



Maker Culture and DiY technologies: re-functioning as a Techno-Animist practice

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ABSTRACT

The emergence of 'Maker Culture' and 'Maker Spaces' within formal (and informal) learning environments around the world can be seen as part of a wider shift in consciousness regarding the relationship between human and the material environment. This is reflected in theoretical and academic movements such as the 'material turn': where concepts such as Jane Bennett's 'vibrant matter' and Karen Barad's 'intra-activity' have begun to displace human intention as the exclusive centre of agency. In this article, an engagement with DiY (Do-it-Yourself) technologies is explored through an observation of the workshop environment of a single practitioner: uncovering strategies which allow material agency to re-function simple technologies into forms which would be difficult to reproduce using exclusively human intention. Deviating from the role of technology as an invisibly functioning tool, material media is defined as an approach to technologies which incorporates materials as active agents in the creative process of making of cultural artefacts. Through the use of redundant and discarded materials, the DiY practitioner examined in this article is seen to follow a Techno-Animist approach to media technologies: acknowledging the qualities of 'vibrant matter' as an active component of agency; re-situating the human in relation to the material environment.

Introduction

The 'material turn' and new materialism trends in media studies have created a revived interest in the relationship between human and material. Maker Culture and similar craft-based strategies of upcycling and the re-using of discarded technologies (Spencer 2007, 2008; Hatch 2014) have been paralleled in the emergence of 'Media Archaeology' as a new field of academic enquiry (Zielinski and Wagnermaier 2007; Huhtamo and Parikka 2011; Parikka 2012). These practices document a fascination with the materials of media, with redundant forms of media providing a more visible and malleable manifestation of the materials environment. Objects and fragments of technologies, which have been re-configured into new assemblages, are all part of the *material media* discussed in this article, whereby the material processes can be seen more clearly as an indexical link between the cultural artefact and the materials of technology. An example of this closer indexicality are the micro-grooves of the vinyl record where sound is recorded in peaks and troughs reflecting the actual shape of the recorded sound, contrasted with the digital data recorded on a compact disk: an invisible collection of zeros and ones which cannot be seen by the naked eye. The Maker Movement, described as the '[third] industrial revolution' (Hatch

2014, 3–10) and a return to materiality echoing the ‘material turn’ in media studies, identifies the physicality of making as ‘fundamental to what it means to be human ... [and that] physical making is more personally fulfilling than virtual making ... [through its] tangibility; you can touch it’ (Hatch 2014, 12). It is the ‘tangibility’ of material engagement, and material media, which this article addresses as being an important aspect of re-situating the human within the material environment. In this sense, forms of ‘material media’ are those which have less opaque enclosures to obscure the workings, processes and materials contained within: this also includes media which have had the ‘Black-box’ removed. The DiY practitioner discussed in this article can be defined as someone who engages with the materials of media technologies: allowing material agency to become part of the process of both practical making and making meaning of the material environment.

Maker Culture and the DiY practices explored in this article can be seen as part of a theoretical practice which is a counter-point to Black-boxing. Black-boxing is a term used by Latour (1987, 1999, 2005) to describe technologies where the mechanics of its workings are concealed under an opaque surrounding, so that: ‘When a machine runs efficiently ... the more opaque and obscure [the workings] become (Latour 1999; 304). It seems that the Black-box depends on the efficient functioning of technology to maintain its invisibility: it is doing the intended job and, therefore, technology becomes ‘invisible by its own success’ (304). This function of *success* to obscure the materiality of Black-box media is contrasted by approaches of Maker Culture where ‘experimentation is highly regarded, with playful engagement and risk taking (learning through making mistakes, trying novel approaches) very much encouraged’ (Sharples et al. 2013, 33). It is this aspect of ‘learning through making mistakes’ and the experimentation with what appears to be ‘error’, in terms of conventional ideas of function which is of interest in both the theoretical concerns and the practices observed later in this article. Science and technologies studies (STS), particularly the methodology of observing practices within a laboratory or workshop as part of a network of actants, forms part of the theoretical situating of this article: whereby a DiY practitioner is observed within his workshop, and the wider material environment, as being part of an extended mesh of agency. The concept of Techno-Animism recognizes the extended mesh of agency which incorporates both human and nonhuman actants, opening the Black-box which obscures the processes behind the functioning of devices, to become ‘opaque’, enclosed and ‘completely determined by its [intended] function’ (Latour 1999, 183). Through the opening of the Black-box, technologies also become an engagement by amateurs in the processes of ‘expert territory’ (Parikka and Hertz 2012, 148), creating transversal practices which focus instead on ‘novel applications of technologies, and the exploration of intersections between traditionally separate domains and ways of working’ (Sharples et al. 2013, 33).

The argument is that Maker culture, by working in the ‘intersections’, displaces human intention as the central figure of agency. The separation between human and material is also challenged by Karen Barad, who claims that the separation of the human and the nonhuman is part of the duality imposed by Western philosophies which: ‘assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse’ (829). For Barad, the dissolution of human and nonhuman duality is part of a material turn, shifting away from the focus of language as a tool for understanding the world, and a new emphasis on material forces which recognize that ‘language has been granted too much power ... [in] the belief that grammatical categories reflect the underlying structure of the world’ (2003, 801–802). Through exploring these intersections, between human and nonhuman material, the aim is to enter into the theoretical concerns of Maker culture, as a methodology which recognizes the entanglement between practice and theory:

If we wish to understand what technology means to those who invent, tinker with, build, or just use its products, we must investigate how the aesthetic is intertwined with the practical; how the giving of meaning is related to building and making. (Pacey 1999, 18)

The first task is to situate Maker Culture within the theoretical concerns of breaking down the barriers between human and material, setting the theoretical agenda in terms of defining ‘error’ as a diversion from an exclusively human agency.

A theoretical backdrop to the material forces of the workshop

This article introduces the concept of 'error' as a diversion from an exclusively human agency. Error is central to Latour's concept of *reverse Black-boxing* (1999, 174–215), a procedure which describes the emerging visibility of processes and materials when a previously invisible item of our technology ceases to function as intended. Using the example of a video projector, Latour argues that when it is operating, the actual machine is invisible and composed only of the function it is performing. However, when something goes wrong with the technology, the Black-box process is set into reverse and the enclosure of the dysfunctional object begins to break down into multiple objects and components replacing the previously 'invisible' functioning of the Black-box:

Now suppose that the projector breaks down. The crisis reminds us of the projector's existence ... Whereas a moment before the projector scarcely existed, now even its parts have individual existence ... our 'projector' grew from being composed of zero parts to one to many (1999, 183).

Reverse Black-boxing is a way in which individual components become disengaged with overarching function, this means that the object unfolds from being a single invisible function, 'composed of zero parts'; to being comprised of 'many': the multiple components and materials which can now be seen to contribute to functionality.

To reverse the process of Black-boxing means that previously closed objects of technology become open to participation at the level of material entanglement. The disparate components obscured by the containment of the Black-box, and the context of function under which they were subsumed, now possess capacities for multiple functionalities: they are no longer 'bent, enrolled, mobilised, [or] folded in any of the others' plots' (Latour 1999, 185) but instead unfold in 'time and space' (183), just as the disparate objects and materials in Larsen-Jensen's workshop originate from multiple periods of media development, and multiple functionalities. This unfoldment of multiple actants is a form of extended agency, whereby the intersections between human and material are explored.

Extended agency is a theme of Clark and Chalmers' argument that the physical environment is an active participant in thought processes, extending the space of the mind into the material environment of the workshop:

Where does the mind stop and the rest of the world begin? ... Some accept the demarcations of the skin and skull, and say that what is outside the body is outside of mind. Others are impressed by arguments suggesting that the meaning of words 'ain't just in the head', and hold that this externalism about meaning carries over into an externalism about mind. We propose to pursue a third position ... an *active externalism*, based on the active role of the environment in driving cognitive process. (Clark and Chalmers 1998, 7)

In 'active externalism' (Clark and Chalmers 1998, 7; Clark 2011), the area of the mind extends beyond the physical borders of 'the demarcations of the skin and skull' (7), and includes external materials as active agents in the cognitive process. In addition to this, the material external world also actively influences the processes of the mind, as a two-way intra-action, as suggested by Karen Barad earlier in this article. *Active externalism* argues that processes of the mind can take place externally to the human body, with external devices actively engaged within the thought processes. In following Clark and Chalmers' argument, the human cognitive system, our way of creating meaning and ideas, results from an intra-action between internal and external actants: an interdependency which Clark and Chalmers describe as a 'two-way interaction':

The human organism is linked with an external entity in a two-way interaction, creating a *coupled system* that can be seen as a cognitive system in its own right. (Clark and Chalmers 1998, 8–9)

In Clark and Chalmers' view, the brain and the external world form a 'coupled system' which is as interdependent and interlinked as 'part[s] of its [own] brain' (8–9) and therefore represents an extension of cognitive agency outside of the human. According to Levi R. Bryant, the extended mind means that 'our minds are not simply ... *in* the brain, such that the brain is a centralized controller that manipulates representations, but rather minds are extended out into the physical media of the world' (2014, 86–87). In viewing the mind as a source of agency, the idea of the 'extended mind' and 'active externalism' is

adapted in this article as a signifier of *extended agency*: a recognition of the active agency of objects within the material environment.

Extended agency is of particular interest when it comes to observing the workshop practices of a DiY practitioner later in this article: and as a tool for recognizing the influences of the wider material environment, such as the recycling centre from which many of the materials are gathered and become active participants in the creation of artefacts. In this article, the term 'Techno-Animism' is used to describe the re-situating of the human, and the participatory role of materials in the processes of creating artefacts. Whilst Techno-Animism infers traditional animist beliefs that recognize a spirit or source of agency contained within material objects, the focus is towards the more contemporary concepts of Jane Bennett's 'neo-animist ontology' (2011, 120), evoking the concept of 'vibrant materials' (Bennett 2010, 23) where 'vital forces ... [create] an open-ended collective' (24). This idea of Techno-Animism is echoed later in this article, when DiY practitioner Felix Larsen-Jensen says of materials: 'It's got its own life. This stuff makes its own music' (22 February 2013 interview), implying a process of re-functioning which emerges from the entangled configuration of human and materials.

Methodology

Since the form of DiY culture I wish to examine in this article is highly practice-orientated, part of the concern is to determine the most effective way in which data can be accessed, analysed and presented within the literary constraints. The two main roles of the researcher are therefore: to maximize access to relevant forms of data in the field and also; to analysis these observations in respect to the theoretical perspectives articulated in the first part of this article.

In the practice-oriented field of DiY culture, access to data comes from the capacity of the researcher to allow participants to articulate what would usually be an unspoken form of 'tacit knowledge', emerging from the intra-action of material practices and theoretical considerations. According to Michael Polanyi, this personal or tacit knowledge is knowledge that 'falls short of the ideal of precise formalization ... unspecified knowledge ... [such as] an art which cannot be specified in detail [and] cannot be transmitted by prescription, since no prescription for it exists' (Polanyi 2005, 55). Tacit knowledge is the type of knowing that is experienced in the act of making and is particularly relevant to the study of DiY Maker Culture and its 'exploration of intersections between traditionally separate domains and ways of working' (Sharples et al. 2013, 33) as mentioned before.

One way in which the researcher has increased access to data is through having a shared repertoire of experiences and perspectives within the field of study: that the researcher is also a participant within similar practices or has collaborated and participated with practitioners within the field. The argument is that shared experiences allow the researcher to both access data and also to bring informed insights into the direction of the research. This means that researcher and practitioners within the field 'speak the same language', the researcher is more likely to be trusted by practitioners and will also have access to a wider variety of practitioners from which to choose. Through shared experiences the researcher is drawing upon 'complementary knowledge' which enables insightful observations and analysis to be made from practices within the field of study. This means that the source of this complementary data, in the form of personal experience, is not necessarily 'quotable' and able to be incorporated directly into the text but adds to a 'nuanced understanding of context that can come only from personal experience ... [without which] we may not always ask the right questions' (Mack et al. 2005, 14).

By acknowledging the importance of incorporating multiple types of knowledge, generated by a mixed methodology, the positivist paradigm of objective observation is challenged and the type of knowledge generated is therefore 'situated' within a particular context, rather than claiming a universal objectivity. In the case study of this article, the enquiry is specifically limited to a close reading of the activities of a single practitioner in the field of DiY sound culture: as a sharing of situated tacit knowledge between the researcher and the researched.

In a post-positivist methodology, it is assumed that the researcher will inevitably effect the research outcomes. The process of making the researcher more 'visible' becomes one way of recognizing and

accounting for these influences as part of the research process. Placing the researcher within the picture is part of the mixed methodology which has been adopted by Duncombe (2008), McKay (1998) and Spencer (2008), all of whom incorporate anecdotal and informal data sources to situate their experiences within the field of practice. This is indicative of a post-positivist approach in which a single viewpoint is replaced by multiple methodologies for generating and analysing data.

Part of the mixed methodology used in this article is to incorporate a form of grounded-theory which emerges from the informed observations of the studio practices of a single DiY practitioner. Grounded theory leans towards an inductive methodology, in which multiple views rather than one objective position is sought. Grounded-theory requires a higher degree of connection and sensitivity between the researcher and the object of study than a traditional positivist approach. To be sensitive to the field of study means to be 'insightful' in the act of observation and analysis of practices within the field, and as Juliet Corbin and Anselm Strauss suggest, positions the researcher as an active participant in the production of knowledge:

Sensitivity stands in contrast to objectivity. It means having insight as well as being tuned in to and being able to pick up on relevant issues, events, and happenings during collection and analysis of the data. (2015, 78)

For Corbin and Strauss, 'sensitivity' in the field of research means that there is increased access to data through 'analysis' and 'insight(s)' (78), and also in the ability of the researcher to 'pick up on relevant issues' (78) which may be denied to other researchers.

'Sensitivity' of the researcher comes from experiential knowledge of the particular aspect of DiY culture examined in this article, allowing insights into concepts which emerge from practices. A background of experience and collaboration within the field of research also means that the researcher is more able to 'discern' between different aspects of theoretical concern, as Corbin and Strauss state:

We need to have some background, either through immersion in the data or through personal experience, in order to know what we are seeing in data is significant and to be able to discern important connections between concepts (2015, 79–80).

My argument here is that 'personal experience' (79–80), in terms of tacit knowledge of the field of study, works as a complementary viewpoint which allows 'important connections [to be made] between concepts' (79–80) and also between the observation of practices and more theoretical concerns.

My personal experiences in DiY culture, over a number of years, has included many aspects of the DiY practices which are examined in the case study, enabling the researcher to 'walk, so to speak, in that other person's shoes ... to discern the meaning of words and actions of participants' (Corbin and Strauss 2015, 78). In allowing multiple viewpoints to influence the methodology of this thesis, the 'sensitivity' (Corbin and Strauss 2015, 78) of the researcher becomes an active component of influence, with the aim of the researcher to balance sensitivity in the field with the more rigorous application of prescribed theory. These multiple viewpoints and consideration of the researcher as an active element offers a methodology in which the researcher is seen as being more involved as 'part of the situation they are investigating' (McNiff and Whitehead 2006, 9). Action research takes away the focus from the individual and towards the situated 'action' of the practices involved. Action research is a methodology which was originally devised for the development of educational practices in which teaching practices were evaluated by researchers who were engaged in the practices themselves (Dick 2006, 441). Action research offers an alternative to situating the researcher outside of the field of study, to ask:

'What are those people doing over there? How do we understand and explain what they are doing?' This kind of research is often called spectator research, and is usually outsider research. Action researchers, however, are insider researchers. They see themselves as part of the situation they are investigating. (McNiff and Whitehead 2006, 8)

As an alternative viewpoint to 'outsider research' (8), action research offers a methodology for analysing the influence of more participatory roles of the researcher.

In the less participatory role of researcher as participant there are varying degrees of active positioning of 'participant as observer' (Bryman 2001, 289–310). This varying degree of active positioning is discussed in terms of the levels of participation of the researcher with the chosen case study. A

participant as observer means that the other participants are aware of my role as researcher, but that I am also perceived as a participant in the field of research.

The primary source of data in this article comes from a recorded, unscripted and informal conversation between myself and DiY practitioner Felix Larsen-Jensen, taking place within the context of his home workshop on 22 February 2013. The choice of using the studio space for the interview allowed a more visceral connection with both the material objects and the processes involved, it also allowed Larsen-Jensen to demonstrate some of his DiY machines in various states of completion. In observing the workshop environment and the role of materials, within a DiY practice, this article utilizes a form of material analysis, driven by the emerging concept of Techno-animism: where the forces of ‘vibrant materials’ have been articulated, through observation and interpretation, as a complimentary source of data to the recorded spoken conversation.

Starting from an observation of Larsen-Jensen’s workshop, the investigation shifts to the wider material environment of the recycling shop where Larsen-Jensen obtains his materials. The implication is that both workshop and source of materials play a role in influencing the configuration of DiY electronic musical instruments, emerging from an ‘intra-action’ between human and material environment: as an extended agency which reaches beyond the exclusively human domain and re-situates the human within the materiality of a Techno-Animist paradigm.

In this sense, the idea of intra-action is influenced by Karen Barad’s view of agency as an ‘enactment’:

Agency is a matter of intra-acting; it is an enactment, not something that someone or something has. It cannot be designated as an attribute of subjects or objects ... Agency is ‘doing’ or ‘being’ in its intra-activity. (Barad 2007, 178)

In Barad’s view, agency, as the ability to make change happen, is situated in the entanglement of material and human forces, so that, it is ‘important to consider agency as distributed over nonhuman as well as human forms’ (2007, 214). Through the DiY attitude to technology, the practice of re-functioning using discarded and faulty components is examined in this article as influencing the design structures of the musical instruments which emerge from Larsen-Jensen’s studio.

The extended agency of the workshop

As Figure 1 suggests, Felix Larsen-Jensen’s workshop, *B-side Studios*, is a complex material environment of discarded, broken, repaired and re-configured technologies from diverse eras of media development. The central shelf shows various pieces of equipment, reading left to right: there is a tape deck (ca. 1980);

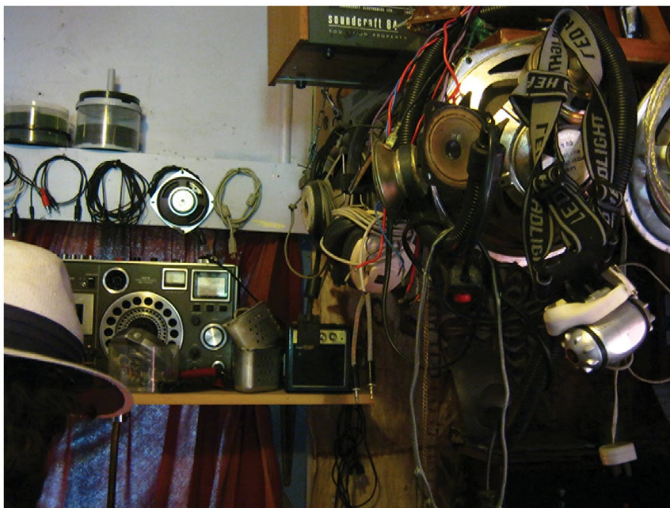


Figure 1. Materials awaiting re-functioning (image by author, 2013).



Figure 2. Larsen-Jensen in his 'environs' of B-side studios (image by author, 2013).

a set of two aluminium pressure cooker steamer trays (ca. 1970); and a repaired micro guitar amplifier. Above this shelf there is a jumble of the various leads used to connect audio signals between pieces of equipment. The appearance of cooking utensils seem strangely out of place, until we look at the materials used in Larsen-Jensen's DiY musical instruments later in this article, where diverse objects and materials, such as these, are part of their configuration.

In a similar image of the workshop (Figure 2), we see an overflowing 'mess' of materials, in which wires, equipment and dismantled components, in various states of functionality, are displayed as potential materials in assemblages which can be used in the production of sound.

From observing the arrangement of objects in Larsen-Jensen's workshop the impression is that the connection between objects and their new re-functioned purpose is an 'organic' process, that is, a process which emerges from the practice of collecting, sorting and storing potential objects for re-functioning. By 'organic' I mean a process which echoes the self-organizing capacities of organic growth, and that objects seem to find connections with other objects through an agency which is not entirely situated within human intention: again suggesting the life force of objects as a Techno-Animist process.

Observing Larsen-Jensen's workshop it seems that when technologies become redundant or forgotten, the materials leave their original context, and functionality begins a process of re-configuration. Initially, this seems to reduce the object to its basic materials by removing the supporting context of other interlocking functional objects, so that: objects, and their functions, are defined by their location amongst other objects; and a functionality which comes from their position within the assemblage of components used to fulfil a particular purpose. This could also be understood in terms of the potentials and capacities of objects to connect with other components to create new functions: designated as the *re-functional capacity* or *re-functional potential* of materials within this article. Therefore, the recycled object, devoid of its context, is an object defined by its individual material qualities, characteristics and its capacities to connect to other objects.

This re-functional capacity of materials is suggested in the 2006 version of the *B-side studios* website:

The *B-side studio* operates by a 'Womble ethic' of using whatever is available. Most of our gear has come from rubbish tips or junk shops, then sometimes fixed or modified, sometimes not. Many of our methods and techniques have developed from the limitations imposed by the equipment at hand, necessity often proving to be the mother of invention. (Larsen-Jensen 2006)

The 'Womble ethic' of B-side records refers to an animated British children's television programme (ca. 1973) about a group of anthropomorphic animals who live in an underground burrow, recycling

discarded materials and technologies from the human world. This is a good analogy to Larsen-Jensen's workshop environment, where living space is melded with workspace, an 'underground burrow' suggesting a close engagement between the human and the material environment. In the television programme, the underground environment of *The Wombles* is filled with everyday items which have been re-functioned into new, surprising and inventive uses. The 'Womble ethic' is closely aligned to aspects of the DiY and Lo-Fi ethos, in which functionality is not fixed by the manufacturer of a product, but remains malleable and dependant of the available capacities of other found objects. This can be related to Amy Spencer's discussions of the DiY approach to Lo-Fi music, where the functions of technology are considered to be malleable:

The Do-it-yourself approach to music making is all about producing you own music using whatever resources are available to you ... usually played on home-made or improvised instruments ... [a] tradition of Lo-Fi music, the concept of not trying to seek out new technology to produce your music. (Spencer 2008, 187)

Lo-Fi and redundant technology is particularly malleable since the original function has either become obscured over time, or has been erased in the process of transforming a functioning item into its basic material components. The process of technology taken from 'rubbish tips or junk shops, then sometimes fixed or modified, sometimes not' (Larsen-Jensen 2006), suggests that alterations to functionality and *error* are central roles in the process.

Error has the connotation of being a failure of function, objects which have ceased to function in the correct way, however, falling short of complete error, the partial functioning of technology is seen by Larsen-Jensen as the 'limitations imposed by the equipment at hand' with which he works (2006). This implies that obstacles, such as broken equipment, can be found to have the accidental advantage of providing functions which are somehow preferable to the intentional functioning of standard fully functioning and therefore 'invisible' technologies (Latour 1999). In this way, the 'Womble ethic' is an engagement with *material media* which comes about through the disruption of intended function: through the errors which allow the Black-box to become open to the participatory potentials contained within.

Through Larsen-Jensen's process of dismantling equipment and visibly storing the materials found inside, the workshop functions as both a catalogue of available materials and as an 'open' collective of connections and re-functioning capacities. My impression is that Larsen-Jensen's workshop functions as a Techno-Animist environment, with materials acting as active participants, influencing the creative process through intra-acting materials placed within the proximity of each other.

As seen in Figure 3 above, the main entrance of the studio is studded with excess supplies of dismantled loudspeaker components removed from their usual opaque enclosure: visibly extending the process of sound into the material environment and reflecting one of the aims of Larsen-Jensen, to:

Make electronic music where people can see that the music is actually being made in front of them, not just being played back in front of them. (22 February 2013 interview)

In this sense, the material process becomes an important part of the final outcome. By making processes visible, the influence of materials is utilized as a vital component of DiY practices, situating the material environment as an active capacity of agency: an extended agency which incorporate the configuration of human and work shop materials.

This can also be seen, as Rebecca Onion says, an urge to use mechanical and Lo-Fi technology as a way to increase the 'transparency of motion functions ... [which allows a] closer physical bond' (2008, 146) or *indexicality* between materials, media and the human participant. Another way of looking at Onion's idea of material media increasing the 'transparency of ... functions' is through extended agency, which is more the focus of this article. Through extended agency, 'indexicality', as a tangible link between maker and materials, emerges from material engagement between human practitioner and material environment.

The idea of extended agency can be applied to the material environment of Larsen-Jensen's workshop: as a configuration of ideas generating material-human intra-action, and also; in regards to the wider material environment of the recycling shop where the availability of discarded objects also



Figure 3. 'Material media' of the open loud-speaker (image by author, 2013).



Figure 4. Raw materials and resulting oscillators (adapted with permission from Larsen-Jensen, 2011).

becomes part of the process. One way that Larsen-Jensen allows the material environment to influence the form of his art is in his choice of recycled materials:

A lot of it comes from the recycle centre here in Raglan, the rubbish tip, called *Xtreme Waste*, [for example] those are pie dishes, for baking a pie in. I found a bunch of those up at *Xtreme Waste* a couple of years ago. (22 February 2013 interview)

The environment of *Xtreme Waste*, and the objects available there, play a significant role in determining the form taken by Larsen-Jensen's oscillators. For example, the physical shape of the oscillators owe their form to the re-use of aluminium and wooden containers which Larsen-Jensen finds at the local refuse tip, as shown in Figure 4, showing the types of materials on the left which are used in the construction of the oscillators on the right side of the image:

As can be seen in Figure 4, with the oscillator on the far right, its casing is made from an assemblage of three wooden and aluminium kitchen bowls. The use and selection of materials, such as those pictured above, is dependent on the available supply of recycled artefacts which come from the local rubbish tip. Therefore, the environment of the rubbish tip can also be seen as part of the process of active externalism which links the workshop and human practitioners within a particular productive configuration. The influence of *Xtreme Waste* is examined below in terms of the way that materials are sorted, categorized and displayed according to material characteristics rather than function: a process which removes objects from their usual association with other objects and contexts of similar functionalities.



Figure 5. *Xtreme Waste* in Raglan (image by author, 2013).

One interesting feature I observed at *Xtreme Waste* (Figure 5) was the sorting of objects into different material types, such as steel, wood and glass. This means that the functionality of the object is secondary to the material qualities, and that, objects of the same material are placed together regardless of their original purposes.

In the categorized environment of *Xtreme Waste* connections between objects occur which would not necessarily happen when the objects are embedded in their functional situations. For example, looking at the above image, birdcages, deckchairs and Zimmer frames (as seen at the top left of Figure 6) are placed next to each other, and in the foreground, kitchen trays are placed next to drain pipes and sinks, all placed together due to their material characteristics of being made from aluminium. The re-distribution of familiar objects, within the context of *Xtreme Waste*, not only places an emphasis on the materiality of the object, but also provides a fertile ground for the imagination to reconstruct functions for the objects which are beyond their usual capacities. By categorizing objects into materials, the original function of the object is taken out of context, reducing the object to a series of material characteristics which increase the re-functional potential of materials.

An example of *Xtreme Waste* materials can be seen in Figure 7, depicting Larsen-Jensen's *bread tin audio mixer*. Here, the metal of the bread tin functions as an efficient electrical insulator for the audio signals as well as a strong casing for the fragile electronics contained within. I argue that part of this re-functioning of the bread tin has been influenced by the way in which *Xtreme Waste* categorize objects depending on types of metal – so that when Larsen-Jensen visits the dump shop looking for a metal enclosure for his electronics, he is directed towards a collection of objects with diverse functionalities.

As an environment used by Larsen-Jensen as a source of materials, the argument is that *Xtreme Waste* offers what Clark and Chalmers calls an 'active externalism' (1998, 7): an extension of the mind into the material environment and also, in a more Techno-Animist viewpoint, there is also a flow of agency from the materials; as an influence on the structure and appearance of the object created. This vibrancy of materials suggests an almost human-like sense of agency: indicating the 'two-way interaction ... [of] a coupled system' (Clark and Chalmers 1998, 8, 9).



Figure 6. *Xtreme Waste*: sorting of objects into material categories (image by author, 2013).

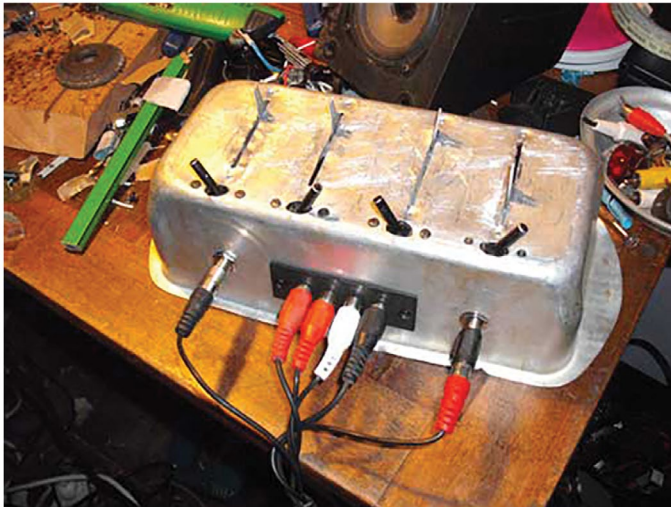


Figure 7. Bread tin audio mixer (image by author, 2013).

Another example of the Techno-Animist influence of materials can be seen in the connections of materials in Larsen-Jensen's guitar effects box, seen in the images below, in which an aluminium jelly mould has been re-functioned as the casing:

In the *jelly mould guitar effects pedal* (Figure 8), the light metallic material of the jelly mould provides an efficient electrical insulation from stray radio waves and is also an aesthetically appealing re-functioning of an everyday object. The question is: what are the processes involved 'to deviate, to change, to alternate, [and] to modify' (Zielinski and Wagnermaier 2007, 9; Huhtamo and Parikka 2011, 12) the functioning of such an object, in such a dramatic and varied manner? In reference to a Techno-Animist view of materials, there has been some form of agency which has emerged from the characteristics of the object: a vitality which has allowed the object to shift from functioning as a common kitchen item to becoming enmeshed within an entirely different configuration of functionalities. Techno-Animism

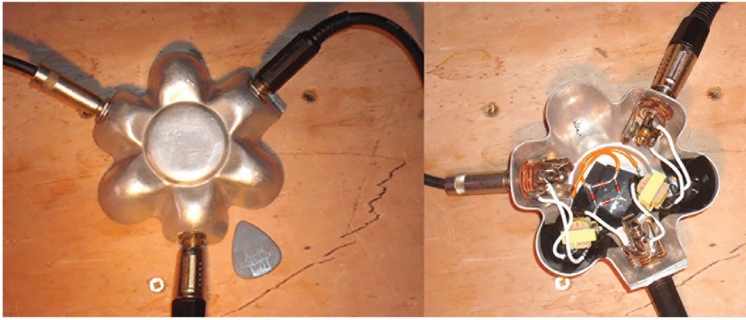


Figure 8. The re-used jelly mould as a guitar effects pedal casing (adapted with permission from Felix Larsen-Jensen, 2013).

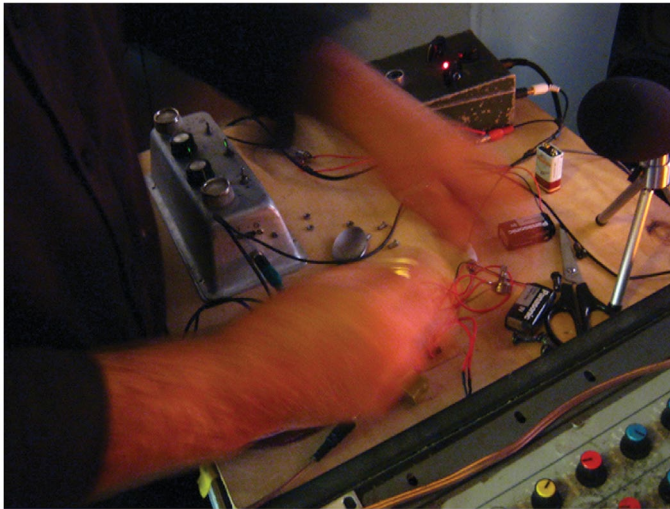


Figure 9. Larsen-Jensen adapting one of his oscillators (image by author, 2013).

suggests that factors within the object and the material environment play a role in determining the resulting functionality, for example: the jelly mould becomes redundant due to changes in kitchen behaviour, material factors such as decreased food preparation time and an increase in the availability of mass-produced food items; the mould is disposed of at *Xtreme Waste*, where it is sorted according to the type of material it is made from; selected by Larsen-Jensen and stored at his workshop until a new functionality emerges as part of an assemblage of other materials and objects.

Techno-Animism infers that the process of re-functioning is on-going and continuous, with objects and materials falling in and out of different functional states.

Figure 9 shows Larsen-Jensen adapting one of his oscillators using makeshift tools, including a spoon (centre of image) and a pair of scissors, used to open up one of the casings since, as he says: 'a lot of them never really get finished ... most of them are like this, held together with bits of tape' (22 February 2013 interview). This *perpetual prototype* approach describes the playful attitude of experimentation with the electronic circuits, whereby, the process is a major component of the music:

They are all prototypes. In a way, the process is the music, part of the language of this sort of music is the language of discovering what circuits do ... these machines start directing the music, in that, this circuit makes this kind of sound, so that's the music you are going to make today. (22 February 2013 interview)



Figure 10. Larsen-Jensen's 'pie-dish' oscillator used with tape-machine amplifier (Reprinted with permission from Felix Larsen-Jensen, 2012).

As demonstrated so far, Larsen-Jensen's engagement with materials and technology involves allowing material agency to determine the form, or 'language' of the sound created, this theme is further explored below.

The influence of materials in the structures of media produced

Figure 10 shows an instrument made by Larsen-Jensen in 2006, named by the researcher as the *pie-dish oscillator* because its casing is made from a discarded aluminium dish usually used for cooking pies. The recycled pie-dish was obtained from Raglan's refuse centre along with the control knob on top, which is recycled from the tuning knob of an old Bakelite radio.

One of the faulty components used in the *pie-dish oscillator*, is the frequency control potentiometer or 'pot', which is the electronic component which the musician operates to change the pitch of the oscillator. Over repeated use the potentiometer has deteriorated and now, instead of a smooth sweep between frequencies, the oscillator creates a very different sound, as Larsen-Jensen describes:

That's a very simple square wave oscillator, this is the first one I built and its starting to die a little bit (very loud harsh atonal noise heard on interview tape), it feels like the 'pot' is wearing out a bit and it's not very precise anymore, so it kind of wobbles around a bit ... It's just the 'pot' itself, when it was new it was a very smooth kind of [sound] ... now it just wobbles around [between different frequencies]. (22 February 2013 interview)

The circuitry of Larsen-Jensen's 'simple square wave oscillator' is based on a 4000 series integrated circuit, a component used in the logic circuitry of calculators in the early 1980s. The re-functioning of this basic logic circuit means that the type of audio output is limited to a series of 'on/off's', that is, it produces the 'simple square wave' which is the most basic sound wave possible from an electronic means. Using the faulty 'pot' component to control the frequency of the square wave, the oscillator is able to produce a very complex sound, way beyond the capabilities of the simple components used. It is the combination of these two functional units, the square wave oscillator and the faulty frequency control component which produce the characteristic complexity of sound. The complex output obtainable from the intra-action of these simple components brings to mind the characteristics of Jane Bennett's non-totalizing assemblage, where the effects of the assemblage are: 'distinct from the sum of vital



Figure 11. The chaos and pattern of the *pie-dish oscillator* waveform (image by author, 2013).

forces of each materiality considered alone' (2010, 24). I understand this to mean that, the way materials intra-act creates an output which is 'greater than the *sum of its parts*,'¹ suggesting that this additional 'vitality' (in the form of re-functioned 'error') emerges from the assemblage. Due to this faulty component, when the 'pot' is turned the *pie-dish oscillator* produces an intermittent 'noise' effect, varying from harsh metallic grinding sounds to a sound similar to fluctuating hissing steam which sporadically and unpredictably resumes a pitched tone:

The visual representation of the sound in Figure 11, shows that the regular pattern of the square wave is still visible, the waveform is broken and fragmented and made irregular by the faulty operation of the 'pot'. The resulting waveform can be seen to display a combination of simplistic and complex characteristics produced from a combination of the basic square wave circuit determined by the worn-out 'pot', producing a broken, intermittent and chaotic waveform made from the straight line characteristics of the square wave circuitry.

The unpredictable performance of the 'indeterminate pot' evokes the idea of Techno-Animism to describe sound as affected by a 'spirit' of the materials. In the Techno-Animist sense, the mechanistic square wave, created by the oscillator circuit, is altered through a complex operation of re-functioning in which human intention is side-lined to the material agency of the faulty component. This is supported by Larsen-Jensen, who has not intentionally tried to produce this effect but has retained it as an element of his music:

I haven't built anything deliberately like that, but now that it's doing that I'm sort of keeping it like that rather than fixing it, whereas I used to use it as a smooth kind of, hitting a deliberate tone, now I use it for a screaming sort of [sound] (atonal bass noise of indeterminate pitch is heard on interview tape). (22 February 2013 interview)

In this way, the material characteristics of the broken 'pot' represents a material actant which is, in some ways, independent from human intention as Larsen-Jensen says above: 'I haven't built anything deliberately like that'. The process involves utilizing the faulty component to provide a non-structural element to the sound, disrupting the simple square wave functioning of the circuitry and introducing a complex re-functioning of the sound waves.

This human-machine functioning of Larsen-Jensen can be seen as a process which disassembles and re-functions materials from the original context of the Black-box to allow a new functionality which is not supplied by the manufacturers. Larsen-Jensen describes the process behind the re-functioning of the 'pot':

Part of the reason it wobbled off is because, I remember pulling that pot apart when I first did it, because I wanted to turn it all the way around ... there's a little tab inside that stops the thing, so, probably pulling it apart didn't help the longevity of the pot, but it's cool because it allows you to do those sort of [sounds] (short 'whipping' sounds as Larsen-Jensen turns the control all the way around several times). (22 February 2013 interview)

What has happened is that the potentiometer has been modified so that the usual stopping point is no longer functioning. The potentiometer is similar to the volume control, where the knob cannot be turned beyond the maximum or minimum volume. Larsen-Jensen has removed this stop so that the highest frequency jumps to the lowest frequency and the knob can now be turned continuously.

Just as the faulty operation of the 'pot' shapes the types of sound which are possible to produce, there is an overall influence on the organization of the sound which emerges from the characteristics of the material agents comprising the instruments: as if 'those instruments have their own language ... there's *something else* in those instruments' (22 February 2013 interview).

As discussed in this article, through interview, observations of the workshop space, and the wider material environment where recycled objects are scavenged, an engagement with the agency of materials has emerged as a recurring theme in the DiY (Do-it-Yourself) practices of Felix Larsen-Jensen. The wider implications of this study involve the suggestion that these practices follow a Techno-Animist approach to technology, situating the human practitioner in parallel with the 'vibrant' objects of the material environment. This re-situating of the human, as part of a DiY attitude, arises from the relationship between technology and practitioner: an engagement with *material media* which allows material agency to become part of the on-going process of creation: as Larsen-Jensen says;

I think when you build stuff you definitely have a different relationship with it [technology] ... it's got its own language. *It's got its own life*. This stuff makes its own music [and] *creates its own structures*. (22 February 2013 interview)

The ability of material media to 'create its own structures', as Larsen-Jensen say above, means that human and materials are entangled as equal partners in the processes of creation.

Re-situating the human as part of a two-way intra-action with the material environment, opens up the potential for media studies oriented around the question of what is material media? How does material media contrast and parallel with different aspects of digital media and can the same strategies of 'error' be used in other forms of media? The Techno-Animist view of materials and technologies is a concept, introduced in this article, which offers a wide scope of potential research directions: exploring different ways that forms of material agency can be incorporated into engagements with different types of media practices; as a discussion of vital materials and the way in which practitioners can work with material agency to develop strategies of re-functioning.

In conclusion, 'Techno-Animism' has been used as an umbrella term to incorporate a variety of conceptual perspectives on material agency, material engagement and the particular approach of the DiY practitioner examined in this article. I believe it is a valid term which is useful in identifying a re-situating of the human which acknowledges the participatory role of materials in the processes of creating artefacts. Whilst this article has examined a solitary practitioner, further research is suggested which embraces a wider sample of practitioners within the context of the emerging '[third] industrial revolution' (Hatch 2014, 3–10) of Maker Culture.

Note

1. A phrase associated with Aristotle: 'The whole is greater than the sum of its parts', here used in the context of Jane Bennett's assemblage of vital materials.

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Notes on contributor

Emit Snake-Beings is a practitioner of DiY electronics and other forms of Lo-Fi engagements with technology in the field of visual arts, sound art, 8mm photography, electrical shrine making and performance (see www.snakebeings.co.nz for more details). His 2016 PhD thesis explored Do-it-Yourself culture as a material engagement with technology which situated

the human within the extended agency of the material environment. His current research approach is concerned with innovative ways of capturing the embodied and tacit knowledge which emerge from the active engagement of creative practitioners with the material environment of the workshop. Emit is a research associate at the University of Waikato, New Zealand.

References

- Barad, K. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. London: Duke University Press.
- Bennett, J. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.
- Bennett, J. 2011. "Response to Thomas Princen's Review of *Vibrant Matter: A Political Ecology of Things*." *Perspectives on Politics* 9 (1): 120–121.
- Bryant, L. R. 2014. *Onto-cartography: An Ontology of Machines and Media*. Edinburgh: Edinburgh University Press.
- Bryman, A. 2001. *Social Research Methods*. Oxford: Oxford University Press.
- Clark, A. 2011. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford: Oxford University Press.
- Clark, A., and D. Chalmers. 1998. "The Extended Mind." *Analysis* 58 (1): 7–19. doi:10.1111/1467-8284.00096.
- Corbin, J., and A. Strauss. 2015. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 4th ed. Thousand Oaks, CA: Sage.
- Dick, B. 2006. "Action Research Literature 2004-2006: Themes and Trends." *Action Research* 4 (4): 439–458.
- Duncombe, S. 2008. *Notes from the Underground: Zines and the Politics of Alternative Culture*. Bloomington, IN: Microcosm Publishing.
- Hatch, M. 2014. *The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers*. Columbus, OH: McGraw-Hill books.
- Huhtamo, E., and J. Parikka. 2011. "Introduction: An Archaeology of Media Archaeology." In *Media Archaeology: Approaches, Applications and Implications*, edited by Erkki Huhtamo and Jussi Parikka, 1–21. Berkeley, CA: University of California Press.
- Larsen-Jensen, F. 2006. "B-Side Beats." Accessed May 13, 2013. <http://web.archive.org/web/20060524194101/http://www.bsidebeats.com/studio.htm>
- Latour, B. 1987. *Science in Action*. Cambridge, MA: Harvard University Press.
- Latour, B. 1999. "A Collection of Humans and Nonhumans." In *Pandora's Hope: Essays on the Reality of Science Studies*, 174–215. Cambridge, MA: Harvard University Press.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-network-theory*. Oxford: Oxford University Press.
- Mack, N., C. Woodson, K. Macqueen, G. Guest, and E. Namey. 2005. *Qualitative Research Methods: A Data Collector's Field Guide*. Research Triangle Park, NC: Family Health International.
- McKay, G., ed. 1998. *DiY Culture: Party & Protest in Nineties Britain*. London: Verso.
- McNiff, J., and J. Whitehead. 2006. *All You Need to Know about Action Research*. London: Sage.
- Onion, R. 2008. "Reclaiming the Machine: An Introductory Look at SteamPunk in Everyday Practice." *Journal of Neo-Victorian Studies* 1 (1): 138–163. Wales: Swansea University.
- Pacey, A. 1999. *Meaning in Technology*. Cambridge, MA: MIT Press.
- Parikka, J. 2012. *What is Media Archaeology?* Cambridge: Polity Press.
- Parikka, J., and G. Hertz. 2012. "Zombie Media: Circuit Bending Media Archaeology into an Art Method." *Leonardo* 45 (5): 141–153. Minneapolis, MN: MIT Press.
- Polanyi, M. 2005. *Personal Knowledge: Towards a Post-critical Philosophy*. London: Routledge.
- Sharples, M., P. McAndrew, M. Weller, R. Ferguson, E. FitzGerald, T. Hirst, and M. Gaved. 2013. *Innovating Pedagogy 2013*. Milton Keynes: Institute of Educational Technology, The Open University.
- Spencer, A. 2007. *The Crafter Culture Handbook*. London: Marion Boyars.
- Spencer, A. 2008. *DiY: The Rise of Lo-Fi Culture*. London: Marion Boyars.
- Zielinski, S., and S. M. Wagnermaier. 2007. *Variantology – On Deep Time Relations of Arts, Sciences and Technologies*. Cologne: Verlag der Buchhandlung König.

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