Speculative Sound Circuits

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Alternative approaches to electronic music through speculative sound circuits are discussed. These approaches borrow from emerging theories in speculative design and the work of designer/theorist Anthony Dunne. Dunne's post-optimal technological object is also discussed along with slow tech and the slow movement. George Brecht's *Water Yam* and the absurdist creative strategies of the Fluxus movement are seen as prototypes for speculative design. With particular reference to electronic music and speculative sound circuits, the instruments of Percy Grainger and Gijs Gieskes are considered. Speculative sound circuits are viewed as part of a broader theoretical framework in relation to critical making, as referred to by Garnet Hertz, John Cage's 'music of objects' and David Tudor's 'composing inside electronics'. Finally, a specific example of the author's work as Dirty Electronics, *Making for Radio* and *Speculative Circuit*, are offered up to illustrate speculative sound circuits along with spontaneous and intuitive approaches to circuit building, rapid prototyping strategies, and making as a processual part of performance. Indeterminate and chance-based music, models for extended instrumental techniques, and questions arising concerning physiologies in performance and human-machine interaction are also reflected upon.

Speculative design. DIY electronic music. Sound circuit. Object-based. Objecthood. Musical instrument.

1. INTRODUCTION

This paper describes an object-orientated or object-based approach to the creation of electronic music, and how speculative, rather than technical approaches towards the design of musical instruments or sound apparatus can lead to a new artistic practice. A part-playful, part-absurdist methodology is applied, where unlikely or disparate technological devices and objects are speculatively combined to make sound-based performance. This goes beyond approaches found in circuit bending and hacking and encourages the notion of object transformation and hybridisation. Both outer (knobs, switches, dials, etc.) and inner (electronic circuit) parts of devices are recontextualised. There is a deliberate, preconceived intention to disregard technical knowhow to create a tabula rasa for electronic music. The speculative nature of the approach and the heightened sense of risk concerning sound or musical outcomes are seen as critical parts of making and performance.

Speculative sound circuits builds on the theoretical frameworks of DIY and maker music culture (Collins 2006) (Richards 2017), David Tudor's composing inside electronics, the idea of objecthood found in the works of John Cage, and, borrowing from Brian Eno, oblique strategies for composition and performance. This approach also seeks to look beyond the lexicon associated with synthesisers and sound circuits. Early Fluxus works are considered. And Anthony Dunne's speculative design and notion of post-optimal technological objects are also discussed as an important influence towards the creation of new speculative performance paradigms in electronic music. Parallels are made with the instruments and work of Percy Grainger and Garnet Hertz's *Critical Making*, where making is seen as a modus operandi for critiquing technology and society (Hertz 2012). As such, speculative sound circuits place an emphasis on making as a processual part of performance: it is only through the process of investigation, exploration and research of the circuit/objects that the music/performance are found or realised. What constitutes musical instrument or sonic apparatus is also put up for grabs. Musical instrument becomes assemblage, where a collection of things is explored based on relationships. Consequently, the distinction between 'the work' and 'the instrument' to enact the work becomes blurred.

2. COMPOSING INSIDE ELECTRONICS

John Cage opened the door to an ontological approach to musical instrument or sound-making apparatus and a music that could be considered object-based. A quote of Cage's I often turn to is from a conversation with Daniel Charles, where Cage gives an example of an everyday object, the ashtray, and how it contains latent musical potential if only it could be revealed. Cage states: "Object would become process; we would discover, thanks to a procedure borrowed from science, the meaning of nature through the music of objects" (Cage & Charles 1981) (Richards 2013). The idea of a music of objects appears to have stemmed from Cage's interest in Zen Buddhism and in particular the work of Daises Teitaro Suzuki. Suzuki was instrumental in bringing ideas of Zen Buddhism to the West through his classes, some of which Cage attended, and writings on Zen philosophy (Suzuki 1927). From the 1940s, Cage, in general, became increasingly influenced by philosophies of the East, including India and China. His philosophy in these regards aligns with the emerging minimalist ideology of the time. Cage began to consider the act of composing as something that sat outside of the self, where the ego could be supressed, and finding music in the everyday and the surrounding environment.

Cage's collaborator, David Tudor, extended the idea of a music of objects to embrace technological artefacts. During the 1960s, Tudor coined the 'term composing inside electronics' (initially deriving from a group of musicians known as Composers Inside Electronics). One of his first works to explore this approach was *Bandoneon!* (1966): "… *Bandoneon!* uses no composing means, since when activated it composes itself out of its own composite instrumental nature." (Tudor in Kuivila 2004). Tudor also remarked:

> In my electronics, I work with an instrumental principle. … They [electronic devices] become my friends. They have personalities, that only I see, because of my use of them. It's an act of discovery. I try to find out what's there and not to make it do what I want but to, you know, release what's there (ibid).

Furthermore, for example, in Tudor's *Rainforest IV* (1973) sound is mediated, ideas are mediated, and composing is mediated through the materials of electronic components, wires and found acoustic objects. In composing inside electronics, the electronics' schema also takes on a musical dimension as a score of sorts.

It is import to emphasis the material nature of a music of objects. In both Cage's and Tudor's cases, materials and technological processes are not viewed as transparent, but as defining factors in the work. Cage and Tudor, through their music of objects, challenge the traditional notion of musical instrument, where the machine qualities of an instrument are often overlooked. There is a broader discussion to be had here about, what Tudor defines as, "instrumental principle" and a music where instrumental qualities and idiosyncrasies, evident in much chamber music, plays an important part in distinguishing the music; but this is beyond the scope of this paper. And there are parallels between the object-based philosophy of John Cage and more current modes of thinking in relation to object-orientated ontologies as expressed by (Latour 1993) and (Harman 2002). But I also do not want to get dragged into a discussion on applying the philosophies of Latour and Harman to sound or music.

3. SPECULATIVE DESIGN

Speculative sound circuits draw extensively on theories emerging in design and more specifically the work of Anthony Dunne. Dunne and Fiona Raby in *Speculative Everything: Design, Fiction, and Social Dreaming* set out their manifesto-like list of polar concepts:

> *Speculative Everything* began as a list we created a few years ago called *A/B*, a sort of manifesto. In it, we juxtaposed design as it is usually understood with the kind of design we found ourselves doing. *B* was not intended to replace *A* but to simply add another dimension, something to compare it to and facilitate discussion. Ideally, *C, D, E,* and many others would follow (Dunne & Raby 2013).

Their A/B list of twenty-two juxtapositions include, for example: "Problem solving - Problem finding; … Makes us busy - Makes us think; … Ergonomics - Rhetoric" (ibid). Dunne's theories of speculative design build on his previous work, such as the post-optimal technological object. In *Herzian Tales*, Dunne considers an alternative approach to the design of technological artefacts (Dunne 2005). He postulates a design in tech where, for example, optimisation, speed, efficiency and durability are not the primary aims and objectives of the designer. Dunne places an emphasis on design considerations that celebrate the poetic, make believe, or incongruous. These aesthetics are closely bound to ideas that emerged at the beginning of the millennium such as slow tech (Hallnas & Redstrom 2001) and the slow movement (Honoré 2004). To surmise, Dunne advocates an experiential relationship with the things that surround us rather than, in particular,

considering technological objects solely for their function. An earlier example of speculative design in practice can be found in Daniel Weil's artwork *Radio in a Bag* (1981/83). In this work, Weil presents a number of questions, such as: 'What happens if the circuit of a transistor radio is housed in a printed plastic bag?' and 'How does this change our relationship with such as object?'

The use of polar concepts and juxtaposition of ideas/principles as a method for creating new artwork/design can also be found in early Fluxus works. There are striking similarities between the methods employed in Dunne's and Raby's speculative everything manifesto and, for example, George Brecht's *Water Yam* (1963): a series of cards, event scores with provocative comments. The cards present a range of absurdist juxtapositions: for example, BACH, Brazil; DANCE MUSIC, fig; CONCERTO FOR CLARINET, nearby (Brecht 1963). Following on from Brecht's *Water Yam*, Brian Eno and Peter Schmidt also adopted a related approach in their work *Oblique Strategies* (1975), a box of cards that serves as a tool kit in case of creative blocks (Eno & Schmidt 1975). Brecht's and Eno's work can be seen as a prototype for the speculative design aesthetic put forward by Dunne.

4. PRECEDENTS IN MUSICAL INSTRUMENTS

A precedent of, what I shall call, a speculative sensibility in relation to the design of musical instruments or sound devices can be found in the work of Percy Grainger. Grainger used the term Free Music to describe his experimental approach to music, which involved designing and developing electro-mechanical devices for the generation of sound. Many of these machines used appropriated materials and were automated. Although it can be argued that Grainger's Free Music devices are not strictly speculative, they are to a certain extent meticulously designed, they demonstrate an eccentric, unorthodox, and at times absurdist approach to musical instrument. For example, the design of his Oscillator-Playing Tone-Tool involved a convoluted means to turn the knob of an oscillator of a Morse code practice device. Grainger's machines used crankshafts, gears, and flywheels that would pull scrolls of cut paper or plywood with undulating contours that he would refer to as 'hills and dales'. Running along the edge of these contoured controllers would be tone arms that altered, for example, the pitch or volume of an oscillator. The quirkily named The Cross-Grainger Kangaroo-Pouch Tone-Tool uses a similar mechanism.[1] Comparisons can be made with the mad inventions of British cartoonist Heath Robinson, a term now used in general to describe a ridiculous or over complex approach, whose humorous illustrations depicted impossible and absurdist machines.

Other convoluted machines and part-absurdist mechanisms Grainger developed to control oscillators included mounting a hand-cranked drill on top of a Singer sewing machine. The running of the sewing machine would drive the hand drill, which would subsequently turn the knob and change the pitch of an oscillator. The imaginative names, alternative construction techniques and juxtaposition of found objects suggest a design method not dissimilar to that expressed by Dunne and Raby where "Fiction, and Social Dreaming" are to the fore (Dunne & Raby 2013).

The idea of juxtaposition of materials, mechanisms and found objects in the design of electronic instruments can also be found in the work of Gijs Gieskes. One particular device that exemplifies this approach is his adempercloep (Gieskes 2018). Grainger developed the Reed Box Tone-Tool, which consisted of automated electric fans to blow air through the reeds of an appropriated piano accordion. An automated electric fan also features in Gieskes' adempercloep. In this device, a fan and miniature bellows are used to inflate and deflate a plastic bag. Electronic sounds are mixed with amplified acoustic sounds generated from mechanical and electric components along with the whirring of a fan and the wheezing and rustling of a bag. The moving needles of old VU meters become beaters to strike small-amplified springs and rubber bands. There is an emphasis on the poetics of the circuit. The machine is given a human-like quality through the idea of the breath and rhythmically inflating the bag; whilst the hidden acoustic sounds of the meters are brought to the attention of the listener through amplification. The function of many of the components are subverted and explored laterally or through oblique strategies.

5. MAKING FOR RADIO

At this point, I would like to focus on an example of my own work as Dirty Electronics detailing a speculative sound circuit. *Making for Radio*, a radio broadcast and commission for Czech Radio, consisted of a group of pieces, one entitled *Speculative Circuit* (2017), that combined the circuits of a pocket calculator and the Dirty Electronics' Bed of Nails: a prototypic, DIY noise circuit using a feedback network, and made with wood, nails and wire-wrapping techniques (Figure 1). A calculator was chosen as a common-or-garden technological object that in general sits outside the domain of electronic music; and it was the speculative nature of combing the electronics of a calculator with a predetermined sound circuit that led to a new performance/sound piece. The specific

calculators used in the piece were the Casio fx-19 and fx-102, and the Rockwell R8. *Speculative Circuit* was presented as a kind of event score with the provocation: "A hardware mash-up based on mere fiction. But can these two circuits be combined to make music?" (Richards 2017b). The piece was approached from a music of objects perspective as outlined above where the music is found through the exploration of the object and relationships with other objects. The 'score' was presented to a group of performers/makers to realise.[2]
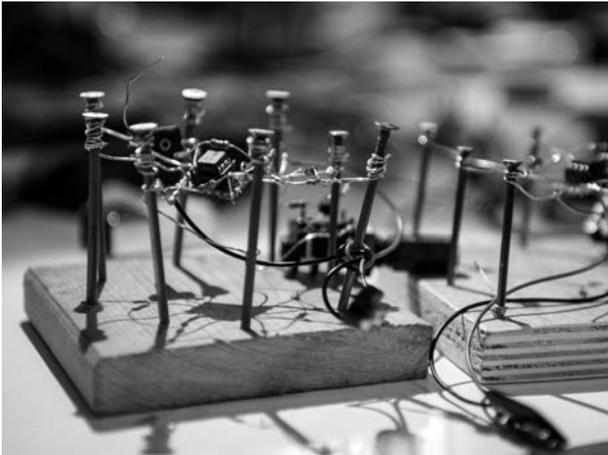

Figure 1: Dirty Electronics Bed of Nails.

Speculative sound circuits rely heavily on spontaneous and intuitive approaches. Although it is possible to study schematics, the 'speculations' need not be pre-determined or overly analysed. There is a rapid prototyping strategy also at play. This builds on previous research facilitating rapid, collaborative, publicly-oriented making in artistic settings (Bowers, Richards et al 2016). In *Speculative Circuit*, a short time frame, a day, was set aside to explore the calculators, along with the technical limitations of a makeshift workbench, a few hand tools and multi-meter (Figure 2).[3] Similar methods can be found in circuit bending, where trial and error procedures dominate, and there is an emphasis on the primacy of the ear: the investigation of electronic circuits aurally. The calculators as objects presented a number of characteristic behaviors and potential in relation to the Bed of Nails. The calculators were able to produce sound in their own right through internal oscillators, clocks and dividers; but the operation of the calculators also produced a range of variable voltages that could be used as control signals for the Bed of Nails. The 'digital' waveforms from the calculators tended to be harmonically rich, typical of square waves, and this timbre was exaggerated by passing the signal through the Bed of Nails to create distortion and waveform clipping. The summing of the multiple outputs was kept to a minimum, resulting in signals 'fighting amongst

themselves'. This also brought about an idiosyncratic behaviour of the sound circuit where sounds and signals would often bifurcate leading to sudden changes of state.

Figure 2: Max Wainwright – music of objects, calculators and Bed of Nails.

As mentioned in the introduction, speculation can occur on a more macro level in relation to objecthood and through the ideas of object transformation and hybridisation. For example, how can the interface or physical characteristics of the objects in *Speculative Circuit* be combined? The open circuit of the Bed of Nails lends itself to hybridisation and modifications, the wire frame and nail terminals providing the perfect patch system for crocodile clips and wires, a form of "clip art" as referred to by Phil Archer (Archer 2007). Patching may be live, or a procedural part of performance. In this context, the speculation and exploration of the objects and circuits can form part of performance. The crocodile clip and wire is also an ideal go-between for merging circuits. The typical layout of a pocket calculator also suggests specific interactions. The calculator number/key pads are finger-sized and grouped close together, and the proximity of these pads offers the potential for whole-hand cluster chords/events. One aspect that was not fully realised in the first performance of *Speculative Circuit* was the calculator displays. The LED display and VFD (Vacuum Fluorescent Display) of the calculators produced a number of abstract patterns when connected to the Bed of Nails. In subsequent performances of the work, the calculator displays featured in what could be termed an audio-visual performance.[4]

It is important to underline that the exploration of these objects were not only technical. Much of the speculation occurred on a musical, poetic and conceptual level through group discussion. The study of the objects was not limited to the objects themselves, but the results of the study were used as a foundation for instrumentation including, in this

case, the clarinet. Clarinettist Bruno Cunha was asked to adopt similar characteristics of the pocket calculator, Bed of Nails mash-up. This was not a mimicking of the sound as such, but used as a method to objectify the playing and sound of the clarinet. This was an approach I have previously explored in works such as *Still* (2013), where the charging and discharging process of an inbuilt flash of a disposable camera was used as a basis for a work also involving acoustic instruments as well as choreography. Consequently, the clarinettist produced hard-sounding timbres, clipped waveforms, and multi-phonics, whilst using extended techniques of unorthodox fingering and over-blowing. The clarinet added to the reedy and dissonant texture of the overall sound of the piece that consisted of an intense drone with sidebands and beating effects. The balance between of electronic and acoustic sound was intended to be on an equal footing (Richards 2017b).

6. CONCLUSION

Speculative sound circuits is an approach to the creation of DIY electronic music and forms part of critical making, a term used by Garnet Hertz where there is an emphasis on 'why?' as much as 'what?'. Through the problematising of electronic sound circuit, the designer, artist, performer is pushed to think beyond the immediate workings or functionality of a device or apparatus towards the post-optimal technological object, as outlined by Dunne (Dunne 2005). Electronic circuits and the physical characteristics of objects act as a form of materiality that lends itself to be investigated. The circuit is not necessarily a means to an end - part of a sound generating circuit or synthesiser - but exists as an ecosystem in its own right. There is no methodology as such, because method and result are intrinsically linked. The work 'is' the method, or the method 'is' the work. Speculative sound circuits draw on a wider discussion surrounding subject/object discourse, and musical instrument ontologies. This way of thinking about musical instrument has clear roots in the work of Cage and Tudor, where music is not necessarily played 'on' an instrument, but is found in the 'everyday' and objects at hand, a music of objects, where performer, maker, composer, and designer melt into a singular observer and listener.

More specifically, speculative sound circuits bring danger to making and performing like much experimental art practice. There is a possibility of failure. With this also comes a heightened sense of excitement and new possibilities, unknown territories and clean slates. The combining of circuits and object-based music as discussed in this paper are not aesthetically neutral. There is a tendency to gravitate towards an indeterminate and chance-based music. Results can be unrepeatable. But like Eno's *Oblique Strategies*, speculative sound circuits lubricate mental blocks, artistic impasses, whilst habits can be broken and reformed. There are different degrees of absurdity posed when juxtaposing circuits. However, the purpose of these juxtapositions is to lead to the objectification of musical instrument and to a certain extent the performer. The focus on materials, such as an electronic circuit, also raises questions concerning physiologies in performance. The performer no longer remains at the centre in a human-machine interaction, but enters a new speculative relationship.

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[1] Information on Percy Grainger and his work are available from the Grainger Museum https://grainger.unimelb.edu.au/home

[2] The premiere of *Speculative Circuit* was performed by Max Wainwright, Monika Jagerova, Bruno Cunha and Sam Topley, Czech Radio, Prague, November 24, 2017.

[3] Max Wainwright did the initial exploration of the calculators.

[4] In following performances of *Speculative Circuit*, a camera has been used to project the image of the calculator displays.