on social and cultural life. She makes connections between the workings of capacitors and the workings of human composers, how they store and release tensioned energies. Like Franklin, she saw both great value and the potential for great harm in humanising the machines that people use by promoting greater individual control and flexibility. Though she saw great potential in new technologies, she stated in her conclusion, “the more we consider it the more we realise that the future still rests with human character and personality” (2016, p. 161).

Following the completion of the original Oramics machine, Oram attempted two projects extending the ideas and functionality of Oramics: a Mini-Oramics machine meant to be affordably manufacturable and used in schools, and a software version of Oramics. Ultimately the Mini-Oramics project lacked the financial backing needed, and Oram ceased working on her software project following a stroke in 1994 which prompted her retirement (Manning, 2012). Despite the fact that these two works never came to fruition, Oram’s career, though unusual, was ultimately remarkable. She was able, as an unmarried woman, to make a living from music working independently of an institution and primarily from her home studio composing advertising jingles and teaching (Manning, 2012). Unfortunately, it is in part because of this commercial (non-artistic) work that Oram is often only briefly mentioned in electronic music history as a founder of the Radiophonic Workshop and inventor of the unique but ultimately unsuccessful—in the sense that it was both not commercially viable, and does not fit neatly into a linear progress narrative leading to another technology—Oramics machine.

Oram’s focus on education, research, and humanizing the process of music making, and her commercial cultural labour career puts her at odds with the Romantic ideal of the composer who creates only for art’s sake. Her work is situated at an ideological crossroads in the shifting

of the narrative around music technology where she does not fit neatly on either side. Stockhausen and Shaeffer, Oram's contemporaries, were canonized in a similar manner to other "greats" of art music composition, as genius artistic innovators building on Western art music traditions. Key electronic music pioneers of the next few decades, inventors like Robert Moog and Don Buchla, were still considered to be products of individual genius, but this time as rugged tinkerers and technicians who were able to create mass-consumer products and influence the sounds and techniques of generations of composers and performers to come. This change signals a shift in focus from prestige via ideological and musical influence (the Romantic ideal), to prestige via proliferation in consumer markets and visibility in the popular music industry.

### **Music Technologies as Marketable Consumer Goods**

One of the main advertising points for new music technologies over the years, from synthesizers to computer programs, has been the "freedom" to be in control of the entire musical process as an individual, effectively glossing over the various levels of labour and decision-making that are beyond the reach of the user (Vágnerová, 2017). Consumer music technologies inherently fit Franklin's definition of prescriptive technologies and, like the piano, are prone to processes of standardization. Since many of these technologies are developed and sold primarily as consumer goods, they also tend toward another of Franklin's concerns—the alienation of users from aspects of their work in order to improve ease of use and thus increase marketability to wider demographics. This is the locus of a key issue in electronic music where Franklin's work resonates clearly—that is, whether the accessibility through simplicity and standardization of the user interface is ultimately worth the trade-off of relinquishing control and skill to the vast network of other actors involved in the development and maintenance of the technology? Though Oram championed the idea that music technologies like her Oramics machine would allow for greater accessibility to creating with sound for those without traditional music training, her primary goal was to move beyond the constraints of previous interfaces like keyboards and Western notation. She aimed to allow the user greater individual control over all elements of the sound—though like any technology her visual system also had its limitations—and by extension humanize the machine through its flexibility (Oram, 2016).

Today, standardization in music technology is occurring most obviously in Digital Audio Workstation (DAW) software like ProTools and Ableton Live. Knowledge of "industry standard" programs like these is quickly becoming a prerequisite for production and sound engineering jobs and an expectation for electronic music composers across genres. These programs carry high price tags (as of this writing the full version of Ableton live is \$969 CAD and ProTools' "industry standard" middle tier is \$389 CAD per year), and some have also spawned specially designed plug-and-play peripheral hardware like the Ableton Push. The prices of these programs and the standardization of their use has created new inequities instead of simply



erasing old ones (such as traditional instrumental training). Though institutional training in these programs is becoming more common as music technology and audio production programs become more common in music education systems, skill-building in the DAW user base is what Franklin (1999) calls “asynchronic,” happening across time and space and in dispersed learning networks. Many users rely on internet forums, official and unofficial, to learn new skills and troubleshoot. Learning to navigate these online knowledge sharing systems is a skill in and of itself that is essentially a requirement for acquiring knowledge about DAWs. Franklin observed these kinds of patterns when she expanded on *The Real World of Technology* in 1999, “there are new haves and have nots, now defined in terms of their ownership of equipment, their access to and knowledge of the new codes that allow asynchronic practices” (p. 117). Instead of removing the monetary and educational costs of music making (instruments and formal training), the proliferation of DAW software has shifted these costs elsewhere in the form of expensive standardized software and hardware products and the expectation of the necessary digital literacy to participate in online community-based learning practices.

As Barry Truax (2002) notes, “The relation of music and technology is increasingly paradoxical. Within musical thought, digital technology allows the composer to conceive musical ideas from strikingly new perspectives. At the same time technology allows music to be increasingly embedded within the *media environment* as a commodity with more exchange value than use value” (p. 21). Truax explains that, although technological advances in computer software have made audio production and experimentation more flexible and, in many ways, more accessible, the commodity market has restricted the availability of such software to a handful of similar products. He also notes that, in efforts to increase accessibility and thus marketability, popular DAWs come with pre-made samples, effects, and other plugins built into the program, removing the necessity for users to make their own or search the vast libraries of independently made plugins available online (Truax, 2002). Additionally, the control of these programs is almost always in the hands of software companies whose primary function is to increase sales and profits. While these goals may sometimes line up with the creative needs of the user base, the fact remains that software marketability has become a key impetus driving the forces of the standardization of practice in electronic music production.

## **Conclusion**

Ursula Franklin’s *The Real World of Technology* remains relevant despite the massive changes that have occurred in technology in the decades since its publication. Her ways of thinking of technology as practices which form a mutually shaping bond with society, work, and culture can be applied across many fields and examples, including music and other forms of cultural production. Electronic music history in particular includes many examples of technological practices developing in differing ideological settings and integrating different sets of values and established practices. Daphne Oram’s work and philosophy is one example of how some of the

innovators of early electronic music shared some of the values Franklin would later engage with in her writing. The context of her career shows how music technologies are impacted not only by the development of new machines, but also shifts in technological labour and musical values. These forces remain relevant in examining music technologies of today, where forces of standardization and control have changed substantially, but still reflect many of Franklin's concerns around who and what shapes the technologies that shape us.

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## Author Bio

**Hannah M. Brown** is a PhD student in Musicology at the University of Toronto, specializing in gender and technology in electronic and computer music and music community and sociality in the digital sphere. Her research focuses on gendered labour in electronic instrument development and manufacturing and early software music. Her work has been supported by a SSHRC CGS-M grant, and she has recently published in the journal *Critical Studies in Improvisation*. In addition to her work in musicology, she holds a MI degree and is an active sound artist, with works presented by Tone Deaf Kingston and NAISA.