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Hugh Davies's Electroacoustic Musical Instruments and their Relation to Present-Day Live-Coding Practice : Four Suggestions

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<http://www.james-mooney.co.uk/EMS2015>.

Abstract

This paper presents the self-built electroacoustic musical instruments of Hugh Davies (1943-2005), and proposes points of similarity between Davies's practice and present-day live coding practice. (Live coding, in this context, refers to the practice of using a computer programming language to program a musical performance in real time.) In the first part of the paper, the context within which Davies's instrument-building practice developed, in the late 1960s, is outlined, and a number of specific instruments are described. Aspects of Davies's performance style, repertoire, and the ensembles with which he performed are discussed, as are activities such as instrument-building workshops and public exhibitions of instruments, in which he regularly participated. In the second part of the paper, four areas of connection with present-day live coding practice are suggested, namely, that both are: (1) part of a long historic tradition of live electronic music performance (as opposed to electronic music constructed in the studio); (2) practices in which the performer him or herself builds the apparatus (whether physical or code-based) through which the music is mediated; (3) improvised or semi-improvised art-forms in which music is developed in real time, within a framework bounded by material or quasi-material constraints; and (4) centred upon communities of practice with a distinct agenda of promoting understanding through engagement.

Introduction

In this paper I discuss the self-built electro-acoustic musical instruments of Hugh Davies (1943–2005), and their relation to present-day live-coding practice. (Live coding, in this context, refers to the practice of using a computer programming language to program a musical performance in real time.) Four suggestions are offered as to how these two seemingly disparate practices are related.

Further discussion of the ideas explored in this paper can be found elsewhere (Mooney 2015a, 2015b).

Shozyg

The following video shows Davies playing the first of his self-built electroacoustic instruments, the ‘Shozyg’ (Klapper 1991):

- <https://www.youtube.com/watch?v=wPT9A0IsGgs>

Shozyg I (to give the instrument its full name) was built in 1968. It consisted of a collection of fretsaw blades, a ball-bearing, and a spring, the sounds of which were amplified via two contact microphones. These objects were mounted inside the cover of a book that had had its pages removed, which was an encyclopaedia volume covering the alphabetic range of topics from SHO to ZYG; this is where the instrument got its name from. A second model—Shozyg II—was built later the same year; both models are shown in Figure 1, below.

The Shozygs were designed to be played with the fingers or with the aid of accessories such as ‘needle files, small screwdrivers, matchsticks, combs, small electric motors, small brushes, coins, keys, etc.’ (Davies 1968). In the video Davies appeared to be using a screwdriver to scrape along the fret-saw blades and interact with the objects in various ways, which were then amplified to produce the sounds heard. The Shozyg is an *electroacoustic* instrument because the means of initial sound production are acoustic, but the vibrations—which would be too tiny to hear otherwise—are amplified electronically.

Throughout his career Davies produced well over a hundred self-built musical instruments, many of which were similar in principle to the Shozyg.

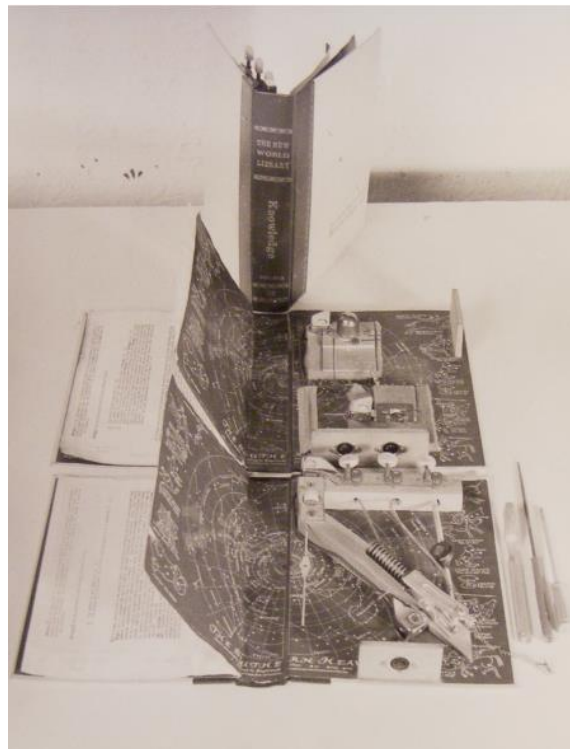


Figure 1. Shozyg I (above); Shozyg II (below).
Photo © Pam Davies. Courtesy of The British Library.

Live Coding

The following video shows Alex McLean live coding in 2011, using a text-based programming language of his own creation, ‘Tidal’ (McLean 2011):

- <https://www.youtube.com/watch?v=1lolx69pD8>

Live coding in the sense that I’ll be discussing it involves typing computer code to generate music in real time, in a live performance context. In the video, Alex was typing the code that generated the sounds. The video shows the computer screen superimposed on top of the video of Alex at the keyboard, and it can be seen that as he made changes to the code—in a more-or-less improvised way—there are corresponding changes in the music.

What is it, then, that Hugh Davies’s electroacoustic instrument-building practice and live coding have in common? What is it that connects Davies’s practice, which began in the mid- to late-1960s, with the practice of live coding, which began in the early 2000s and continues to the present day?

Influences : Stockhausen and Cage

Beginning in 1964, Hugh Davies spent two years working as personal assistant to the avant-garde composer Karlheinz Stockhausen. During that time Stockhausen was working on a composition entitled *Mikrophonie I*, which is a piece that involves using microphones and electronic filters to amplify and transform the sounds of a large tam-tam gong. Davies performed *Mikrophonie I* several times during his time as Stockhausen’s assistant; he was one of the performers who operated the electronic filters.

Mikrophonie I was a work of *live* electronic music, that is, it involved the use of electronic equipment to transform sounds in a live performance context. Obviously the use of electronic equipment in live performance is nowadays commonplace, but in the middle of the 1960s it was quite unusual. At that time, the vast majority of electronic music was made by cutting and splicing magnetic tape in the studio, such that a completed composition could take months or even years to realise. The idea of using electronic equipment in a live performance was a novel one, and Stockhausen was among the first composers to experiment with it. Another of the first composers to do so was John Cage, whose piece *Cartridge Music* (composed in 1960) involved amplifying the sounds of every-day objects by inserting them into the magnetic pickups of record players. Both Stockhausen and Cage were influential upon Davies’s early instrument-building activities.

Early Experiments in Instrument-Building

When Davies returned to England in 1967, he sought to emulate some of the techniques he had learned about during his time as Stockhausen’s assistant. However, since he no longer had access to any of Stockhausen’s equipment, and lacked the funds to buy his own, he was forced to improvise, and hence started building small sound-producing devices using every-day objects and throw-away items.

Some of Davies’s first constructions (see Figure 2, below) were made from combs, broken light-bulbs, and springs stretched across an empty tin. These objects were amplified using

contact microphones, so that the tiny sonic details could be heard via loudspeakers; a process similar to that employed in Stockhausen's *Mikrophonie I*, and Cage's *Cartridge Music*.

Davies soon began to build somewhat more sophisticated instruments using amplified everyday objects. The first of his fully developed instruments was *Shozyg I*, discussed previously.

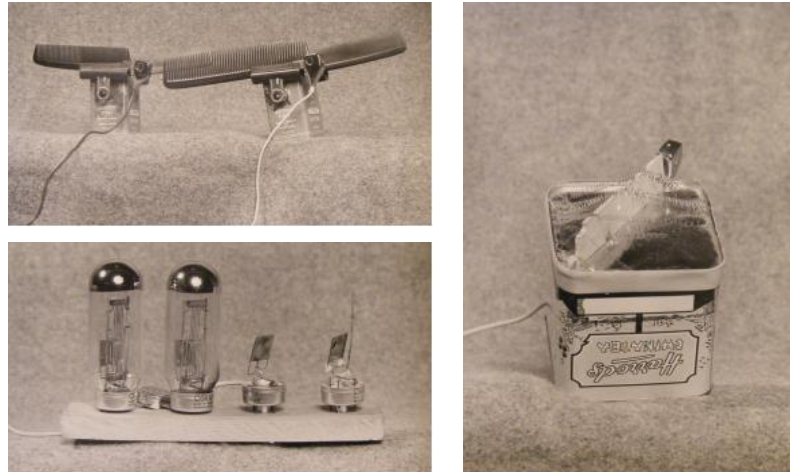


Figure 2. Some of Davies's early experimental sound-producing devices.
Photos © Pam Davies. Courtesy of The British Library.

Springboards

Beginning in 1970, Davies built a dozen instruments that he called Springboards. (Mk. III is shown in Figure 3; Mk. V in Figure 4.) These were instruments in which 'a number of springs [were] mounted on a wooden board,' amplified via magnetic pickups, 'and treated rather like strings' (Davies 1997, pp.12-15).



Figure 3. Davies with Springboard Mk. III.
Photo © Michael Dunn. Courtesy of The British Library.

Concert Aeolian Harp

Another of Davies's instruments was the Concert Aeolian Harp, first built in 1972 (shown in Figure 4). This consisted of a collection of 'thin fretsaw blades [...] mounted in a holder [...] [which were] blown on by the human breath as well as played with a variety of miniature implements such as a feather and a single hair from a violin bow' (Davies 1997).

Solo Performance Table

Davies combined several self-built instruments in a compound instrument that he referred to as his Solo Performance Table (see Figure 4, on the next page). This incorporated the three instruments already mentioned—the Shozyg, Springboard, and Aeolian Harp. It also included an amplified 3D photograph, 'whose grooves [were] played by running fingernails across them at different speeds', two upstretched springs and a metal egg-slicer, amplified via magnetic pickups, two long springs 'with keyrings [...] to vary their tension', and a guitar string amplified via a record player cartridge, as in Cage's *Cartridge Music*, which could be plucked or bowed. In performance, Davies would select and combine these prefabricated materials in a more-or-less improvised way, using a mixer to mix the various amplified sounds together in real time (Toop 1974).

Performance Contexts

Davies's instruments were typically played in improvised, semi-improvised, or process-driven contexts. In the late 1960s and early 70s he played them in three different performing ensembles. Music Improvisation Company and Naked Software were both improvisation ensembles. Gentle Fire, on the other hand, specialised in performing compositions with indeterminate scores that left a significant degree of interpretative freedom to the performers, or works that developed according to some kind of (as it were) 'algorithmic' process. These included several of Gentle Fire's own *Group Compositions*, which were process pieces devised collectively by the members of the group.

From the early 1970s onwards Davies began to perform more as a soloist, but his performances retained the improvised, semi-improvised, or process-driven approach just described.

Participatory Activities

Davies's practice also included a distinctive participatory, or pedagogical slant. He frequently staged instrument-building workshops for children, for example. He also regularly exhibited his instruments in art galleries, where members of the public would be encouraged to play them. Davies's activities were underpinned by a commitment to 'learning by doing.' His Shozyg was described in the BBC's *The Listener* magazine as 'an encyclopaedia degutted to substitute direct experience for learning' (quoted in Toop 1974), which is a description that captures his philosophy rather well.

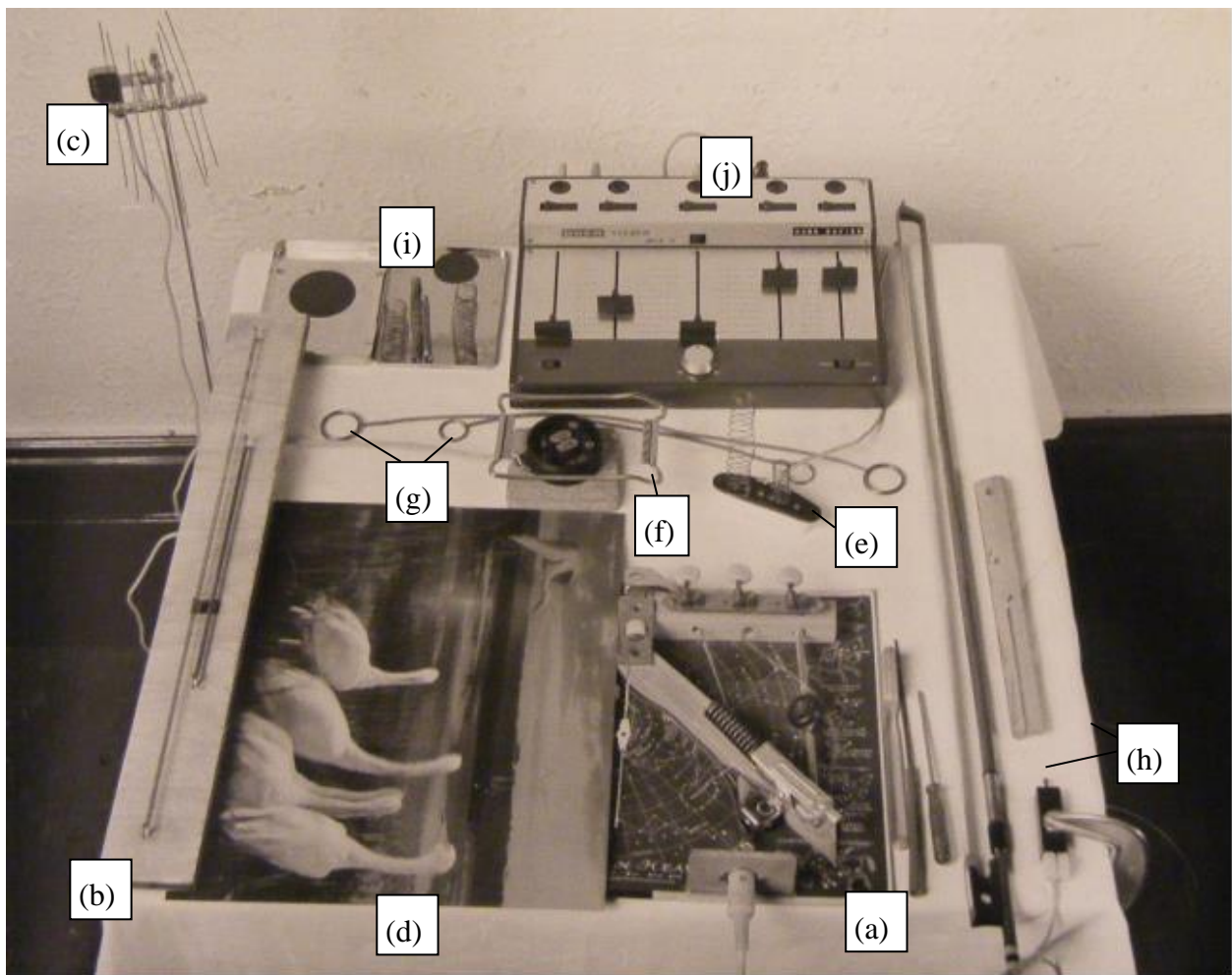


Figure 4. Solo Performance Table, incorporating: (a) Shozyg Mk. II (1968) with a range of playing implements; (b) Springboard Mk. V (1970); (c) Concert Aeolian Harp (1972); (d) 3D postcard; (e) two upstretched springs and magnetic pickup; (f) Egg-slicer and magnetic pickup; (g) Long springs with key-rings to vary their tension; (h) Guitar string mounted in gramophone cartridge, with bamboo tensioner and bow; (i) Diaphragms used in conjunction with egg-slicer, plus further springs; (j) Stereo mixer, modified to operate quadraphonically. Photo © Pam Davies. Courtesy of The British Library.

Four Suggestions

What is it, then, that connects Davies's practice to the present-day practice of live coding? Here are my four suggestions.

1 : Live Electronic Music

First, Davies's practice and live coding are both forms of *live* electronic music: practices in which music is generated electronically in the context of a real time performance, as opposed to off-stage in an electronic music studio. In that respect they are both parts of the same broad, historic, trajectory, from the very first attempts to harness electricity in musical performance, through Davies's activities and those of his contemporaries in the late 1960s, through the first attempts to use computers in a live performance context beginning in the late

1960s and continuing throughout the 70s, up to the live coding activities of the present day. (See Figure 5.)

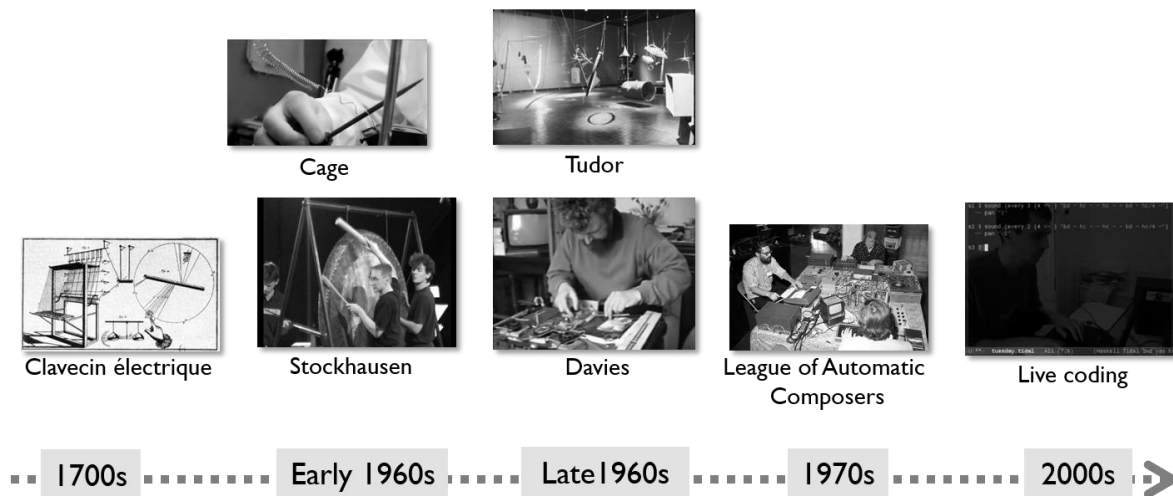


Figure 5. Timeline (very selectively) sketching the development of live electronic music.

2 : Building, Making, Modifying

Second, in Davies's practice, as in live coding, it is the performer him or herself that builds and modifies the structures through which the music is mediated. Davies built his own instruments, which were then used in performance; live coders build the *algorithmic* structures by which the music is mediated.

On the surface of it, the fact that Davies's instruments were built before the performance, whereas in live coding the building takes place during the performance might appear to point to a fundamental distinction between the two; but does that apparent distinction really stand up to close scrutiny? In live coding, the code is *not* all written during the performance: a considerable portion of it is written in advance. (As the digital musician and live coder Thor Magnusson observes, 'this requirement of starting from a clean slate [in live coding] is always an illusion' (quoted in McCallum and Smith 2011).) Whether it is the programming language itself, or a graphical user interface, or a portfolio of functions written in advance, there is always a large part of the programming infrastructure—the majority, I would go so far as to suggest—that pre-exists the performance. What the performer does on-stage is combine, modify, or add to those pre-existing materials.

The same is true with Davies's instruments. It is true that *parts* of the instrumentarium were built in advance of the performance; but the ways in which those materials were combined and interacted with remained open-ended, and would change reactively as the performance proceeded—much as it does in live coding. The selection of different playing implements like screwdrivers and nail-files, or indeed the selection of different individual components of the Solo Performance Table, might be likened to the selection and execution of different pre-programmed functions in live coding, chosen as appropriate to the musical development and the dynamics of the performance context.

3 : Improvised and Process-Driven

Third, both Davies's practice and live coding involve improvised, semi-improvised, and process-driven—that is, algorithmic—aspects. In live coding it is perhaps self-evident that there are algorithmic processes at work, and live coding also involves an element of improvisation, as code is modified in response to ongoing developments in the music, and in the audience's reactions to it. Davies's practice, similarly, included both improvised and 'algorithmically-driven' elements, since it developed in improvisation ensembles, but also in groups that specialised in the performance of process-driven works. In both cases improvisation takes place within a framework bounded by finite constraints: in Davies's case, the physical affordances and capabilities of the instrumentarium; in the case of live-coding, the syntactic and interface constraints of the chosen programming framework. Both involve an element of dexterity, in that all of the actions within that framework must take place 'on the fly', in the context of a real-time performance.

4 : Community-Focussed

Finally, in Davies's practice and in live coding, there is a clear desire to promote understanding through participation, and learning by doing. In both cases this manifests itself in a demonstrative, or perhaps even 'pedagogical' approach, and, in community or group-based activities with an emphasis on hands-on engagement. Davies's instrument-building workshops and group composition activities might be likened to the collaborative processes of open-source software development that underpin much live coding practice, and nowadays, activities like Davies's instrument building practice and live coding might very well find themselves taking place side-by-side in the many so-called 'hack spaces' and 'maker' events that have been gaining increasing exposure throughout the first two decades of the 2000s.

One specific practice that both Davies and live coding have in common is the practice of 'screen sharing.' In live coded performances, it is common practice to video-project the computer screen, so that members of the audience can see how the code being typed relates to changes in the music. Similarly Davies, in live performances, used whenever possible to video-project images of his hands while playing his self-built instruments, 'enabling the audience to make a clearer connection between what they see and what they hear' (Davies 1997, p.13). In both Davies's practice and in live coding the video-projection is undertaken in order to facilitate audience engagement, and a better understanding of the processes by which the music unfolds.

Conclusion

In summary, my four suggestions are as follows. Davies's practice and live coding are both:

- 1) parts of a common historic trajectory of live electronic music
- 2) practices in which the performer him- or herself builds, modifies, and combines the tools of music-making
- 3) improvised in nature, bounded by the constraints of the chosen system, and have algorithmic or process-driven aspects
- 4) underpinned by a community-engagement ethos.

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