The DiY [‘Do-it-Yourself’] Ethos:

A participatory culture of material engagement.

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ABSTRACT

Do it Yourself (DiY) is a participatory culture which exemplifies a particular ethos in its approach to technology and materials. Rather than engage with 'complete' technologies, such as a technology supplied as ready-to-go item, the DiY practitioners examined in this thesis engage with the raw materials of garbage and recycling, 'incomplete', broken and discarded technologies. In this type of DiY practice the emphasis is towards creating individualised and custom-built forms of technology: often made from components and materials which have been re-functioned from their original intention to produce new and unexpected functionalities; practices which disrupt the dominant discourses of technology. This thesis involves a situated application of theory to DiY practices in the field: focusing on three case studies featuring New Zealand-based DiY sound practitioners and their embracing of functional 'errors' as a means of increasing the participatory potential of materials.

My initial argument is, that the social perspectives and 'human-biased' view examined in current literature on DiY culture, depicts an attitude towards power and knowledge which obscures the recognition of material agency. In this thesis, 'power' is defined within a social constructivist, or as a 'human-biased' view, whereas 'agency', as the ability to make something happen, is more expansive and incorporates the capacities of materials to become active participants in the production of cultural artefacts. Through engaging with the work of contemporary theorists relevant to material agency (including Karen Barad, Jane Bennett, Levi R. Bryant, Susan Kelly, Lambros Malafouris and Bruno Latour), the limitations of the 'human-biased' view of DiY culture are highlighted and the emphasis is shifted from DiY participatory culture as a social phenomenon towards the idea of 'extended agency': agency which includes both human and material actants within the entangled assemblages of DiY practices and the material environment.

When extended agency is applied in the three case studies, the initial question asked is: ‘How does the intra-action of human and material environment influence the processes of DiY practices and what specific strategies are used to increase the participatory potential of materials?’.

In this sense, DiY culture challenges the way we see ‘power’ and ‘structure’ as being exclusively human traits, influencing our way of relating to the material environment and creating consequences and considerations which extend from the localised DiY practices examined in this thesis. The suggestion is that the extended agency of DiY culture represents a timely re-evaluation of the relationship between the human and the material environment, challenging prevalent discourses which place the human at the centre of power and knowledge.

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"An actant never really acts alone" – Jane Bennett (2010, p. 21).

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Figure 1: ‘The extended hand of agency’

(adapted with permission from Geoff Doube, 2015).

Introduction

Do-it-yourself (DiY) culture can be regarded as a prevalent feature of the New Zealand psyche. The DiY ethos is articulated in the colloquial expression 'number eight wire', which relates to the capacity to use agricultural fencing wire to fix anything mechanical, no matter how serious the problem. Through DiY practices the material of 'number eight wire' can be said to have been re-functioned[1] from its original purpose to a new and multi-faceted potential. According to one New Zealand commercial outlet, specialising in home improvement materials, DiY is as universal as the material of our bodies: "DiY: it's in our DNA"[2]. This aspect of DiY culture focuses on an engagement with everyday materials and the concerns of everyday living in a geographically remote country where historically there has been little alternative than to 'do-it-yourself', such as the amateur builder activities investigated in Michael Mackay's recent PhD thesis *DiY (Do-it-Yourself) Home Improvement in New Zealand* (2011). On the other hand, DiY culture is also concerned with an attitude of making one's own *Culture*[3], a potentially politicised practice with the implication that the resulting artefacts are custom made by the practitioner to satisfy some need which is lacking in mainstream culture. In the politicised accounts of DiY culture by George McKay (1998), Stephen Duncombe (2002; 2008) and Amy Spencer (2008), DiY is depicted as a social movement which resists the mainstream organisation of culture; the resisting of dominant discourses of both culture and technology. The resistance to dominant social structures are a major concern for this form of DiY culture,

[1] The process of adapting an originally intended function and a major theme within this thesis.

2 A slogan used by Mitre10. This definition of DiY taps into an aspect of the historical settler spirit of New Zealand, where geographical remoteness and the lack of commercially available products resulted in the cultivation of the skill of improvising and 'making do' with the available resources.

[3] Culture with all the connotations of identity, belonging and expression.

accounts of which focus on the alternative forms of social organisation that DiY engages in[4]. A major part of this social, or 'human-biased' view[5], is the expression of the DiY ethos: attitudes expressed towards social organisation, as well as attitudes which guide the use and engagement with technology, based on human concerns of resisting dominant discourses.

With respect to the apparent range of this topic, this PhD focuses on a dimension of DiY culture that is missing from much of the available literature: interconnecting, examining and discussing the following aspects of DiY culture; 1) the 'human-biased' DiY ethos which guides practitioners in their approach to DiY practices and their engagement[6] with technologies and; 2) the participatory potential of materials, as fragments of technologies and easily available everyday objects, and their influence in the process of making DiY artefacts. Together these two aspects form what I term the 'extended agency view' of DiY culture, since its conceptual viewpoint encompasses both human and material aspects of the 'how and what' of the DiY artefacts examined in this thesis.

Although there is an initial differentiation between the 'human-biased view' and the material aspects of DiY culture, this preliminary aim of the thesis is to address the differences in these two approaches to DiY culture, the 'human' (Chapter One) and the 'material' (Chapter Two), and to combine aspects of both

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[4] For example, Duncombe's "community of difference" (2008, pp. 66-70) as a social grouping based on diversity rather than collective agreements.

[5] The 'human-biased view' emphasises the 'social' aspects of DiY culture, concerns such as identity, aesthetics, attitudes and ethos, culture, power and politicised aspects of the production of knowledge.

[6] My initial premise is that *material engagement* represents an interconnection between the practitioner and the materials, extending the idea of agency, who or what is responsible for the production of culture, to include *both* the human practitioner and the nonhuman materials which the DiY practitioner engages with.

of these conceptual approaches to DiY culture, applying these concepts to actual DiY practices in three case studies which form the bulk of this study. This thesis not only deviates from traditional accounts of DiY culture, but also attempts to expand the theoretical basis of DiY participatory culture to incorporate the participatory potentials of material engagement and material entanglement[7].

My motivation in examining DiY practices as a participatory culture comes from a perception that participation in new media, often termed 'participatory culture', is more likely to emphasise *interaction*, rather than an *active participation* in the creation of new technological forms. Interaction in this context means that participants limit their activities to the use of existing 'enclosed' technologies: complex technologies that are supplied as a complete solution to enable social interaction in the functions and structures these technologies entail. An 'enclosed' or 'complete' technology, as defined in this thesis, are the types and uses of technology that offer predetermined interactive functions but have limited potential for participation in the 'workings' and processes enclosed within: denying recognition of the materials or components which produce these functions.

Situated within the Screen and Media programme at the University of Waikato, New Zealand, this thesis departs from the predilection of Media Studies to emphasise audience reception and the use of 'enclosed' technological forms: for example, social media where participation is viewed as a matter of social interaction, with the processes of technology invisibly playing their role to provide these 'socially-oriented' functions. Removed from the concerns around both new media and mass media technologies, the shift in emphasis from the human-biased view towards including material engagement and material agency, challenges the idea of agency as being either an exclusively human trait or

[7] Material entanglement is provisionally defined in the sense that agency, as the ability to make something happen, is located within the complex participation of human and material actants.

something determined by humanly intended technological functions. In this way, the DiY engagement with materials, with its emphasis on the disruption of 'enclosed' technological structures, goes against the dominant discourse of Media Studies, highlighting ways in which agency can be expanded to acknowledge the influence of material agency in the formation of small scale and idiosyncratic DiY technologies. Here, participation is between the practitioner and the materials used, rather than between an audience and an 'enclosed' technological form.

The premise is that the material engagement of DiY culture offers something more than *interaction* with 'complete' technologies, drawing on Karen Barad's "notion of *intra-action*, in contrast to the usual *interaction*, which presumes the prior existence of independent entities" (Barad, 2003, p. 815) [8]. The argument, developed in Chapter Two, is that the *intra-action* of the DiY practitioner is something which emerges from *within* the combined characteristics of all available and participating actants[9], both human and material entities.

As an alternative to participatory culture facilitated by 'enclosed' technologies, the element of DiY culture I wish to focus on has a strong tradition of working with basic materials, engaging in materials as active participants within the processes and practices. My argument is that this form of DiY, which uses rejected, recycled and discarded materials in its constructions, offers materials the potential to participate within the formation of 'structures' and 'functions', as artefacts emerging from the processes of intra-action of human practitioners and the materials of fragmented technologies. DiY technology, in this study,

[8] Based on the quantum physics writings of Niels Bohr (1885-1962).

[9] As defined in this thesis, an actant is a human or nonhuman entity which exerts an influence and has some form of agency to, as Jane Bennett says: "to make a difference, produce effects, alter the course of events" (2010, p. viii)

comprises redundant, broken fragments and components excluded from any particular technological functionality, termed 'garbage' in this thesis.

The significance of garbage, for John Scanlan, is that it is material which has been removed from any exact and defining context, not referring to a particular category of "object" but as a "return to some [basic] material condition" (2005, pp. 14-16). DiY's ability to engage with incomplete fragments of technology, as an active participation in the materials of technology, highlights the absence in scholarly literature which emphasises the materiality[10] of DiY participatory culture. This thesis is attempting to establish the recognition that materiality (as material agency) plays an active participatory role in the DiY practices examined.

Studies within the field of DiY's re-use of garbage are a relatively new and as yet sparsely recognised phenomenon. In the emerging field of media archaeology, the use of garbage and broken technologies has recently been labelled "zombie media" by Jussi Parikka and Garnet Hertz, (2015), since it represents the "living dead of media history" (p. 145) where previous new media technologies are brought back from redundancy with new and unexpected functions. Parikka and Hertz's explorations of zombie media examine "circuit bending", defined as, "an electronic DiY movement focused on manipulating circuits and changing the taken-for-granted function of technology without formal training or approval" (p. 145). In this thesis the focus of DiY engagement with redundant technologies and garbage is located in the 'localised' practices of New Zealand sound culture, examining the wider use of discarded materials, for example the re-functioning of aluminium pie dishes used by both Felix Larsen-Jensen and Greg Locke (Chapter Four and Five), as well as the re-functioning of electronic media technologies.

[10] *Materiality* is used in this sense as a general indicator of the importance of the material environment to DiY practices.

On a contextual note, my personal interest in the material aspects of participatory culture, and the use of recycled materials, can be traced to early childhood viewing of the animated children's television programme *The Wombles*[11], an experience shared by some of the practitioners discussed within this thesis. The lyrics of the theme tune to *The Wombles* includes the line:

> Pick up the pieces and make them into something new, is what we do (Batt, 1973).

The Wombles main activity was collecting discarded garbage, which they would 'pick up' from Wimbledon Common (London) and then try to find uses for. In the context of this thesis the 'Womble ethic' represents an engagement with basic materials rather than 'complete' or 'enclosed' technologies. The 'Womble ethic', an idea taken from DiY practitioner Felix Larsen-Jensen (see Chapter Four), describes the practice of using found materials, garbage and 'broken' components of redundant technologies: an engagement with the material environment from which all kinds of "pieces" are re-functioned and configured into "something new". These fragmented pieces of discarded technology are some of the raw materials used by DiY practitioners. It is these practices that this thesis intends to interrogate, exploring the DiY ethos which engages with such materials, rather than readily available commercial technologies, and acknowledging the processes of re-functioning to "make them into something new" (as *The Wombles* would say). In this sense, this thesis is situated within the various practices of recycling, scavenging, up-cycling and informal 'picking over rubbish', much of which are common practices in developing countries but are now prohibited in countries such as New Zealand. The widespread practice of obscuring the processes of turning once usable objects into waste means that

[11] *The Wombles* was a children's animated T.V. show (1973-1975) which features a community of imaginary bear-like creatures who live from collecting and re-using discarded waste materials found in their local environment. One of the recurring themes of the show is the surprising and unexpected uses that discarded materials can be applied to.

scavenging practices are forced 'underground' and therefore 'under the radar' of scholarly literature. One exception to this practice is the occasional legitimised 'dump shop', such as Raglan's *Xtreme Waste,* which allows cheap access to discarded materials and is used as a source of materials for the DiY practitioner discussed in Chapter Four.

The following pages detail the outline of this thesis, chapter by chapter, introducing the key concepts and definitions used, and explaining my approach to the topic.

The preliminary questions in Chapter One begin with examining the social aspects of DiY culture, as represented in the literature available. Using this literature as a starting point I will address the question: 'What is the traditionally human-biased view of DiY culture according to available literature on the subject?' This serves to apply concepts from this literature in the context of a provisional theoretical framework of DiY, representing the human-biased view of DiY culture, which can then be compared to theoretical approaches which emphasise the material aspects of DiY culture, introduced in Chapter Two.

By addressing the question: 'What are the theoretical concerns and limitations of the traditionally human-biased view of DiY culture?', the aim is to interpret and extend social theories implicit within the DiY ethos, so that its main themes can be identified. The preliminary focus on the social theories of the DiY ethos sets the scene for the shift in emphasis to the material or extended agency view[12] of DiY culture. This focuses on the discussions of the DiY ethos, particular strategies used to realise this ethos, and by examining the DiY attitudes towards resisting dominant organisational forces and structures which limit the *participatory potential* of the DiY ethos.

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[12] The material view represents an extension of agency to include both human and material actants.

In Chapter One, the resistance of certain aspects of social 'power' will be discussed in terms of the politicised accounts of DiY culture by George McKay (1998), John Jorden (1998), Stephen Duncombe (2002, 2008), Amy Spencer (2008) and *SteamPunk magazine* (2007-2012). The latter two embracing attitudes to the use of more basic technologies which enable the practitioners to participate more fully in technological processes. This will lead to questioning the type of social 'power', which DiY is presumed to resist, and the types of structures which are formed through the relationship between knowledge and power. In Chapter One, 'power' is defined through a social constructionist viewpoint, using Michel Foucault's view that "power produces knowledge… power and knowledge directly imply one another" (1995, p. 27). In this sense, power is seen as a socially productive force, as a means in which knowledge can be organised and structured. This is determined by the assumption that politicised DiY culture resists the types of structures produced by the knowledge/power relationship and that DiY culture, through its resistance, is a negative-space[13] 'outside' of the knowledge/power relationship of the 'validated knowledge' of the expert. The connection between power and knowledge and its resistance by DiY practitioners is an approach suggested by Bruno Latour's concept of the Black-box (1999), a space of knowledge (such as a technological object) to which access is restricted and is deemed "expert territory" (Parikka & Hertz, 2015, p. 148). Using the idea that 'outsider art', like DiY culture, can be perceived as a practice of negative-space, there is a discussion in Chapter One on strategies which resist the social aspects of the Black-box, through amateur experimental 'tinkering' which attempts to operate 'outside' of the territory of

[13] Negative-space of knowledge - an idea which is developed from Stephen Duncombe's discussions of DiY's "negative identity" (2008, (pp. 66-70) in association with Michel Foucault's discussions of knowledge/power (1995, p. 27), meaning a space of practice as an active resistance to the social construction of knowledge through the type of 'power' associated with the disciplines and categories of 'validated knowledge' of the expert.

the expert and, therefore, resist the power/knowledge relationship associated with 'enclosed' territorialised spaces. As this discussion progresses it is seen that the dichotomy of the 'inside' and the 'outside' of 'validated knowledge' forces a language-bias which emphasises the human as the centre of power. This dichotomy is seen as an agent which excludes the acknowledgement of material agency, opening the way for a shift of emphasis from the human-biased concept of 'power' to an 'extended agency' in which both human and material are recognised as active participants.

In the second part of Chapter One, the politicised view is contrasted with Jim Hopkins' *Blokes in Sheds* (1998), New Zealand-based practices of DiY, where individual practitioners work in relative isolation to pursue their respective hobby-type activities. This view of DiY, examined in Chapter One, offers the suggestion that the workshop is an extended space of the practitioner, a space in which the practitioner and the materials participate in the co-creation of artefacts. This relates to concepts of material agency discussed in Chapter Two, where Andy Clark and David Chalmers' idea of the "*extended mind"* (Clark & Chalmers, 1998, p. 7) argues that mental processes are supported by elements outside of the mind. Chapter One ends with a discussion of New Zealand 'noise music', a type of musical practice which has a strong emphasis on DiY as a material engagement. 'Noise music' engages with the basic components of sound, actively resisting musical structure, to produce "non-idiomatic" sound, as noise collective *Vitamin-S* describe it (2013). "Non-idiomatic" is sound produced through a strategy of resisting the traditional structures of music, an avoidance of existing cultural forms, continuing the theme of DiY cultures resistance to knowledge and power. Noise music also acts as context to the examination of DiY sound culture practices in New Zealand, which is the focus of the three case studies of this thesis.

In Chapter Two, the shifting of emphasis from the human to the material becomes focused on the differences between the idea of 'power' as a human-biased concept and the concept of 'agency' as the ability to acknowledge the

additional influence of materials. Between Chapters One and Two, there is a shift of emphasis from the 'human' to the 'material' or 'extended agency' view of DiY culture, in which the anthropocentric connotations of the word 'power' are discussed in terms of its limitations to allow a concept of material agency to emerge. Theoretical discussions of material engagement also begin in Chapter Two, where the preliminary question is asked: 'What are the theoretical concerns of DiY practices which allow materials a participatory role?'. To answer this question, in Chapter Two, it seems more appropriate to speak of agency, rather than power, as agency has a different connotation to the social-biased concept of power. The preliminary definition of agency is the ability to make something happen, as a capacity of change which emerges from an entanglement of human and material, in contrast to 'power' which is seen as something belonging exclusively to human intention. This definition draws from Jane Bennett's definition of agency as an actant of "efficacy, [which] can do things, has sufficient coherence to make a difference, produce effects, alter the course of events" (Bennett, 2010, p. viii). Therefore, in Chapter Two the less anthropocentric concept of agency is substituted in place of 'power', placing emphasis on extending agency to include the participation of material agency and material engagement as an intra-action of human and the material environment.

The initial hypothesis is that the material engagement of DiY culture offers a view of participatory culture which diffuses the human as the exclusive source of agency. The shift from the definition of power as socially-productive and human-based, to a definition of material agency, incorporates the influence of Jane Bennett's "vibrant matter" and the actant:

> An actant never really acts alone… A lot happens to the concept of agency once nonhuman things are figured less as social constructions and more as actors (Bennett, 2010, p. 21).

In this way, with "nonhuman things" and materials "figured less as social constructions", the definition of power is shifted from the initial premise of being

a socially productive force to being a way in which to express the intra-action of human and nonhuman "actants" involved in DiY culture.

In the context of the DiY ethos to disrupt social structures, discussed in the politicised accounts of DiY culture in Chapter One, the connotations associated with the word 'structure' is that human intention is responsible for its emergence. Structures, as defined in this thesis, represent a way of organising the world around human concerns, centring the human as the sole responsible agent and eliminating the possibilities of material agency. Structures are also seen as 'enclosed' spaces which deny participation, territories in which knowledge and power are responsible for the configuration of materials. In Chapter Two the idea of the transversal is introduced as a strategy of *de-territorialisation.* To de-territorialise, in this context, means to remove the boundaries of a particular space, such as an 'enclosed' space of 'validated knowledge' (or the boundaries of an 'enclosed' technological form), and to allow participation with selected components, concepts or materials within. With the concept of *de-territorialisation*, there is an alternative view to the idea of DiY occupying negative-space through its attitudes to disrupting structures. De-territorialised space, applied to the DiY concern with 'structure', is linked with several ways that DiY culture organises 'material', such as transversing the territories of the Black-box and cutting across enclosed spaces of 'validated knowledge'[14].

In contrast to structure, the concept of the assemblage represents a more fluid construction, since it does not centre the human as the exclusively responsible

[14] 'Validated knowledge' is referred to as the territories of the 'expert', an 'enclosed' space controlled by the relating of power with knowledge, creating a human-biased socially constructed territory, in contrast to DiY practices which do not operate within the framework of the knowledge/power relationship of the 'expert'.

agent of organisation. The non-totalising assemblage[15], introduced in Chapter Two, is a type of organisation in which structure emerges from the *intra-action* of multiple actants, rather than organised through the imposition of a central human-biased 'power'. The discussion of the DiY attitude to structure, and the process of breaking down complete technologies into smaller components, is continued in Chapter Two, where *reverse Black-boxing*, to use Bruno Latour's phrase, becomes part of the strategy of DiY culture to dismantle components from the larger whole. The process of reverse Black-boxing is initiated by the removal of intended function, either through unintentional dysfunction or, as argued in this thesis, 'error' as a strategy utilised by the DiY practitioner to increase the participatory potential of materials[16]. Through this DiY strategy of de-territorialising the intended function of the technological object, the premise is that DiY practices allow functions to emerge from material agency which was previously subsumed within the Black-box. Since this thesis represents a shift from the idea of agency as a solely human trait, towards a concept of agency incorporating nonhuman materials, the term 'function' becomes a word which spans across this shift in definition: with *re-functioning* representing the DiY-driven change of intended or original function. In this way re-functioning becomes a way in which to examine the 'extended agency' view of DiY culture.

In Chapter Two the performative qualities of *function* is a term incorporated by Levi R. Bryant's concept of the machine, as a human/nonhuman object of agency (2014). Bryant's machine emphasises functional qualities rather than the idea of essences or fixed characteristics of objects. The use of the word 'machine'

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[15] Based on Jane Bennett's interpretation of Gilles Deleuze and Félix Guattari (2013), the non-totalising assemblage is a 'structure' which resists organisation by a 'totalising' centre of power, instead, allowing the interaction of multiple actants contained within to participate in creating a constantly changing configuration or assemblage.

[16] 'Error' in this sense is defined as a strategy to increase the *participatory potential* of material agency, departing from an exclusively human view of power.

traditionally implies a nonhuman entity, whereas Bryant's machine, as used in this thesis, is defined as being the functional capacities of both human and nonhuman entities. Influenced by Graham Harman's *Object Oriented Ontology* (2002), Bryant's substitution of the word 'machine' in place of 'object'[17] avoids the connotations of a subjectivity/objectivity dichotomy, where materials and forms are viewed in terms of concrete or absolute attributes. The functionality of the machine shifts emphasis from the object/subject dichotomy as "a subject of predication... that possesses a set of qualities or properties that make it the subject that it is" (Bryant, 2014, p. 37). When a machine oriented view replaces the subject/object, the focus of enquiry shifts: "The first question to ask of any machine is not 'what are its properties?', but rather 'what does it do?' 'What operations does this machine perform?'" (Bryant, 2014, p. 39).

This emphasis on operations and function, influenced by Bryant's concept of the machine, is of particular significance to this thesis and is expressed through the recurring discussions of *DiY strategies,* or 'ways of doing things'. The implication is that DiY strategies, fuelled by attitudes and the DiY ethos, are also machines which express particular functions, as 'ways to make something happen'. By viewing both humans and nonhumans as machines with functional capacities, agency departs from the exclusively human realm of knowledge/power and enters into an extended view of agency. The idea of the machine also incorporates Bryant's *"reciprocal determination...* in which the machines that flow through a machine modify the machine that operates" (Bryant, 2014, p. 50), meaning that the functions of machines are altered and influenced by the intra-action and participation of other machines. "*Reciprocal determination"* is used throughout the case studies of this thesis to analyse the intra-action between different actants and the resulting influences on functionality, as observed in the strategies of material engagement enacted by DiY practitioners.

[17] Bryant's Machine Oriented Ontology (2014)

The concept of *extended agency*, involving DiY strategies which extend agency to the material (presented in the three case studies of this thesis: Chapters Four, Five and Six), is developed from Jane Bennett's "*distributive agency*" (2010, p. 31) and Clark and Chalmers "extended mind" (1998, p. 7), entangling agency within the material engagement occurring between the material environment and the DiY practitioner. By the end of Chapter Two, there is a 'tool box' of theoretical concepts with which to analyse DiY practices in terms of an extended agency view, transversing the dichotomy of human and nonhuman agency.

In Chapter Three the methodology of this thesis is discussed in terms of a post-positivist approach using a degree of 'insider' research, part of the methodologies of George McKay, Stephen Duncombe and Amy Spencer, and situating the researcher in terms of the varying degrees of active participation involved within the case studies. The positioning of the researcher draws on the integration of my own tacit knowledge[18] of DiY culture as an indirect influence. This tacit knowledge is information, interpretations, attitudes and experiences which are available to the researcher due to participation within the field of research, situating the researcher as a 'researcher-participant', meaning that the researcher is recognised as being "part of the situation they are investigating" (McNiff, & Whitehead, 2006, p. 9).

As a result of the choice of methodologies in this study, I argue that my own experiences as a practitioner in the field of DiY culture offer the potential for "insight(s)" (Corbin & Strauss, 2015, p. 78) to the field of study, possibly denied to other 'outsider' researchers. My own practices in the field, discussed as tacit knowledge in the methodology chapter of this thesis, also involve collaborations with other practitioners. This has been incorporated into the design of three case

[18] According to Michael Polanyi (2005), *tacit knowledge* is personal knowledge of the field in the form of information, impressions, attitudes and experiences which are available to the researcher due to a history of participation within the field of research.

studies which focus on a small selection of practitioners within the field of DiY sound culture within New Zealand. These three case studies form part of the methodology of this thesis, in which prescribed theory discussed in Chapter Two, is applied to observations informed by tacit knowledge. In this way the knowledge of the researcher, as being a participant within the field, is exploited as a research tool which allows access to data and as insightful guidelines for observing the practices of others.

My various levels of participation are expressed in the three case studies, starting with a low level of participation and shared tacit knowledge with the informant Felix Larsen-Jensen in Chapter Four. The participatory role of the researcher increases in Chapter Five, with a higher level of researcher participation from the experiences of collaborating with the informant Greg Locke on several music video projects involving his robot band *The Trons.* In Chapter Six, the third case study *Bingodisiac*, the researcher assumes the most active participatory role, with an existing collaborative practice, called *Bingodisiac*, adapted and initiated by the researcher as a series of events with over thirty participating musicians. The methodology involved in Chapter Six assumes a form of action-research, the examination of an existing practice, with data generated through the reflections of the researcher, through field notes, and interviews with participants.

In Chapter Four, *Case Study One: Larsen-Jensen's oscillations of 'error' and the 'perpetual prototype'*, has two aims: 1) to apply theories of material engagement and extended agency to actual practices, and; 2) to develop connections between theories and strategies which emerge from the informed observation of practices. This first case study is based on an individual practitioner and a view of DiY participatory culture as a material engagement, discussing the various strategies of practitioner Felix Larsen-Jensen which allow material agency to surface. Chapter Four examines the electronic sound oscillators made by Larsen-Jensen, musical instruments which embody the DiY ethos which values process over 'finished' work, de-territorialisation of structure, and the re-functioning of

discarded materials. A related research question is: 'what are the practices and strategies which allow material agency to participate in the process?' To address this question I will use data drawn from interview and personal observation of Larsen-Jensen's practices, examining the artefacts as well as directing questions towards the processes and attitudes involved in the practices. A secondary research question concerns the role of the material environment and the concept of extended agency: 'How is agency seen to extend beyond the human practitioner to include the workshop environment and how does this influence the structures of the type of work produced?' To answer this question I will draw on data obtained from an interview situated within Larsen-Jensen's workshop space so that observation of working practices and workshop environment can be included as a source of data. One of the approaches to this first case study has been to allow concepts to emerge from the observation of practices, so that theory is grounded within actual practices.

In the second case study, developed in Chapter Five, Greg Locke's self-playing robot garage band *The Trons* are discussed in terms of functionality and material agency, with an emerging theme of 'error' arising from the observation of practices. In this case study there are two approaches used: 1) to apply theories of material agency and functionality to the practices and strategies of *The Trons*, and; 2) to extend concepts from the observation and discussion of strategies which emerge from situated DiY practice. *The Trons* function as music-playing robots controlled by a primitive computer, obsolete in 1995, and made from re-functioned materials, including an aluminium pie plate and the children's construction toy 'Meccano'. The research questions asked in this chapter are: 'What is the DiY ethos which emerges from the practices and strategies of Greg Locke?' and; 'How do the use of materials influence the structures and functions of *The Trons*?' To address these questions the role of functionality, re-functioning and strategies which incorporate the use of 'error', are discussed in terms of Levi R. Bryant's concept of the machine as a series of *intra-action* between components known by Locke as '*Machine-talk*'. Machine-talk occurs through the

intra-action of material to adapt functionality in one or more of the materials. This is a more developed version of the concept of re-functioning, integrating Bryant's machine as well as several observed practices of Locke. A major feature of material agency and the machine is Locke's practice of using the children's toy 'Meccano', an "inaccurate" and "flimsy"[19] material, which is used extensively in the construction of robotic functions of *The Trons.* The 'errors' and mistakes which arise from the use of Meccano is, according to Locke, a strategy to allow the characteristics of materials to influence the sound quality which arises from the robot band. Locke's embracing of 'error' and inefficiencies of materials means that material agency becomes part of the process of *The Trons.* In this thesis, "error" is defined as a diversion from human intention, influenced by Latour's process of reverse Black-boxing which is initiated by 'error' in the functioning of the device, allowing materials and components to become visible participants in the process. Through the incorporation of error the practitioner is following a strategy of allowing material agency to participate in the outcome. As Locke suggests: "I know that often the 'mistakes' sound better than what I was thinking of"[20].

In Chapter Six, the third case study: *DiY strategies of the Bingodisiac Machine,* the aim is to examine a collaborative event involving multiple participants and to engage in some of the theoretical concerns of Chapter Two. Research questions include: 'What strategies are used to create assemblages which de-territorialise conventional human-biased structures?' and; 'What is the role of 'function' in the *Bingodisiac Machine?*' Since there are more human participants in *Bingodisiac* than the previous two case studies, there is the potential for more emphasis on the entanglement of the material and human-biased view of DiY

[19] Greg Locke in an interview by the author 07 December 2012 duration one hour twenty minutes.

[20] Interviewed by author 07 December 2012 duration one hour twenty minutes.

culture. This is expressed in the linking of human and nonhuman participants, conceptually framed by Bryant's machine. Through this framework, *Bingodisiac* is viewed as a machine assemblage of intra-connected functions, with both human musicians and nonhuman actants forming a non-totalising assemblage. Another concern explored is the DiY strategy of de-territorialising social structures, this strategy of allowing material actants to participate has been seen in the previous two case studies, typically through the use of 'error'. In *Bingodisiac* de-territorialisation comes from the material agency of the cueing system: allowing randomly generated cueing signals to organise and group sounds together. The unpredictability of the cueing system is one of the main strategies of de-territorialising human-centred ways of organising sound, such as would occur if the musicians were left to their own human-oriented methods of organisation. The intervention of the cueing system means that de-territorialisation or 'error'[21] plays an active role in organising elements in the machine assemblage of *Bingodisiac.* Of significance to this thesis is the use of 'error' as a strategy of reverse Black-boxing. In *Bingodisiac,* 'error' is a way in which the non-totalising assemblage replaces a human-oriented structure, and offers strategies of incorporating material agency in the form of indeterminacy and unpredictability. This intervention of material agency is expressed by participating musician Geoff Doube, when he says: "control was almost completely absent… as [in] *someone* having control over the final result"[22].

Chapter Seven concludes this thesis with a review of findings from the three case studies and a discussion of DiY practices and strategies to re-integrate the human into the material environment. In this sense, the dichotomy suggested by the presentation of the 'human' and the 'material' views of DiY culture, in the first

[21] 'Error' is defined as a diversion from an exclusively human-oriented agency and as a way in which material agency can participate within the assemblage.

[22] Interviewed by the researcher via email 21st October 2013.

two chapters of this thesis, is de-territorialised: dissolving the borders between the human and material through the evidence gathered within the observations and discussions of DiY practices. The ability of DiY to extend participatory culture to an active role of materials is revisited in the form of the *participatory potential* of materials, which arises from the non-totalising assemblages created by DiY culture. Within these assemblages the human and the material are entangled, as interpreted by the extended agency view of DiY culture, and conclusions drawn on the implications of these findings.

Within the scope of this thesis one of the limitations I have found is in addressing the gender imbalance within my selection of DiY practitioners. Perhaps due to my own gender bias, the practitioners I have encountered within New Zealand DiY culture, and the practitioners I have chosen to discuss, have been male. However, this is not to suggest that this study of DiY culture is a continuation of the 'Blokes in Sheds' mentality of material practices, nor practices which can be viewed as a 'final bastion of masculine power'. My intended view of DiY culture is that it is heavily influenced by contemporary feminist-oriented appropriations of 'craft' and traditional forms of woman's domestic labour, and the transformation of crafts such as knitting into informed art practices. The gender-bias of the case studies of this thesis occurs more accurately in Chapters Four and Five, whilst in Chapter Six there is less of a gender-divide with the inclusion of female noise musicians. One aspect of the gender issue is addressed in Chapter Two and the selection of theories of material engagement, representing a higher percentage of female inclusion, with some of the core concepts originating from the likes of Jane Bennett, Karen Barad, Amy Spencer and Susan Kelly. Although a complete discussion of gender issues is not within the scope of this thesis, this gender imbalance within DiY practitioners is suggested as an area of future research: addressing the apparent invisibility of female DiY practitioners active within New Zealand and investigating the traditional view of DiY culture as an exclusively male domain.

Chapter One: literature and the 'human view' of DiY

1.1 The 'human-biased view' of DiY culture

The 'human biased' view of DiY culture, as described in the following literature, offers an emphasis on the socially-oriented aspects of aesthetics, identity, culture, politics and the construction of knowledge. Central to the human-biased view is the idea of socially constructive 'power': a productive force which shapes technology, organises material and creates enclosed spaces of 'validated knowledge'. In terms of the definition of power offered in this chapter, the human is privileged by being situated as exclusively responsible for initiating and controlling the 'structures' which are super-imposed onto material. This human-bias of power, which excludes material agency, places a particular 'social' emphasis on DiY culture.

This chapter begins with examining the human-biased aspects of DiY culture, drawing on examples of literature, and addressing the following question: 'What are the themes which emerge from this literature and what are the strengths and weaknesses of the perspective taken?' I will also be discussing how the human-biased view connects with the material or extended agency view[23] of DiY culture. This will be answered through discussions of the DiY ethos; particular strategies used to realise this ethos, and by examining DiY attitudes towards organisational forces and structures which either limit or enhance the *participatory potential* of materials.

The human-biased view emphasises the 'socially constructed' elements of DiY culture, including the attitudes and ethos which drive practitioners to do what they do. Of significance to this thesis is the idea that this 'socially constructed'

[23] The material view is concerned with the extension of agency to include the influence of both human and material actants. This is discussed in more detail in Chapter Two.

view requires a particular concept of social 'power' which centres the human as responsible for the structures which emerge. In terms of this thesis, this is the defining attribute of social construction: as a process which places the human at the centre of 'power' through which the material world is organised, categorised and implemented. DiY's attitude to 'structure' is of particular significance and acts as a cross-over point between the human view and the extended agency view. In Chapter Two this idea of the human being central to a definition of power is challenged, allowing theories of material agency to be developed.

The resistance towards social structure is discussed in the community aspects of DiY zine culture using Stephen Duncombe's account of Lo-Fi self-publishing. Duncombe's idea of "negative identity" and "community of difference" (2008, pp. 66-70) expresses a DiY attitude of resisting the types of social structures in which the individual is 'enclosed' within a collective identity. In the context of this thesis, the apparent resistance of DiY culture to such subsuming structures becomes a way of contextualising the strategies of DiY practitioners, discussed in the later case studies, to resist the 'enclosed' structures of technology, opening participation to materials and components. Duncombe's view of the resistance of DiY culture to the structuring abilities of social power on knowledge is derived from ideas of power based on Michel Foucault's concept of the knowledge/power relationship, situating the politicised account of DiY as opposing 'validated knowledge'.

The core premise of Foucault's explanation is that knowledge is shaped by power, and even that knowledge cannot exist independently from the validating effect of power. This gives power a productive role as generator of validated 'knowledge', a form of social power which is resisted in the politicised accounts of DiY culture. This positioning of power is supported by Michel Foucault in *Discipline and Punish* when he argues:

> power produces knowledge… power and knowledge directly imply one another; that there is no power relation without the correlative constitution of a field of knowledge, nor any

> knowledge that does not presuppose and constitute at the same time power relations (1995, p. 27).

For Foucault, power is not only the ability to produce knowledge, such as the power and ability to produce knowledge as a productive force of participating within cultural production, but also a means to define what forms of knowledge are validated through producing recognised 'disciplines' and categories of knowledge: a "correlative constitution of a field of knowledge" as Foucault states. Within a social constructivist paradigm, power is centred in the 'human', as a socially productive force, and also the institutions and social structures through which human power is exerted. In the context of what the politicised accounts of DiY culture resists, is the knowledge/power relationship which concentrates knowledge into recognised categories, to divide up knowledge into areas of specialisation and to restrict participation to the trained professional, in contrast to the self-trained, amateur DiY practitioner.

These discussions of the 'social', human-biased, aspects of DiY culture act as a counterpoint to build the context of this thesis and its theme of *material engagement*. In this chapter, the language-biased view of DiY culture places the idea of power as a socially productive force, a social construction based in human intention and determination.

The oppositional aspects of DiY culture are expressed in John Jorden's discussion of DiY as 'outsider' art, in George McKay's study *DiY culture: Party & Protest in Nineties Britain* (1998), tapping into the countercultural aspects of DiY culture. Jorden's view of DiY politics as being connected to outsider art and the avant-garde begins a discussion of what DiY culture may be 'outside' of? In the case of the romantic view of the avant-garde, it is argued that the avant-garde is art 'outside' of the language system of art. By using language to define our world, DiY culture appears to be a space 'outside' of the conventional knowledge/power relationship of 'validated knowledge' – symbolising a form of knowledge similar to the avant-garde and outsider art, captured within the same paradox of attempting to represent something unrepresentable and 'outside' of language.

The use of language to define DiY culture as being 'outside' is questioned at this point on the basis of Karen Barad's view that "language has been granted too much power... [in] the belief that grammatical categories reflect the underlying structure of the world" (2003, p. 801-802). The use of 'outside' becomes viewed as a way of discerning between DiY culture and the culture of 'validated knowledge', a dichotomy which is not useful to this thesis since it is based in an exclusively 'human' view of DiY, preventing the emergence of extended agency towards which this thesis is driven.

The second part of this chapter adds context to this thesis, in terms of the DiY attitude towards the use of technology and the Lo-Fi approach to music technologies, the focus of the case studies in Chapter Four, Five and Six. In this there is a shift towards literature which engages with elements of material engagement, including Amy Spencer's view of DiY culture in terms of a Lo-Fi ethos: "providing [Lo-Fi] alternatives to new technology… [and] subverting the term Hi-Fi" (2008, p. 14) with the attitude of using simple technologies, stretching from the DiY practices of 1950's Skiffle bands through to 1970's punk music. The attitudes of *SteamPunk magazine* are included in this chapter as an example of the DiY ethos of working with Lo-Fi and discarded materials in literature and practice. Although predominantly a fashionable countercultural social movement, the DiY ethos of SteamPunk offers examples of material engagement and active participation with technologies. These discussions of SteamPunk act as a preliminary context to some of the concepts introduced in Chapter Two, such as the idea of Latour's Black-box as an enclosure which limits participation and the strategy of using technological dysfunction and 'error' as a way in which reverse Black-boxing can occur. The discussions of noise music, at the end of this chapter, are also contextual to the case studies of this thesis, introducing the attitudes of the *Vitamin-S* collective to disrupting musical structures so that participation in the elements of 'sound' can occur.

Emerging from this chapter are some of the concerns of DiY culture to experiment in the disruption and transgression of various social structures and

categories of knowledge and technology. These 'power structures', meaning structures which are formed and maintained through 'validated' social attitudes and positions, are viewed as social constructions with which the attitudes and ethos of DiY culture engage and resist. 'Power', as a definition derived from the politicised accounts of DiY culture and what it is seen to resist, is situated within social or human intention, a notion which is challenged by the emerging theme of extended agency which is discussed more fully in Chapter Two.

1.1.1 DiY zine culture: "negative identity" and "community of difference"

The human-biased view of DiY culture begins with a discussion of Stephen Duncombe's study of zine culture (2008). The zine is a self-published pamphlet, often hand-made and reproduced on a small scale, using the widely available technologies of the photocopier or home computer printer. In some ways the zine pre-dates the blogging era of the internet, where the widespread availability of electronic web-based self-publishing has taken away some of the uniqueness of the zine as a vehicle of self-expression[24]. However, the continued presence of the post-internet zine also represents a material culture, an engagement with materials and processes embodying the DiY ethos, as a form of participatory culture which differs from the high-tech technological complexity of the internet. The comparison between the blogging era and the practice of making zines is a topic taken up by Stephen Duncombe in his *Notes from the underground: Zines and the politics of alternative culture* (2008).

According to Duncombe, one of the key concepts of zine culture is the adoption of "negative identity", as an active avoidance by participants of categorisations

[24] A zine is an abbreviated form of magazine or fanzine, the latter being connected with fan culture, whilst a zine can be about anything including the writer themselves.

and a tendency to avoid overarching definitions of collective identity (pp. 66-70). "Negative identity" is what Duncombe observes as the 'anti-everything', or "I'm against it" (2008, p. 47) attitude of zine producers, a resistance by DiY culture to become categorised and assimilated into a collective identity with which individual practitioners may not necessarily agree. In the context of this thesis, Duncombe's perceived resistance of DiY culture to subsuming structures (such as identity) is used to contextualise DiY culture's strategies to resist the 'enclosed' structures of technology and allow participation to become an engagement with the materials and processes within.

A negative identity is expressed by Duncombe as an identity constructed in opposition to what they perceive as "the rest of society": "Zinesters construct who they are and what they do in opposition to the rest of society. Their identity is a negative one" (2008, p. 46). For me, negative identity means that DiY is defined not in terms of what it *is*, but in terms of what it is *not*. For Duncombe, the world of the zine-maker is one in which conventional forms of social power are resisted. In this sense, the DiY space of the zine is what I term a 'negative-space', a space which opposes existing fields of knowledge and the power structures which shape knowledge. One of the disadvantages of negative-space is its tendency to form a dichotomy with 'validated knowledge'. Within this dichotomy, negative-space becomes a space of knowledge which is defined as being 'outside' of the recognised disciplines of 'validated knowledge': DiY is the residue left over after areas of knowledge have been categorised and structured through the particular knowledge/power relationship in which the culture of 'validated knowledge' engages. This presents problems, as will be discussed later in this chapter.

In terms of the positioning of the negative-space of DiY culture as being against the centralised knowledge/power of 'validated knowledge', means that separation occurs as borders which are formed between different areas of knowledge. With centralised knowledge/power it then becomes possible to speak of knowledge as being either 'inside' or 'outside' of a specific set of

validated borders between disciplines. Within the knowledge/power relationship of 'validated knowledge' there are also borders erected between 'validated' knowledge and knowledge which is 'outside' of the field of validation. This is particularly relevant in terms of the DiY engagement with technology, in which the use of discarded materials, garbage and redundant technologies can be seen as objects expelled from the space of 'validated' or current technologies. If knowledge is inseparable from power, as Foucault has suggested, then forms of DiY knowledge, such as those using garbage and redundant materials, can be identified as operating 'outside' of the way in which the culture of the expert would organise disciplines.

Negative-space, as the space 'outside' of validated space, can be compared to Victor Turner's idea of the liminal, as the dynamic space in *The Ritual Process: Structure and anti-structure*:

> Liminal entities are neither here nor there; they are betwixt and between the positions assigned and arrayed by law, custom, convention and ceremonial... [Liminal entities are marked by] ambiguous and indeterminate attributes (2008, p. 95).

Being "betwixt and between" categories, Turner's liminality describes many DiY practices which operate across various boundaries traditionally assigned as specialisations of 'validated knowledge'. Turner's idea of the liminal has been applied to a variety of practices which "elude or slip through the network of classifications" (2008, p. 95). This is particularly relevant to the art practices of working between recognised disciplines, such as those documented in Hans Breder's *Intermedia: Enacting the liminal* (2005), or between the human and the machine in Chris Salter's *Entangled: Technology and the transformation of performance* (2010), both of which focus on the dynamic enactment of liminal spaces. This is also true of DiY practices which position themselves as "liminal [social] entities", linking the idea of the liminal with Duncombe's view of DiY culture as a "negative identity", in which positions and identities are not fixed classifications, but a series of "ambiguous and indeterminate attributes" (Turner,

2008, p. 95). The liminal is also significant in attempting to define the DiY engagement with the knowledge/power relationship as utilising aspects of negative-space and Turner's "betwixt and between" (2008, p. 95)[25].

In Duncombe's view, the negative identity of zine culture, lacking a coherent identity, means that there is a sense of conflict between individual practitioners and the formation of a perceived group identity. Negative identity, therefore, becomes a way of organising the human-biased aspects of DiY culture and the conflict between the individual and the aims and outlooks of the group referred to by Stephen Duncombe as a "community of difference" (2008, pp. 66-70). The community of difference is significant to this thesis as an example of a structure which is 'non-totalising', that is, its contents resists an overall 'totalising' cohesion.

In a "community of difference" the cohesion of the community identity is less emphasised than the inclusion of potentially disparate voices (Duncombe, 2008, pp. 66-70). The 'community of difference' allows differences of outlook, intention and aims to occur between its individual members and recognises the importance of participation without the need for a strong collective consensus. Individual identity is not limited or subsumed by a homogeneous collective identity, allowing a focus on the expression of the individual as an active agent in creating the community (Duncombe, 2008, pp. 56-58).

In contrast, the idea of a group held together through common practices is expressed in Jean Lave and Etienne Wenger's "community of practice": a coherent identity formed through reception and production of artefacts (Lave & Wenger, 1991), through shared activity and "concrete practices" (Fox, 2000, p.

[25] Extending the ideas of negative-space and Turner's "betwixt and between" towards material agency is Bruno Latour's concept of plasma, in *Reassembling the Social*, as a space which has not been categorised, "not yet formatted, socialized... surveyed, mobilized, or subjectified... It's in between and not made of social stuff" (Latour, 2005, p. 244).

854). A community of practice, in this sense, would impose a particular identity onto the DiY practitioner, held together through shared aims and attitudes. However, Duncombe proposes a different type of social organisation and formation of structure:

> If community is traditionally thought of as a homogeneous group of individuals bound together by their commonality, a zine network proposes something different: a community of people linked via bonds of difference, each sharing their originality… It allows people the intimacy and primary connections they don't usually find in a mass society, but with none of the stifling of difference that usually comes with tight-knit communities (Duncombe, 2008, pp. 57-58).

Therefore, according to Duncombe, rather than produce a "homogeneous group of individuals bound together by their commonality" a community of difference creates "a community of people linked via bonds of difference, each sharing their originality" (pp. 57-58): meaning that the originality and difference between individuals is what creates a sense of community.

This idea of 'community of difference', as a way of creating a structure which does not revolve around a particular centre of power, such as a common practice or belief, can be described as 'non-totalising', since it cannot be reduced down to a particular 'totalised' or categorised identity. The 'non-totalising' aspect means that each participant within the community of difference has an influence on the multiple formations of identity, and that there is no subsuming identity which can be placed over the community. The question is: 'In what ways can structure be organised without the influence of a subsuming force and without placing a human-biased 'power' as the organising agent?' This becomes relevant in the three case studies of this thesis where the DiY practitioners allow a non-totalising 'structure', or assemblage of materials, to influence the outcomes of their practices. Therefore, the non-totalising aspect of the community of difference, emerging from a human-biased view of DiY culture, but later adapted to theories of the extended agency view of DiY culture, is part of the contextual influence of this thesis. The non-totalising aspect of organisation can also be viewed in DiY

culture's attitudes to the use of technology, in particular the use of Lo-Fi and recycled materials which play a major part in the discussions of DiY practitioners in later chapters of this thesis.

1.1.2 Lo-Fi mode of address and the dominant discourse of technology

Significant to this thesis is the DiY practitioner's use of materials and media in ways which were not originally intended, as a strategy of re-functioning materials to create new technological non-totalising assemblages and to resist existing structures of technology. The re-functioning of materials and technologies from the original intended function to a new context of usage forms a large part of what Amy Spencer calls the Lo-Fi 'ethos' of DiY culture (2008)[26].

Lo-Fi is the aesthetic use of technologies which are considered to be discarded, redundant or of lesser cultural value than currently available technologies. According to Amy Spencer this is not an outright rejection of new technology but a re-assessment of the dominant discourse of technology: questioning the confusion between "the mode of communication; the tools for expression, with the act of creativity itself" (2008, p. 12). Therefore, for Spencer, the choice of technology and the ways in which tools of expression are used are an integral part of the creative act. Rather than reject or oppose technology completely the Lo-Fi approach is based on a strategy of communication which maximises the *participatory potential* of technologies, as Spencer says; "the Do-it-yourself approach... is all about... using whatever resources are available to you... [and] not trying to seek out new technology" (2008, p. 187). For Spencer, the use of Lo-Fi questions the central role of participation with technology without resorting to

[26] The use of the word ethos suggest a fluid set of attitudes to media and technology, rather than a fixed identity which is linked to specific practices.

an anti-technological attitude: “embracing but also providing [Lo-Fi] alternatives to new technology” (2008, p. 14) and demonstrating what can be done with less complicated resources. For Spencer, the technically limited Lo-Fi “mode of communication” (2008, p. 12) is used as a vehicle to reveal the workings of technology: allowing participation with the method of construction through allowing the process to become visible. Spencer uses the example of 1950’s Skiffle music and the use of everyday items such as the washboard and tea chest in the construction of the musical instruments, arguing that the use of these objects promote the idea that anybody could participate in what was previously considered the realm of trained professionals (2008, pp. 187-194). In the DiY zine world this is indicated through the use of the high contrast black and white, noise ridden photocopied image, made on technology more suited to the replication of text, as a re-functioning of technology which it was not designed for.

The avant-garde art movements of the early twentieth century used similar techniques of using everyday objects, to invite participation on deeper levels, as Walter Benjamin observes in his 1934 lecture:

> The revolutionary strength of Dadaism consisted in testing art for its authenticity. Still-lifes (sic) put together from tickets, spools of thread, cigarette butts, were linked with artistic elements. They put the whole thing in a frame. And they thereby show the public: look, your picture frame ruptures the age; the tiniest authentic fragment of daily life says more than paintings (2008, p. 86).

For Benjamin, the everyday discarded objects of “tickets, spools of thread, cigarette butts”, were a statement of “authenticity” which ruptured the ‘validated knowledge’ of the art world. The use of the everyday object indicates a politicisation of materials, suggesting an alternative way of social organisation. In terms of DiY culture, this is similar to the strategies described by Spencer aimed at “subverting the term Hi-Fi” (Spencer, 2008, p. 14) through the re-configuration of everyday objects.

The politicisation of the Lo-Fi, through the questioning of the dominant discourse of technology and the values of Hi-tech, is expressed by the DiY filmmaker Marcin Ramocki, who suggests that the form of participation promoted by DiY culture is an event which is marked by:

> [a] militant intention and strategy to reveal the aspects of technology which we take for granted. It is that "taking for granted" which turns us into consumers of culture as opposed to active participants. Figuring out what is inside the black box (and why it was made) is becoming the official duty of artistic [DiY] communities (2011).

For Ramocki, the questioning of technological forms is of most concern to becoming "active participants" in the making of culture. There is the suggestion that by "taking [aspects of technology] for granted", such as predetermined functions, means that technology becomes invisible and enclosed within an opaque "black box", limiting participation to the level of "consumers of culture" (2011). Ramocki's proposed unravelling of the "black box" (2011) is part of an ethos to find new uses for technology and media which go beyond the intended functions of its design. The unravelling of the 'black box' displays a strategy in which DiY culture removes the inaccessible aspects of technology, the opaque covering which prevents participation with the workings and promotes, as Ramocki argues: "consumers of culture as opposed to active participants" (2011). In this sense, the black box is a social construction which prevents accessibility, engaging in the knowledge/power relationship of 'validated knowledge' and expressing the dominant discourses of technology. This human-biased view of the black box as a subsuming 'power' which contains and obscures knowledge, contrasted with DiY culture's attempt to open the black box and become "active participants", can be compared to the types of structures opposed by Duncombe's community of difference. The opening of Ramocki's black box reveals an assemblage of "active participants" (2011) which are not 'totalised' by the social powers which shape knowledge. Therefore, both the open black box and the community of difference are attempts to create non-totalising 'structures' in which participants are permitted active roles in creating culture.

This type of non-totalising structure is part of the context of DiY culture which becomes important in later sections of this thesis, where the human-bias gives way to an extended agency view of DiY culture as a material entanglement.

In the human-biased view of DiY culture there appears to be a propensity to observe DiY practices as being 'outside' of various power structures which prevent *active participation*. 'Power' at this point, is contained within the definition of social construction and the resistance of DiY culture to being contained within structures which are 'totalised' or contained within Ramocki's black box.

Within the case studies of later chapters of this thesis, the use of discarded, recycled and re-functioned materials, brings to light the un-categorisable nature of materials and components used outside of their usually recognisable 'totalised' contexts. This shares some of the attributes assigned to the use of Lo-Fi technologies, whereby materials removed from the contextualising structure and influence of their original technologies become objects removed from a system of meaning. According to John Scanlan, garbage and objects of discard defy definition, since they have been removed from the language system which gave it meaning:

> Garbage does not strictly refer to an object, but is a jumble of inexactness, a discarded… degraded husk of some former object, it seems to lack conventional referents… garbage is the remainder of the symbolic order proper (2005, pp. 15-16).

Scanlan's idea that garbage represents objects and ideas excluded from a system of meaning-making is refered to later in this thesis, in which DiY practitioners engage in the negative-space of discarded technology. Scanlan's view of garbage is as something which fails to fit within a universal system of representation, as an excluded residue which has been expelled from the dominant language system of technology. In this sense, the discarded materials of redundant technologies become the negative-space 'outside' of current and validated technologies, an area 'outside' of meaning which is fragmented and isolated

from the central “symbolic order” of complete systems of technologies. If this is the case, then garbage is a material which presents a paradox of representation: a tangible object which is, at the same time, ‘outside’ of meaning and, therefore, unrepresentable within the context of ‘useful’ material. Negative-space has the same paradoxical qualities, since it is a space which exists only in reference to what it is not. Scanlan’s definition of garbage remains within a ‘language’ view of DiY culture. The question here is: ‘How can we view the excluded material of garbage without becoming integrated or subsumed within a language system and the dichotomies of the ‘inside’ and the ‘outside’?’ As this thesis shifts towards a ‘material’ view of DiY culture in Chapter Two, this definition of garbage becomes material which has been *de-territorialised* from ‘enclosed’ technologies, increasing the *participatory potential* of material agency.

In the following section social structures and the politicised view of DiY are discussed in terms of the avant-garde and outsider art, social movements which have historically attempted to operate ‘outside’ of the kinds of power structures resisted by DiY culture. This continues the politicised view of DiY culture, with the combination of politics, technology, art and expression typical of the DiY ethos to transverse borders of discrete fields of knowledge. These examples of DiY culture are presented in this thesis as part of the context of DiY attitudes towards culture as a participatory event. Parts of the DiY ethos which emerges from the discussion of these contextual studies forms the basis for the selection of theory in Chapter Two and the focus on a material entanglement approach to DiY culture.

1.1.3 DiY and the politics of the avant-garde

The DiY squatting culture[27] of Britain is the backdrop for the study of DiY culture portrayed in the radical political practices found in George McKay's study *DiY culture: Party & Protest in Nineties Britain* (1998). McKay provides an arena for various movements within DiY culture highlighting formations of alternative social structures which emerge from semi-spontaneous organisations of people. The DiY approach to politics is, according to McKay, a multi-stranded narrative based on the breaking down of distinctions between social and political issues and his strategy is to allow his book to become a platform for DiY activists to express their approaches and attitudes.

John Jorden's article *The art of necessity: The subversive imagination of anti-road protest and Reclaim the Streets,* included in McKay's anthology, expresses the link between performance art and the type of direct action politics practiced by *Reclaim the Streets*. *Reclaim the Streets* was a series of high-profile participatory creative-political events, involving several thousand participants, aimed at challenging the ideologies of car culture as a dominant discourse of technology by occupying the space of the road with a series of carnival events. Jorden, in his imaginative and playful essay, links the aims of the avant-garde artists of the twentieth century "to demolish the divisions between art and life... [and] art and protest" (1998, p. 129), claiming that "DiY protest gives art back its original socially transformative power" (1998, p. 129). For Jorden the socially transformative activities of semi-improvised DiY direct action politics is a performance which transcends the structures of theatre, performance art, and sculpture. In this sense the DiY politics of *Reclaim the Streets* is a transversal practice, cutting across structures and divisions of specialised areas of knowledge. Jorden expresses the 'negative identity' of DiY culture as a moment

[27] The practice of occupying empty and discarded houses and dwellings for the use of domestic living or social centres which promote a political agenda. Legal in the U.K. under the term 'squatter's rights' until 2012.

outside of structures of representation, forming connections with the liminal positioning of avant-garde and outsider art, by quoting one of the founders of outsider art, Jean Dubuffet:

> Art [and politics]… loves to be incognito. Its best moments are when it forgets what it is called (Cited in Jorden, 1998, p. 131).

Dubuffet's ArtBrut (also known as outsider art) was a practice which suggested that art was not an autonomous sphere, controlled by the institution, but a stepping outside of contextual limitations and recognisable genres of representation. By "incognito" I understand Dubuffet's view of ArtBrut to be beyond cognition. However, there is an inherent paradox whereby the naming of ArtBrut, as a particular thing, denies the possibility that "its best moments are when it forgets what it is called". My own interpretation is that ArtBrut is forever surfing the edge of the undefined, sometimes racing ahead of definition and at other times captured within the institutions of art. The lack of intention to produce "art" and a creative process absent of formal structures is seen as a removal of the limitations imposed by the norms of institutionalised art. Applying the same ArtBrut principles of creativity to the DiY politics of *Reclaim the Streets*, Jorden is bringing attention to the possibility of reassessing the dramatic, performative qualities of political actions as a work of avant-garde art, as something which attempts to move ahead of definition and to resist capture within the 'known'.

In Jorden's view, DiY culture has parallels with the strategy of outsider art by ignoring the boundaries of what is considered to be within the language of 'art' and to explore spaces where objects have been made 'outside' of the intention of the artist. The 'outsider artist' is thought of as an artist who has not had any formal training, and is in some way 'outside' of the paradigm of institutionalised art. This follows a DiY ethos in which the practitioner is uncorrupted by the preconceptions of tradition, convention and the delineations of what is and what is not considered within the sphere of 'validated knowledge'. There is an implied

honesty, or naivety, in regards to the intentions of outsider art which is lacking in 'insider' art':

> The works are, in their conception and their technique, broadly untouched by influences from artistic tradition or context. They apply never previously used materials, know-how and principles of figuration, invented by their creators and foreign to the instituted figurative idiom (Thévoz, 1990, pp. 34-35).

In the case studies of this thesis, the techniques of ArtBrut to "apply never previously used materials, [and] know-how" becomes particularly relevant to the DiY practitioner's re-use of objects and materials which would not usually be re-used. The DiY re-use of discarded objects, such as the aluminium pie-plate used as a snare drum in *The Trons* robot garage band (Chapter Five), becomes a way in which the functions of an object have been altered through its inclusion in a new unexpected context. The "never previously used materials" of ArtBrut, however, differ from DiY's re-functioned objects in the way in which they are viewed from within a socially constructive framework. Using ArtBrut and outsider art as examples, the socially constructed framework of viewing DiY culture can be critiqued for its limitations and propensities towards a 'language centred view'. In this sense, outsider art attempts to position itself 'outside' of the language of art, which Dubuffet sees as the accepted field of trained experts of art, considered to be within the *language* of art.

Just as Duncombe's idea of DiY zine culture is seen as occupying a negative identity, Jorden's version of DiY culture equally situates itself 'outside' of the areas of knowledge and power categories. If this is the case then DiY culture can be said to exist as a space 'outside' of conventional areas of knowledge and language systems. The question is: 'What are the limitations of viewing DiY culture in terms of this dichotomy?'.

The avant-garde, in which Jorden's view of DiY culture is based, has been linked to the 'sublime' and as a representation 'outside' of the expressive capacities of language. When words fail to describe, we have what Immanuel Kant calls the

feeling of the *sublime* (*Observations on the Feeling of the Beautiful and Sublime* 1764), interpreted by Jean-François Lyotard as an anomaly, or rupture in the efficiency of language, that cannot be placed within an overriding system of expression: "[the sublime] fails to provide a representation corresponding to this idea... an imagination striving to figure even that which cannot be figured" (Lyotard, 1989, p. 203). According to Lyotard the sublime is a failure of language to represent something *outside* of the systems of human intention and provides a glimpse into another world outside of human systems of representation. Negative-space, as an area of knowledge 'outside' of categorisation, shares some of the qualities of the *sublime*. Kant's version of the sublime is a way of describing something that does not fit into a system of language, a type of knowledge which is outside of the knowledge/power relationship since it is not possible to be signified, and therefore categorised, by human language systems.

Lyotard claims that the 'avant-garde' creates a world separate from representable forms so that "art does not imitate… [but]… creates a world apart" (Lyotard, 1989, p. 202). In this aesthetic of the sublime, Lyotard relates the avant-garde to "a negative representation, or even a non-presentation" (1989, p. 204), creating a resonance with Stephen Duncombe's idea of the "negative identity" of DiY culture, where practitioners strive to present an identity defined not by what it *is*, but by what it *is not.* In the same way, negative-space follows a similar aesthetic of the sublime, defying the boundaries of the knowledge/power relationship. The "negative representation" of avant-garde art consists in its refusal to be situated within an existing language of art.

However, the problem of viewing the avant-garde and DiY culture from within a language dominated perspective is that the 'outside' is forever being incorporated and accommodated within the desire of language to be able to represent every 'thing' in the world. This is also a concern of Karen Barad, who questions "the representationalist belief in the power of words to mirror pre[-]existing phenomena [which] is the metaphysical substrate that supports [the] social constructivist [paradigm]" (2003, p. 802). This means that viewing DiY

culture as negative-spaces 'outside' of a central system becomes part of the function of language. Implicit within a language based definition is the idea that there is a sharp delineation between the 'inside' and the 'outside' of the sphere of knowledge, just as it can be observed that a 'thing' is either part of a system of language or is 'outside' of that system of representation. This is a significant limitation of the human-biased view of DiY culture, that it is inevitably subsumed within the dualistic notions inherent in systems and structures of representation through its attempts to escape categorisation. Therefore, when DiY culture is seen to resist structures of representation, it is brought into the paradox of being *categorised* as 'outside' of human-biased systems.

The dualistic tendency of language is 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" (p. 829). The separation between human language (the 'inside') and the sublime (the 'outside') can be viewed as part of this philosophy which separates the human from the nonhuman. Inherent in this duality is also the separation of theory from practice, an extension of the mind/body separation, so that: to say that DiY practices occupy a negative-space, unable to be categorised into any particular theoretical framework, is to reinforce the duality between the human and extended agency view of DiY culture. In this way, the human-biased view of DiY culture follows the same problems of representation as the avant-garde, and its oppositional stance becomes questionable through the process of representation.

The entanglement of the avant-garde with language, via the unrepresentable, is acknowledged by William A. Davison, who sees the avant-garde as part of the same centralised culture which it pertains to exist 'outside' of: "[the avant-garde] belies a certain attitude of cultural hegemony… [since it] promotes the idea of a single point of advance to the whole of human culture… [and] that point of advance is understood to be Western European, or perhaps American" (cited in

Salminen, 2010, p. 215). Davison's view of the "cultural hegemony" of the avant-garde can be understood as a teleological view of culture, heading in a single centralised direction[28]. In this sense, the avant-garde functions as a component of the meta-narrative of the institution of art, maintaining culture within the knowledge/power relationship of 'validated knowledge'.

To continue to view DiY culture as a negative-space presents a paradox of representation, since it seems impossible to represent the unrepresentable through language without bringing the 'outside' into the centralised disourse of language. It could be argued that this way of looking at knowledge as being a matter of language (or being outside of language structures) is an extreme of anthropocentricity, in which the human is placed at the centre of any definition of power. This is a view supported by Barad when she states that "language has been granted too much power" (2003, p. 801) as a basis for cultural studies, and that "the belief that grammatical categories reflect the underlying structure of the world is a continuing seductive habit of mind worth questioning" (2003, p. 802). This is signalled as one of the limitations of the human-biased emphasis of understanding DiY culture and in particular the 'outsider' view, since this view is influenced by the idea that language systems are a way of categorising the world, as a way of understanding the "underlying structure" (p. 802). Therefore, negative-space, as a space 'outside' of validated knowledge and language-biased

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[28] Teleology is defined as cause and effect driving a view of history towards a single and centralised point, usually termed progress. The usually accepted definition of teleology is that of the historian Sidney Pollard and is one which is, according to Ronald Wright, deeply engrained within society:

> Most people in the Western cultural tradition still believe in the Victorian ideal of progress, a belief succinctly defined by the historian Sidney Pollard in 1968 as 'the assumption that a pattern of change exists in the history of mankind... that it consists of irreversible changes in one direction only, and that this direction is towards improvement' (Wright, 2004, p. 3).

systems, is limited in its bias towards an understanding of DiY practices as a social construction, constructed by a definition of power which is incorporated within the social construction of validated or 'inside' knowledge. If we persist in the dichotomy of the 'inside' and the 'outside' of validated knowledge/power, then the extreme of the human-biased view is that DiY culture operates in a negative-space of knowledge/power. Through DiY's resistance to 'inside' knowledge, its positioning is determined as also being 'outside' of the system of language, as a space of non-representation. In this way, the human-biased view of DiY is captured within the types of structures that it aims to oppose (as suggested by Davison's view of the avant-garde (cited in Salminen, 2010, p. 215)). On the other hand, if DiY culture is seen as an ethos of *resisting* structures of knowledge/power but not actually residing 'outside' of the system of representation, then the dichotomy of the 'inside' and the 'outside' is not necessarily formed. It is this dichotomy which is the problem, just as a dichotomy between the human and nonhuman is also problematic, as this thesis turns to the extended agency view of DiY culture.

As the agenda of this chapter is to trace the limitations of the human-biased view, what is needed is a way of viewing DiY culture without the constraints of the dichotomy of the 'inside' and the 'outside'. To do this there needs to be a theory which can be used to observe the DiY ethos of disrupting social structures, and operating *across* borders of knowledge, without creating the dichotomy of the 'outside'. What is needed are conceptual tools through which to view the breaking down of *territories* of 'validated knowledge': of breaking down the idea of 'enclosed' territorial spaces of knowledge. The answer to this need is sought in Chapter Two, where DiY Strategies to *de-territorialise* structures, through the transversal and the non-totalising assemblage, become a way of breaking down borders and barriers to a participatory culture based on material engagement and an extended view of agency.

1.2 Towards an 'extended agency view' of DiY culture

Although still situated in a predominantly 'human-biased' view of DiY culture, the following literature is biased more towards suggesting the types of material engagements which characterise the 'extended agency view' of DiY culture. It should be noted that the division between the 'human' and the material agency views of DiY culture does not mean to suggest that the two views are opposing binaries. The intention of presenting the two views as separate, within this chapter, is to highlight the human-bias of existing literature and to situate this thesis within the need to address DiY culture as including materials as active participants. One of the theoretical elements which has separated the human from the material view, as discussed above, is that of a socially productive view of power, which situates human intention as the exclusive agent of change. In the extended agency view, presented in Chapter Two, material is not presented as having the same exclusive claim to agency as presented in the human view, suggesting the involvement of multiple actants.

In the literature presented in this second section of Chapter One, there is less emphasis on the issues of 'power' and more focus on DiY culture as a material engagement. Although the conceptual tools needed for a full discussion of the active participation of materials are not provided in this thesis until Chapter Two, the intention of including the following literature is to provide a transitional point between the human and the material views of DiY culture: focusing on similarities between the two views and suggesting that aspects of the DiY ethos and attitudes towards technology indicate a need for further conceptual tools with which to address material engagement and entanglement.

1.2.1 SteamPunk, de-territorialisation and the artist-scientist

SteamPunk is a movement which straddles both mainstream media and Lo-Fi DiY participatory cultures. For example, there are a range of high budget films which display aspects of a SteamPunk aesthetic, produced by the studios of Walt Disney Pictures, 20th Century Fox, Studio Ghibli, Universal Pictures and New Line Cinema. It should also be noted that SteamPunk is a literary movement in which the boundaries between fact and fiction are blurred. Despite this blurring of fact and fiction and its mainstream appeal, SteamPunk offers some interesting insights into the DiY attitude to technology and material engagement, continuing the theme of politicised DiY culture which combines the fields of technology, imagination and art. Of particular significance to the trajectory of this thesis towards a material engagement view of DiY culture, are the various strategies of *de-territorialisation* embodied by the SteamPunk attitudes and ethos.

In this section I will be looking at the DiY publication *SteamPunk magazine,* an upmarket zine of sporadic publication totalling eight issues 2006-2012. SteamPunk can be defined as a fashion/literary movement using a Lo-Fi, 'neo-Victorian', aesthetic as a vehicle to critique technology through a "re-envisioning of the past with the hyper[-]technological perceptions of the present" (Catastrophone Orchestra and Arts Collective, n.d., p. 4).

Rebecca Onion, in *Reclaiming the Machine* (2008), identifies a theme in DiY SteamPunk which relates to its specific relationship to technology which she calls a "striving for complete comprehension" (pp. 144-145) through a return to material culture and an attitude of de-territorialising mechanical technologies. According to Onion it is the "transparency of motion functions... [amongst mechanical, Lo-Fi technology which allows a] closer physical bond" (p. 146) between humans and machines. It is through communing with physical machines that "complete comprehension" (p. 145) of understanding technology occurs, an idea which Onion contrasts with the opaque technologies of Bruno Latour's "Black-box" (Onion, 2008, pp. 144-145). As I understand it, Onion's observation of "complete comprehension" (p. 145) refers to the strategies of SteamPunk to

de-territorialise the borders of 'enclosed' technologies to allow active participation between the practitioner and the materials and components. By increasing the *participatory potential* of materials SteamPunk illustrates an ethos to 'open' Latour's concept of the Black-box. The Black-box results when technologies become fixed 'functions' enclosed in a tamper-proof Black-box, concealing the mechanisms and processes involved. The Black-box is a metaphor for a functioning device comprising of inputs and outputs, whilst the mechanics of its workings are concealed under an opaque surrounding (Latour, 2005; 1999; 1987). Therefore, Onion's "complete comprehension" (p. 145) ethos of SteamPunk, can be seen as an attempt to unite the human with technology, so that: "technology is neither slave nor master, but partner in the otherwise unknowable territories of both art and science" (Catastrophone Orchestra and Arts Collective, n.d., p. 5). This is what Rebecca Onion calls "the closer physical bond between machine and person" (Onion, 2008, p. 146) using an example of Thomas Truax's attitude towards his handmade musical instruments, who treats them as "little beings" due to their uniqueness of manufacture ("Thomas Truax: An interview," n.d., p. 52 cited in Onion, 2008, p. 146). This personalised relationship to technology, espoused by SteamPunk, depicts technology as malleable materials, rather than 'enclosed', a prerequisite for the type of material entanglement of DiY culture which becomes the focus of this thesis in Chapter Two.

A recurring theme in SteamPunk literature is one which presumes that once the Black-box of technology is opened, all manner of strange and unpredictable actants will emerge, uncontained and unrestrained by social order. Although imbibed in imagination, the attitude towards technology as a dangerous, irrational, bestial and unpredictable entity is expressed in the SteamPunk figure of the tinkerer, the artist-scientist who aims to deconstruct the mechanics beneath the surface of the mysterious and opaque power structures of the Black-box. This is the figure of the DiY 'tinkerer', espoused by SteamPunk, as a character driven by curiosity, exploring a personalised relationship with

technology which disregards danger signs, intellectual borders erected by experts, and engages deeply with the 'spirit' of material technology. The artist-scientist incorporates irrationality and accidental discovery into a creative/destructive amalgamation of science and art, fact and fiction:

> SteamPunk, that mad scientist, refuses to be fenced in by the ever growing cage of specialisation. Leonardo Da Vinci is the SteamPunk touchstone; a blurring of lines between engineering and art (Catastrophone Orchestra and Arts Collective, n.d., p. 4).

Refusing to be "fenced in by the ever growing cage of specialisation" (p. 4) the Renaissance artist Leonardo Da Vinci is evoked as a practitioner who transversed a multitude of disciplines. The figure of the artist-scientist is central to SteamPunk identity, it is the symbol of an uncontained rationality, which roams beyond borders, a liminal figure who defies categorisation through de-territorialising spaces of 'validated knowledge'. Through the practices of the "mad scientist" (p. 4), technology is taken beyond the borders of functionality where error and even destruction is the next logical step, as indicated in the literary examples of SteamPunk discussed below.

In terms of the focus of this thesis, the DiY strategy of embracing the errors of technology and materials becomes apparent as a strategy in which nonhuman elements of agency are invited as active participants in the creative process. In SteamPunk, this strategy of error is used to highlight our social relationship with technology, as perceived to be destructive, creative and mysterious, rather than as "simpering servants" for the commercial domination of nature:

> SteamPunk seeks to take the levers of technology from those technocrats who drain it of both its artistic and real qualities, who turn the living monsters of technology into the simpering servants of meaningless commodity (Catastrophone Orchestra and Arts Collective, n.d. p. 5).

In this manifestation SteamPunk strives to find a personalised relationship with the "real qualities" of technology, as an artistic exploration of science and materiality which retains the potentially monstrous "living" aspects of

technology and materials. It is of significance to the material view of DiY culture, discussed in Chapter Two, that SteamPunk literature views materials as 'active participants', rather than passive and lifeless. The unpredictable 'life-like' qualities of materials, are significant to the material view of DiY in Chapter Two where Jane Bennett's idea of 'vibrant materials' is discussed in terms of material agency. These unpredictable qualities of materials are a major theme of SteamPunk literature, coupled with the theme of 'error' and in the extreme case, the destructive qualities of machines.

In the case of the *Incredible Steam Band* by John Reppion (n.d. B), it is the intensity of beauty, emotion and sound in performance which causes the machine to self-destruct. The destruction of the sound machine in Reppion (n.d. B) is due to the machine absorbing human-like qualities, highlighting the interconnected relationship between technology and the human and the dangerous and unpredictable qualities of materials. In this sense, the human-biased view is extended towards technology and materials, imposing an anthropomorphic view onto the materials of SteamPunk practices and its attitudes to technology. This 'life-like' sense of technologies, suggests that materials are more than passive participants and that agency is not entirely centred in human intention.

Through the adoption of human qualities the fictionalised technologies of SteamPunk become dangerous and unpredictable: exploiting a theme of media panic or moral panic, a concept outlined by Kirsten Drotner (1999), which is the phenomenon of wide spread anxiety about the effects that 'new' technologies will have on existing social structures. An historical example of the media panic surrounding the invention of the telegraph is described by Jeffrey Sconce in his book *Haunted media: Electronic presence from telegraphy to television* (2000). Sconce examines the historical development of media technologies which allow remote presence to be transmitted and the commonly perceived cross-over between technology and the supernatural which transformed, what we would consider to be, simple everyday devices into objects of mystery and awe. For

SteamPunk, simple technology is imbued with this same sense of mystery and unpredictability as it was in the early years of telegraph, a theme taken up in John Reppion's fiction, *Doppler and the Madness Engine* (Reppion, n.d.), where the 'new' technology of the wax disk voice recorder exerts disastrous supernatural effects on the surroundings of Victorian London. Reppion connects the technology of the wax recorder with the Victorian fascination of parlour séances, therefore, de-territorialising the boundaries of technology to include all manner of unpredictable outcomes. The novel is concerned with the media panic resulting from the use of technology to create the kind of remote presence previously associated with disembodied voices and spirits.

The attitude towards technology, acknowledging danger and irrationality, has an element of Filippo Tommaso Marinetti's Italian Futurist Manifesto. This noted by Rebecca Onion's commentary on Prof. Calamity and his article *My Machine, My Comrade* (2012): "we want to sing the love of danger, the habit of energy and rashness" (Marinetti, 1909, cited in Onion, 2008, p. 149). The Futurist celebratory linking of technology, war and aggression represents an engagement with technology which preserves the irrational, unpredictability of nature: a recombining of the uncivilised and barbaric with the supposed civilising effects of technological progress, as evident in Marinetti's association of beauty, progress, war and destruction:

> We declare that the splendour of the world has been enriched by a new beauty: the beauty of speed. A racing automobile with its bonnet adorned with great tubes like serpents with explosive breath... a roaring motor car which seems to run on machine-gun fire ([1909] 2012).

In SteamPunk the engagement with technology is portrayed as both mysterious and rational, both spiritual and material. These contradictory terms seem to complement the combined scientific/artistic approach to technology, a combination of contradictory logics which includes the imaginary, the accidental and the erroneous in favour of the strictly logical, and the efficiently functional. Again, this is an example of de-territorialisation of the borders of the presumed

rationality of technology, significant to the trajectory of this thesis towards material engagement in which the borders between human and nonhuman actants are like-wise de-territorialised through the use of 'error'[29]. This suggests a research question which asks: 'What is the role of 'error' in DiY strategies to dissolve borders between socially constructed areas of technology and/or 'validated knowledge'?'.

Although the SteamPunk ethos, via its literature, is presented in a highly dramatic and exaggerated fashion, its place within this thesis is as a contextual background to some of the attitudes which exist in DiY culture. For example, SteamPunk's love of the materiality of technology, the embracing of error and technological breakdown, becomes relevant in Chapter Two, where Latour's process of reverse Black-boxing is initiated through technological error. In this sense, SteamPunk echoes many of the strategies used by DiY practitioners within the case studies of this thesis: the use of error (chapters Four and Five) and the accidental (Chapter Six), and the regarding of material actants as 'active participants' within the process of creating cultural artefacts. There is also the way in which SteamPunk moves across various disciplines, as a transversal movement which borrows knowledge from different fields and disciplines, just as DiY culture does.

After the dramatic exaggeration of SteamPunk, it seems relevant to include a more down-to-earth context for this study of DiY culture, where practitioners work in relative obscurity and are less influenced by fashionable interpretations of DiY ideology. In the following section DiY culture is discussed in the context of New Zealand based practitioners, living the mainly rural life of the amateur 'tinkerer' and engaging in a variety of fields of knowledge.

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[29] 'Error' as a diversion from an exclusively human view of agency which increases the *participatory potential* of material agency.

1.2.2 The extended mind of the "shed people"

"What's he building in there? We have a right to know"[30]

As a contrast to the politicised, and, in the case of SteamPunk, the fictionalised accounts of DiY culture, are the more down-to-earth practices of New Zealand DiYers. The New Zealand book *Blokes & Sheds* (1998) by Jim Hopkins presents a photo-interview coffee-table format of the diversity of creative and practical DiY activities: a series of individual obsessions with 'tinkering' on a private project that may or may not become public. The *Blokes & Sheds* version of DiY culture is that of the exclusively male individual in isolation with their chosen obsession of a problematic material challenge: an engagement between the individual practitioner and their materials. This role of DiY is less focused on resisting social structures and at the same time, oriented towards a material engagement.

In the context of this thesis, this form of home-grown DiY reflects the types of working conditions of the practitioners discussed in the case study chapters. Also, by introducing the shed as a specific space of practice, the aim is to build a context around the function of the work-space of the DiY practitioner: the place where the 'human' meets and engages with the 'material' environment to suggest an extension of agency from the exclusively human and towards the recognition of material agency. As the focus of this thesis moves towards the 'material' or 'extended agency' view of DiY culture, more evident in Chapter Two, the workshop is viewed as an extension of the practitioner's ability to make 'things' happen: a material agency which is an extension of the human practitioner and a way in which the space of materials are permitted as active participants in the process of making DiY cultural artefacts.

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30 Lyric from the song "What's he building in there?" by Tom Waits about the mysterious DiY activities of a shed-bound rural loner on the *Mule Variations* album (1999). The song includes the ambient sounds of power tools, hammering and intriguing mechanical noises.

For the New Zealand DiYer, the shed is a space in which the male practitioner can spend time without any particular pressure to produce results, a space of tinkering and thinking amongst the gathered tools, materials and components. This is reflected by Jonathon, who speaks of the indeterminate functions of the "shed people" who are the makers of indeterminate "things", inhabiting a kind of 'dream space' comprised of the human and the material environment of the shed:

> shed people are people who do things. And doing things involves dreams, but you can't have dreams without a place to make them. You can't have dreams without sheds. A shed is where dreams get made (Hopkins, 1998, p.12).

"people who do things" can be compared with the indeterminate sense of identity of the zine maker discussed above, where identity of the shed people mirrors the strategy of zine makers, who prefer to call themselves 'doers' or 'makers' rather than using the term artist. The importance of space can be seen in Jonathon's impression of the shed is as a place "where dreams get made", his self identification based in the place of where making occurs, as one of the "shed people".

As a place of working, thinking and imagining, the sense of the solitary self becomes expanded to include the space of the shed or workshop, as Burns explains: "solitude's very important. The most priceless thing we have is thinking… it's your own world… it's a haven… and it's like an aura, a boundary around me" (Hopkins, 1998, p. 60). This suggests that the space of the workshop is part of the "aura" of the body and mind, an extension of the human practitioner contained as "a boundary around" (1998, p. 60) the DiY practitioner. The importance, in Burn's case, is that the shed is a personal space where the practitioner can engage with the materials as if there was no separation between the body and the space of the shed, as an extension of the "body and mind" (1998, p. 60). This placing of agency between the human and their material environment suggests a research question which needs to address the idea of

'power' as originating from an exclusively 'human' intention, to ask: what are the theoretical concerns of an idea of agency situated as an engagement between the human and the material environment of the workshop?

The shed as an extension of the self is expressed by Pete: "it's great to be by yourself… in your own little world" (1998, p. 88). The autonomy of the shed can be seen as an extended space of the self and, in the case of Geoff, the shed is a mobile unit to accompany his house truck lifestyle, in which he manufactures and sells carvings, a living space which embodies alternative attitudes to land use based on a nomadic rather than sedentary or agricultural organisation of society (1998, p. 64).

The relationship between New Zealand DiYers and technology is expressed in Hopkin's view, in the attitude of self-taught tinkering which prevails throughout *Blokes and Sheds*. The absence of formal learning is replaced by practice-based experience in which technology is seen as a malleable and open-system in which participation can occur. Within this popularised view DiY is seen as a solitary activity, with a focus on engineering and lacking in social, artistic or political dimensions. Without the politicised drive this form of DiY can be seen as a diluted version of the DiY ethos of 'negative-identity', observed by Stephen Duncombe, perhaps as the 'shed people' suggest, as a way of finding a space to experiment and engage with materials: to find a place in which "it's your own world" (Hopkins, 1998, p. 60). This appears to be a trait of the male dominated DiY culture of the 'shed people', to seek out physical spaces away from family, rather than to necessarily position oneself 'outside' and actively oppose conventional society.

In Chapter Two the extended "aura" of the workshop is discussed in terms of an extension of the mind and as the theme of extended agency which runs throughout the three case studies of this thesis. The extended agency of the workshop is a way in which agency, as the ability to make things happen, becomes extended from purely human intention and becomes embodied within

the materials of the workshop. Agency therefore becomes an entanglement of the human and nonhuman elements of the workshop, incorporating both 'bloke' and 'shed' as an interconnected machine of agency.

In the next section, 'noise music' is presented as a strategy in which the borders of existing musical structures are de-territorialised so that the 'material' of sound can be made more available for participation. This continues the theme of DiY attitudes to 'structure' and looks at strategies in which 'human' biased structures can be disrupted.

1.2.3 'Noise music' and 'error'

Within New Zealand, 'noise music' has attained an almost genre-like status as a form of sound art which operates using aspects usually excluded from conventional music. As seen below, the practitioners of noise music attempt to produce sounds which cannot be categorised as any particular form of music. To do this, noise musicians use various strategies, such as improvised atonal sound, the avoidance of recognisable structures and/or repetition, and the incorporation of invented instruments and sounds produced or appropriated from non-musical sources. 'Noise music', distinct from 'noisy' or simply loud rock music, supports several specialist performance venues, such as: The *Wine Cellar* (Auckland), the *Audio Foundation of Aotearoa* (AFA, Auckland), *Happy* (Wellington), *Fred's* (Wellington), and *Arc café* (Dunedin). There are also several organisations dedicated to improvised noise music such as *Vitamin-S* which perform regularly at the Auckland Wine Cellar venue.

The significance of noise music for this thesis, is in its strategies of resisting structures imposed over sound to create music. Sound in this context, is viewed as the 'material' aspect of 'music': with sound viewed as material prior to its formation as music; with music viewed as an 'enclosed' structure which can be

compared to a language system. Noise music provides a context for the DiY practitioners examined in the case studies of this thesis, in particular the collaborating musicians discussed in the *Bingodisiac Machine* in Chapter Six, some of which have been regular participants at Vitamin-S.

Some of the more well known practices of noise music involve a history of DiY home-made instruments, designed to create sounds which are not available to conventional instrumentation. An example being the instruments made by Phil Dadson and the New Zealand based group *From Scratch,* who have performed internationally for over thirty years (Dadson, 2004). Both AFA and *Vitamin-S* regularly feature the music of Phil Dadson.

In terms of defining noise music it can be useful to employ Harold Lasswell's model of communication: "who/says what/in which channel/to whom/with what effect" (Lasswell, 1948; cited in Jensen, 2010, p. 49), with 'noise' being the undesirable aspect which interferes with linear coherence of communication. In this sense, noise is the part of communication which does not belong to the language system of the message. In more technical terms the phrase 'signal to noise ratio' is a measurement used to describe the efficiency of electronic audio equipment in which signal is the desirable component in ratio to the unwanted elements of noise. In most definitions noise represents that which is usually excluded from what is considered the more desirable signal of communication. However, in terms of noise music it is the traditionally useful signal elements which are excluded, in the form of 'notes', 'recognisable musical genres' and 'musical structures', leaving a residue of activity which is intentionally stripped bare of its coherent elements. For example, in guitar playing it is usual to avoid the sounds made by the strings of the guitar unintentionally hitting objects other than fingers or plectrum, whereas, 'noise musician' Ben Spiers intentionally integrates the collision of environmental objects with the strings of his electric

guitar, creating a soundscape of atonal, arhythmic scrapes and clangs[31]. The sound created is a result from what could be called the excluded elements of what is usually considered to be the intended sound of the instrument. In this sense there is a hint of material engagement in the practices of Ben Spiers, allowing material agency to co-exist with the intentions of the musician, so that the results can be viewed as an entanglement of human and nonhuman influences on the sound produced. The question suggested by this is: what are the theoretical concerns of DiY practices which increase the *participatory potential* between the human and the material? The engagement between the human and the material, suggested by Ben Spiers, indicates the need for a more theoretical basis which recognises the agency and participatory potential of both human and material elements. These theoretical tools would support a view of agency as belonging to both human and material, as an intra-action between two non-separate entities. This collaboration between human musician and material is significant to the trajectory of this thesis towards a theoretical framework with which to discuss material engagement and entanglement, as developed in Chapter Two.

One strategy of noise musicians is to de-emphasise human-biased structure by valuing improvised spontaneity over prescribed form. The New Zealand collective *Vitamin-S* describes improvisation as belonging to two main variants:

> 1. Idiomatic improvisation: much the most widely used and concerned with the expression of an idiom - jazz or flamenco for example, and taking its identity and motivation from that idiom.
>
> 2. Non-idiomatic improvisation: here other concerns are fundamental. It is usually found in so-called 'free' improvisation (Vitamin-S, 2013).

[31] Personal observation of Ben Spiers' guitar playing style as a co-member of the Kaosphere Orchestra in 2004.

Vitamin-S utilises the non-idiomatic form of improvisation, emphasising the "other concerns" (Vitamin-S, 2013) of music and bringing forth elements which are usually excluded from "idiomatic improvisation". The strategy of avoiding known idiomatic forms of music, such as "jazz or flamenco", combined with the tendency of modifying and creating new instruments, situates *Vitamin-S* on the experimental side of sound rather than music: an attitude of disrupting the structures of music which mean that intuitive reflexes are valued above containment within a recognisable sphere of music. In this sense, non-idiomatic sound is based on intuition, spontaneity and improvisation and can be seen as a practice which resists the structural language of idiomatic forms.

The activities of Vitamin-S are aimed at providing cultural forms which are lacking in mainstream culture, spontaneously created within the localised situation created by each performance:

> Our music is about the inadequacy of traditional imagery and symbols to convey meaning in today's world. By abandoning representationalism [sic] we are free to express ourselves with pure form. Specific interpretation gives way to a more visceral response (Vitamin-S, 2013).

This aspect of a DiY ethos, to avoid "traditional imagery and symbols" of idiomatic music, represents an ethos which claims to resist the social structures of "representationalism [sic]" to allow expression of "pure form" (Vitamin-S, 2013). This suggests a strategy of 'material' engagement with the qualities of sound, rather than with the structures of musical language. One of the main outlets for this type of experimentation is the weekly *Vitamin-S* event comprising a random selection of four players from a pool of musicians who are allocated to perform together spontaneously without practice, or ideally, without having played together live before. The inclusion of this ten-year-running event in this thesis acts as a context to some of the strategies of the *Bingodisiac* case study, a collaborative project in Chapter Six, which features some of the Vitamin-S musicians and also utilises random elements in its cueing system.

From my own experience of taking part in a *Vitamin-S* event, it seemed that each of the four musicians, myself included, brought with them their own interpretation of 'formlessness': of what it meant to resist the structures of music. This created an atmosphere in which 'coherent' music was biased against and the twenty minutes allocated each quartet generated a sketch-pad of dislocated ideas. This was far too short a time to find any common elements beyond the situation of the moment, painful though it was, which passed without resolve. In speaking after the event to Paul Winstanly[32], who was part of the quartet, we recognised a moment in which each musician was performing their interpretation with minimal interaction and response to other musicians, a strategy of oblique-listening which was our collective solution to that site-specific event. This created a polyvocal, discordant and polyrhythmic form of music, the type of sound which can be heard in a fairground where multiple sound sources blend as one sound. In the *Bingodisiac* case study in Chapter Six, I have termed this type of non-structured multi-layered sound as the 'fairground effect', a strategy of de-territorialising musical structure so that the material of sound and its various intra-actions becomes an active participant in the 'form'. The 'fairground effect' is also a way to disrupt the structure of music using multiple overlapping musical sources to transform idiomatic music into non-idiomatic sound. The breaking down of music into elements of sound can be compared to the process of reverse Black-boxing, discussed in Chapter Two, where the structure of the Black-box is disrupted allowing the material elements to become visible participants. Within a socially constructed view, the musical structure of idiomatic music functions as a Black-box, with the non-idiomatic elements of sound representing a non-totalised assemblage[33] of materials.

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[32] Personal unrecorded conversation.

[33] As discussed in Chapter Two, the non-totalising assemblage is based on Jane Bennett's interpretation of Gilles Deleuze and Félix Guattari (2013): a 'structure' which resists organisation

In a ‘human’ emphasised view, this non-totalising attitude to structure, can be placed within the theoretical framework of Stephen Duncombe’s “community of difference” (2008, pp. 66-70), as a way of creating ‘structure’ which does not revolve around a particular centre of ‘social’ power, such as musical form. It is non-totalising since it cannot easily be reduced to a particular category or identity.

One of the issues which arises from the concept of idiomatic and non-idiomatic improvisational music is that, whilst reproduction of musical form can be avoided within single performances, the reuse of similar strategies and repeated performances can be seen to create an ‘non-idiomatic’ language base. This is a recurrent theme in which the “outside” becomes “inside” the sphere of ‘validated knowledge’, a movement in which structure is adapted to allow what was once outside of comprehension a place within the language. Therefore, it would be wise to consider non-idiomatic, non-structural, and avant-garde forms as contingently functioning as non-totalising, rather than as any permanent spaces which exist ‘outside’. The paradox of ‘outside’ forms of knowledge has been discussed previously in this chapter in terms of outsider art and the avant-garde. Therefore, rather than viewing non-idiomatic music as being ‘outside’ of conventional musical forms, it seems relevant to look at it in terms of its attitudes to breaking down recognisable musical structures.

The DiY tendency of breaking down structure has been discussed previously in the transversal practices of SteamPunk, the ‘community of difference’, ‘negative identity’ and in the ‘negative-space’ where DiY culture operates between disciplines and fields of knowledge. In the context of noise music, the breaking down of musical structures, and the embracing of unstructured ‘noise’, echoes the opening of Ramocki’s black box, with musical forms viewed as social

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by a ‘totalising’ centre of power. This allows the interaction of multiple actants contained within to participate in the changing formation of the assemblage.

constructions which limit or contain participation within the specific parameters of social norms. As this thesis develops and shifts emphasis to a material engagement view of DiY culture in Chapter Two, noise music become relevant to Bruno Latour's idea of reverse Black-boxing, where the incorporation of 'error' is seen as a strategy of breaking down the structure of the Black-box to allow components and materials to become visible participants in the process.

1.3 Limitations of the human-biased view of DiY culture

The literature reviewed in this first chapter depicts DiY culture as a wide and diverse field of practice held together through a series of common attitudes and ethos, known collectively as the DiY ethos. One of the attitudes which has emerged from this chapter is DiY's participatory character, the view that knowledge and technology are something which can and *should be* participated in, and that attitudes or powers which restrict participation should be resisted. DiY's participatory attitude can be seen as having two main themes: the DiY attitude to social aspects of knowledge and power and, secondly; the DiY attitude to technology and materials. The DiY attitude to social structures has been expressed in terms of 'negative-identity' and an opposition to the fields of of 'validated knowledge'. Another aspect of the human-biased view is the organisation of community, in which identity emerges from the diversity of the 'community of difference', as discussed in zine culture. These socially oriented views have suggested that one of the main concerns of DiY culture is the structure and organisation of knowledge. This has manifested in DiY as a resistance to social structures, but also as a resistance to technological structures. Amongst the literature there are other suggestions of DiY's attitudes towards technology: in the use of material 'error' in noise music; the emerging theme of Latour's concept of the Black-box; and also the extended material agency of the shed people, moving closer to expressing DiY culture as an

extension of the social or 'human' view and towards recognising the participatory potentials of materials.

Within this chapter, the DiY attitude to technology and materials has formed a secondary and less defined line of thought, since, within the literature, it is also situated within a human-biased understanding of DiY culture. My argument is that the human-biased understanding of DiY culture, presented in this first chapter, contains certain aspects of theory which obscure the view of DiY culture as a material engagement.

To examine the DiY ethos with a recognition on the influence of materiality[34], there has been the suggestion that the DiY attitude to material engagement requires a rethinking of what 'power' is, as defined in this chapter as a socially productive force, and as a knowledge/power relationship. Other ideas circulate within the 'human' view which obscures the role of material agency, for example, the idea of *structure* as a socially constructed form. In this chapter, DiY culture has been seen to resist both structure and the space of 'validated knowledge', and, on a more material level, resisting the 'enclosure' of technology. By placing DiY culture as being 'outside' of existing language systems, the 'human' view creates binaries which over emphasise often non-existent oppositions and also subsumes DiY culture within that which it aims to oppose. If these binary oppositions were to persist within a 'material' view of DiY culture then the human and the material would be placed as opposing forces, rather than as the intra-action of human and material actants which is suggested by the idea of material entanglement.

Of particular significance to dissolving the dichotomy of the human/material is the change from a definition of 'power' as a socially constructive force, to the

[34] *Materiality* in the context of this thesis is defined as the active participation of materials through the acknowledgement of material agency.

idea of agency which has less emphasis on either the human or the material, but instead incorporates both entities within its scope.

In this chapter, several questions have emerged regarding the human view of DiY culture which I will attempt to address in Chapter Two of this thesis, where theories concerning material agency are developed. One of these questions concerns 'structure' and: 'In what ways can structure be organised without the influence of a subsuming force and without placing a human-biased 'power' in the role of organising?'. In Chapter Two, as the shift of emphasis moves from the 'human' to the 'material', there remains the common element of 'structure' and the DiY ethos and attitudes towards structure. In the human-biased view structure has been seen as socially constructed, whereas in the extended agency view this definition changes so as to allow material agency to participate in the structural forms which are produced. To answer this question, in Chapter Two, requires that an idea of structure is developed which does not rely on the human-biased idea of 'power'. This is also true of the question regarding the nature of the theoretical concerns of an idea of agency situated in an engagement between the human and the material environment of the workshop, in which 'power', or agency, is not situated as an exclusively human attribute but instead extended to the influence of materials.

Another question, concerning 'structure', which has arisen in this chapter can be expressed as: 'In what ways can we alter technological forms to become more "active participants" (Ramocki, 2011)?'. This suggests the need for a more detailed conceptual examination of the DiY practice of re-functioning materials and components of technologies for uses other than for what they were originally intended, including the role that 'error' plays in DiY strategies to dissolve borders between socially constructed areas of technology and/or 'validated knowledge'. The question is, through what process does 'error' become a strategy of breaking down human-biased structures? This is connected with a wider questioning of the theoretical concerns of a DiY ethos to dissolve borders around *territories* of 'validated knowledge'- that is if we also see

enclosed technologies as being territories of 'validated knowledge'. In Chapter Two Bruno Latour's concept of 'error' as initiating a process of reverse Black-boxing is discussed as a conceptual tool for analysing the DiY practices in Chapters Four, Five and Six.

The broader question of Chapter Two is: 'What are the theoretical concerns of DiY practices which increase the *participatory potential* between the human and the material?', continuing the theme of DiY as a participatory culture of material engagement, and ultimately, entanglement of human and material environment.

Chapter Two: Theoretical perspectives of material agency

2.1 The 'extended agency' or 'material' view of DiY culture

In Chapter One the DiY ethos was identified, through Stephen Duncombe's politicised accounts of "negative identity" and "community of difference" (2008, pp. 66-70), as a strategy of disrupting social structures. The idea of 'negative-space' was developed to identify the space 'outside' of the 'validated knowledge', knowledge validated and produced through the knowledge/power relationship. In this way, DiY culture was seen to oppose a socially productive form of 'power' but at the same time, *produce* a 'negative-space' in which to operate. This means that DiY culture, like the examples of the avant-garde, outsider art and the sublime was subsumed within that which it aimed to oppose, that is, the occupation of a negative-space dependent on the positive space of knowledge/power, which it was positioned as oppositional to.

It was argued, in Chapter One, that the human exceptionalism[35] of DiY culture was limited in terms of the dichotomies it produced and the paradox of the 'outside', as a space opposing 'validated knowledge'. This approach was identified as a language-biased approach, since it was a way of viewing DiY culture as opposing systems and structures of 'validated knowledge', including the validating structures of language[36]. The limitations of the 'human' view were presented in order to emphasise the material engagement[37] that occurs within

[35] Meaning the human-bias over materials in terms of agency.

[36] For example, 'outsider' art, which opposes the language of art and yet pertains to be 'art' at the same time.

[37] Also known as the view of DiY culture as a material entanglement.

DiY culture. However, rather than rejecting the human bias, the various aspects of the DiY ethos become a way of identifying attitudes which drive DiY strategies, exemplifying the inclusion of an active materiality discussed in this chapter.

In this chapter there is a shift away from an emphasis on the human towards concepts which consider materials and there active agency[38]. This means that agency is extended from human 'powers' to incorporate the realm of material agency.

Of significance to this thesis is the shift from a socially constructive idea of 'power' to the idea of agency operating across both human and nonhuman actants. As Jane Bennett argues: "a lot happens to the concept of agency once nonhuman things are figured less as social constructions and more as actors" (2010, p. 21). In addition to this there is also a merging of human and material actants, influenced by a combination of Karen Barad's concept of "*intra-action*" (2003, p. 815) [39] and the operation of actants within Jane Bennett's non-totalising assemblage:

> An actant never really acts alone. Its efficacy or agency always depends on the collaboration, cooperation, or *interactive interference* of many bodies and forces (Bennett, 2010, p. 21).

In Bennett's assemblage agency is no longer the property of a single object but situated within the "*interactive interference* of many bodies and forces" (p. 21). Bennett's concept of agency is situated in *interaction* and the connections between actants, rather than being centred on a particular object, human entity or 'space', such as the space of validated knowledge[40]. Likewise, Karen Barad's

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[38] Material agency is a concept developed throughout this thesis as a descriptor of an agency which emerges from material and nonhuman actants.

[39] Described in Chapter One as the "notion of *intra-action*, (in contrast to the usual *interaction*, which presumes the prior existence of independent entities...)" (Barad, 2003, p. 815).

[40]Bennett's idea of agency, as a human-material entanglement, differs from Albert Bandura's more socially-oriented idea of *proxy agency*, as an extension of agency through socially mediated technologies and also *collective agency* in which agency is situated within the actions of a social group (Schott & Burn, 2004).

concept of agency also involves a shift of focus from viewing 'power' as an attribute of a particular agent, to emphasising the actions and "enactment[s]" which occur amongst multiple actants:

> 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, p. 178)

This view of agency, as enacted in the "'doing' or 'being' in its intra-activity" (p. 178), rather than 'situated' as the "attribute" of a particular agent, shifts the emphasis of agency towards the types of material entanglements which occur between the DiY practitioner and the materials with which they *intra-act*.

In this thesis, the term *intra-active interference* (or *intra-ference* as occasionally used) seems better suited to the material view of DiY culture, than Bennett's "interactive interference" (2010, p. 21). The implication is that *intra-active interference* emerges from the intra-actions and functions of human and nonhuman entities from *within* the combined capacities of all available and participating actants of the assemblage.

The concept of *intra-action* signifies Barad's view of agency as emerging from the particular configurations of materials and human actants, merging the distinction of actants as separate entities and placing emphasis on the "doing" (p. 178), so that "agencies are only distinct in relation to their mutual entanglement; they don't exist as individual elements" (2007, p. 33). Intra-action, therefore, situates agency as the active participation within a configuration of actants, rather than as the attributes of "individual elements" (2007, p. 33). This has particular significance to the trajectory of this thesis, shifting from the human-biased view presented in Chapter One, towards the discussion and development of concepts which emphasise material agency and the participatory potential of materials. This view of agency also exemplifies a shift towards 'doing' and functionality or, as Barad suggests, an "enactment" rather than an attribute of human-biased entities:

> if agency is understood as an enactment and not something someone has, then it seems not only appropriate but important to consider agency as distributed over nonhuman as well as human forms (2007, p. 214).

With agency "distributed over nonhuman as well as human forms" (p. 214), according to Barad, "agency is cut loose from its traditional humanist orbit. Agency is not aligned with human intentionality or subjectivity...[and] agency is not restricted to the possibilities for human action" (2007, p. 235). With the concept of agency opened to possibilities beyond an exclusively human-biased orientation, the emphasis of this chapter is free to move towards the development of concepts capable of analysing the material entanglement of DiY culture.

My preliminary research questions in this chapter are: 'What are the theoretical concerns of DiY practices which place materials within a participatory role? and; how do these theoretical concerns differentiate or connect with the 'human' view of DiY culture depicted in Chapter One?'.

2.1.1 The transversal and de-territorialisation

In this section the aim is to introduce and discuss appropriate concepts which can be used to overcome the limitations of the dichotomies encouraged by the idea of negative-space and the anthropocentric language-biased approach. This aim is situated within this thesis as a shift from the emphasis on the DiY *ethos of disruption of structures* to a DiY *strategy of de-territorialisation.* To de-territorialise, in this context, means to remove the boundaries of a particular space, such as an 'enclosed' space of 'validated knowledge', and to increase the *participatory potential* with components, concepts or materials within. This has several implications concerning ideas already discussed, such as DiY's ability to engage with components and materials of technology, in contrast to the

'complete' or 'enclosed' (territorialised) technologies. In this sense, 'garbage', as the choice of material used by the DiY practitioners featured later in this thesis, is material which has been de-territorialised from an enclosed technology, since its containing boundaries have been removed. This is a shift from John Scanlan's discussions of garbage in Chapter One, in which garbage "seems to lack conventional referents… garbage is the remainder of the symbolic order proper" (2005, pp. 15-16), which was entangled with a language view.

The reversed Black-box, introduced briefly in Chapter One and discussed more fully in this chapter, is also de-territorialised, since its boundaries have been opened to participation with the materials contained within. Rather than attempt to disrupt a space of knowledge by creating another (negative) space, de-territorialisation suggests the removal of an idea of 'fixed' space, as a specific territory held together and structured through a particular knowledge/power relationship. This means that DiY culture is not situated through the knowledge/power relationship, but that there is potential for a definition of 'power' which differs from the socially productive view. This emphasis on de-territorialised connections and configurations, rather than the structuring of specific territories, requires a concept which describes this movement of 'cutting across' borders and boundaries of spaces. The 'transversal' is suggested below as a strategy of de-territorialisation, a 'cutting across' of borders which removes the separation between entities.

To transverse, a term borrowed from mathematics, means to draw a line which cuts across or intersects two or more entities. In DiY culture the transversal can be used to describe practices which intersect across two or more disciplinary interests, joining fragments and components of discipline(s) without becoming subsumed to any particular disciplinary area as a whole. The transversal, used in this manner, originates from Jean Paul Sartre's *The Transcendence of the Ego* ([1936] 2011), it also appears in the work of Gilles Deleuze and Félix Guattari (2013; Williams, 2006). Applied to psychoanalysis by Félix Guattari, the transversal becomes a strategy of cutting across two *incommensurable*

dichotomies or “impasses”, such as, in Guattari’s perspective, the conflicting world views of the doctor and patient:

> Transversality is a dimension that strives to overcome two impasses… [and] tends to be realized when maximum communication is brought about between different levels and above all in terms of different directions (Guattari, 2003, p. 80 as cited in Brunner & Rhoades, 2010).

For Guattari, transversality is a movement between and through spaces, a movement across hierarchies, “between different levels” and more importantly, in “different directions” to the patterns of thought which are transversed. The usefulness of the transversal is in its ability to repeatedly enter into spaces and remerge with diverse fragments which are *both* connected and separate.

Guattari’s use of transversality has been described by Susan Kelly as:

> A conceptual tool to open hitherto closed logics and hierarchies and to experiment with relations of interdependency in order to produce new assemblages and alliances (Kelly, 2005).

In respect to the dichotomy of the ‘inside’ and the ‘outside’ of fields of knowledge/power, transversality is useful in viewing DiY culture as a mode of action which is independent of the “closed logic and hierarchies” of the culture of ‘validated knowledge’. Rather than create or occupy a negative-space, transversality emphasises movement and the tracing of a uniquely subjective path across disciplines without the need of engaging in a knowledge/power relationship which enforces and validates certain areas of knowledge. The transversal can be applied to the ways in which DiY culture transverses, or cuts across, various elements of the human and nonhuman, without being subsumed to a specific space of knowledge. Rather than view DiY culture as a specific area, or negative-space, of knowledge, the transversal assigns DiY as a nomadic entity, in which movement rather than territory becomes the emphasis. In this way, DiY

practices can be viewed as strategies, ways of doing[41], rather than ethos, ways of being.

Through connecting transversally across disciplines DiY culture alters the mode of intersected fields of knowledge, by creating assemblages linking otherwise disparate and unconnected objects. This differs from interdisciplinary and transdisciplinary practices which move between disciplines but preserve the disciplinary space as an entity. In this sense, transversal assemblages have the function of challenging the idea that knowledge/power is concentrated within a particular territory. Susan Kelly describes the transversal as "a movement or mode of transversality" (Kelly, 2005), which I understand as meaning that it is *functional* in the sense of being a way of doing something. In this case the function of the transversal is as:

> A modality of the between that produces temporary alliances between practices and 'fields'... not forms of '*solidarity*' between actors or areas of 'inter-disciplinarity'... [and] explicitly sets out to de-territorialise the disciplines, fields and institutions it works across (Kelly, 2005).

For Kelly, the transversal "modality of the between" does not operate to create new 'solid' areas of knowledge, or new "forms of '*solidarity*'" between areas of knowledge as interdisciplinary practices, but instead, has the function to "*de-territorialise* the disciplines". This means that the transversal works to "de-territorialise" spaces of knowledge through connections which are not intended to form permanent links, such as the formation of a new inter-disciplinary field of knowledge, but to operate a mode of relations which differs from the territorial knowledge/power relationship of Chapter One.

In bringing a different mode of relations, the transversal differs from "inter-disciplinarity" (Kelly, 2005) with the addition of an important function which "crucially, cannot leave intact the fields that they have worked across" (Kelly,

[41] The emphasis on 'function' and the functionality, what things do, rather than attitudes held.

2005). Transversal practices, such as DiY practices which work with fragments and materials from different technologies, represents for Kelly a form of logic and validity which resists operating within territorialised areas:

> Transversal practices must often negotiate a double and sometimes paradoxical move. A logic of refusal – of resisting visibility, or taking recognisable forms. This refusal while running serious risks of invisibility, marginalisation, or inoperability, however also becomes a condition for an opening out of another logic, or system of valorisation (Kelly, 2005).

This definition of the transversal has some parallels with previous discussions of negative-space, in which the "logic of refusal... resisting visibility, or taking recognisable forms" has been indicated as a DiY ethos which resists the power of the 'validated knowledge'. According to Kelly, the transversal is a strategy for the "opening out of another logic, or system of valorisation", as a way of refusing the territory of 'validated knowledge' without occupying a territory, such as negative-space, which becomes entwined with the object of refusal. The process of the transversal differs from that of negative-space: negative-space is knowledge that is situated as a separate 'outside'; whilst the transversal removes the boundaries between various disciplines and creates connections, flows, or pathways between and across entities. In this way the pathways of the transversal are both 'inside' and 'outside' of validated knowledge, since de-territorialisation means that there are no borders and barriers in which an 'inside' or an 'outside' can be defined. In this way the transversal does not maintain a permanent, static space but instead, describes a shift across spaces which emphasises the dynamic and entangled nature of entities.

Transversal practices change the spaces they have moved across by revealing the unfixed nature of the space: the space is *de-territorialised* and the boundaries and borders which contained the space, either knowledge/power or an 'enclosed' technological space, are opened up for participation.

Transversality and the process of de-territorialisation is significant to this thesis, since it circumvents the polarising problems of 'negative-space' as a way of

understanding the DiY ethos of opposing structure, replacing opposition with a strategy of de-territorialisation – the opening up of 'enclosed' spaces to increase participatory potential and to allow more active participation. Within the case studies the concept of the transversal is discussed in terms of the process of de-territorialisation and the dissolving of borders and boundaries between otherwise separate entities. A similar strategy of opening up 'enclosed' spaces is discussed below with Bruno Latour's Black-box and the process of reverse Black-boxing, where enclosed space is de-territorialised through 'error'[42] and made available for more active participation.

In terms of material agency, the argument is that 'enclosed' technologies limit the participatory potential of materials. The opening up of enclosed spaces, through transversal practices and the effect of de-territorialisation, is one way in which material agency can be released from the limitations of socially constructed and human-biased 'structures'. The disruption of technological structures, as will be seen in the various DiY practices examined within this thesis, is a way in which material agency becomes entangled with the human practitioner. The argument is that the emphasis on separation between the spaces of human and material, when material is enclosed within a particular human-oriented function, shifts when these spaces are de-territorialised and allows agency to be viewed as an entanglement between human and material actants. Part of this shift is in the way we view 'structure' and the agency responsible for the organisation of material. In the following section two different structures are discussed: the Black-box and the non-totalising assemblage.

[42] 'Error' is defined as a strategy to increase the *participatory potential* of material agency, departing from an exclusively human view of agency.

2.1.2 Re-functional potential, 'error' and the non-totalising assemblage

The concept of agency, and its degree of emphasis on human exceptionalism, is a concern which influences the types of 'structure' and the way that materials are organised. Bruno Latour's *Black-box* (1987; 1999), refers to a grouping of 'validated knowledge' which is collated into a functional unit of thought. Simply put, once ideas have been validated and are put to use, the workings which have created that result are hidden, leaving only the purely functional items. In the case of the Black-box, which could also be a technological device, the workings behind the functioning of the device becomes opaque and is not opened to participation. In this way the Black-box groups together multiple operations and agents in a enclosure that resists tampering, tinkering or participation beyond the validated functions.

The Black-box is a process which can be applied to any idea, physical object or technology in which the processes and workings within the Black-box become imperceptible, since in its normal operation there is deemed no reason to examine how or why functioning is achieved if the device is working well, or as Latour says ''made invisible by its own success":

> [The Black-box describes] the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become (Latour, 1999, p. 304).

Therefore, according to Latour, the "internal complexity" of 'successful' technology becomes "opaque" and only the "inputs and outputs" of functions of the Black-box become visible. In this way, the successful and "efficiently" functioning ideas, technologies or media operate as invisible groupings. The successful Black-box media is technology which becomes opaque and also, in some ways, non-participatory: since participation is restricted to the primary intended function. This has been discussed in Jussi Parikka and Garnet Hertz's article *Zombie media: Circuit bending media archaeology into an art method*

(2015), as the restricted participatory "expert territory" of the inner workings of Bruno Latour's Black-Box, compared to the DiY practices of "non-expert [circuit] bending" which de-territorialise the space of the Black-box (p. 148). Parikka and Hertz use the term "depunctualisation", from Latour's actor network theory, to describe the "breaking apart [of] the device into its components" (p. 149) which then become available as participatory elements. If DiY culture exemplifies a participatory culture which engages with materials and fragments of technology, such as the 'depunctualized' objects of garbage, then the Black-box represents a barrier to the participatory potential of materials. In this thesis the term 'de-territorialisation' is used in place of the concept of "depunctualisation", and describe the same processes of breaking down the territory of the Black-box so that the multiple actants within can become participatory actants.

If we look at the Black-box as a functional device, it is easy to compare it to a 'machine', since according to Latour the Black-box has "inputs" and "outputs" (1999, p. 304) just as machine processes. Machines are generally considered as inanimate devices performing certain functions, although this definition is adapted later in this chapter to include living entities in Bryant's *Machine Oriented Ontology* (2014). According to Latour, the process of Black-boxing obscures the workings of the machine and removes them from the potential of participation, since every component and separate object within the machine is subsumed under a single[43] Black-box device: "The action we are trying to measure is subject to Black-boxing, a process which makes the joint production of actors and artefacts entirely opaque... completely determined by its function" (Latour, 1999, p. 183). Therefore, in this way, *function* becomes emphasised as an important factor in maintaining the Black-box.

[43] Latour argues that rather than a single device the Black-Box is actually invisible itself, appearing only as the function it performs (1999).

Of significance to the trajectory of this thesis, moving from a 'human' view based on DiY ways of being, towards DiY strategies and ways of doing, is the idea that the Black-box is contained by 'function'. The de-territorialisation of the Black-box, therefore, is an increasing of, what I call, the *re-functional potential*[44] contained within. De-territorialisation of the Black-box, therefore, involves a process in which function is disrupted or diverted from its original intention. The hypothesis is that *function* is defined within a human-biased view, whereas re-functioning is situated within the extended agency of DiY culture.

Latour provides a process in which the *re-functional potential* of enclosed technologies can emerge through *reverse Black-boxing* (1999, pp. 174-215). Taken from Latour's third meaning of mediation, *reverse Black-boxing,* describes the processes involved when a previously invisible item of our technology begins to become visible due to 'error' or failure to function correctly. 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 video projector the Black-box process is set into reverse and the enclosure of the dysfunctional object begins to break down until multiple objects and components replace the previously seamless 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, p. 183).

Reverse Black-boxing is a way in which individual components become disengaged with overarching function, this means that the object 'unfolds' from

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[44] *Re-functional potential* is function in a de-territorialised state, suggesting malleability and flux and emphasising an indeterminacy of end result. Re-functional potential also describes the way in which materials *intra-act* to produce complex and unpredictable functions.

being a single object, “composed of zero parts”, to being comprised of the multiple components and materials which contribute to its functionality.

To reverse the Black-box process 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 become potentials for multiple functionalities: they are no longer “bent, enrolled, mobilised, [or] folded in any of the others’ plots” (Latour, 1999, p. 185) but instead unfold in “time and space” (p. 183), allowing more diverse and multiple points of intra-action than the inputs and outputs of the Black-box. With the Black-box technology opened or ‘unfolded’ due to error or obsolescence, the components become available to be connected with other components from other Black-boxes in a transversal process which de-territorialises the enclosed spaces of the Black-box.

The process of reverse Black-boxing is of particular significance to this thesis when it comes to discussing the processes and strategies of DiY practitioners. Within the three case studies there is a recurring theme of DiY practitioners utilising ‘error’ or unpredictable capacities of materials (*Larsen-Jensen*, *The Trons*, *Bingodisiac*). In this sense ‘error’ is a strategy used by the DiY practitioner in the form of faulty components and discarded materials. The term can be misleading and problematic, since ‘error’ is a concept embedded in an anthropocentric language viewpoint of materials as having a particular right or wrong way of functioning. In terms of the Black-box as a container to enclose materials within a human intended function, ‘error’ emerges as a strategy to increase the *re-functional potential* of materials, diverting from an exclusively human agency. This means that, ‘error’ can be used as a strategy to increase the *participatory potential* of material agency, extending agency from an exclusively human view of power. In the context of DiY culture’s use of redundant technologies, reverse Black-boxing can be used to describe the processes in which technology, once it becomes dysfunctional or obsolete, is reduced to

garbage and the multiple materials of which it was comprised. This is a definition of garbage which differs from John Scanlan's 'language' view of garbage, since it is based within a 'material' view of DiY culture, in which garbage is material which has been de-territorialised from 'enclosed' technologies. The question which has emerged from Chapter One is: 'In what ways can 'structure' be organised without the influence of a subsuming force and without placing a human-biased 'power' in the role of organising?'. To answer this question I will refer to the non-totalising assemblage as a way of organising matter.

The 'structure', which the containing affect of the Black-box represents, where materials and processes are obscured, can be contrasted with Jane Bennett's 'non-totalising assemblage': an "ad hoc grouping of diverse elements, of vibrant materials of all sorts" (Bennett, 2010, p. 23). Influenced by Gilles Deleuze and Félix Guattari (2013), the connections created in the non-totalising assemblage disrupt 'structure' in a similar way to the opening of the Black-box, so that:

> The effects generated by an assemblage are… emergent in... their ability to make something happen… distinct from the sum of vital forces of each materiality considered alone… [it] is never a stolid block but an open-ended collective, a 'non-totalizing sum' (Bennett, 2010, p. 24).

In the assemblage, effects are "emergent", just as in the opened Black-box material actants emerge from what was previously considered as a solid grouping. The "non-totalising" aspect of the assemblage reflects a grouping which contrasts the 'enclosure' of the Black-box. By remaining non-totalised, agency in the assemblage is dispersed amongst human and non-human actants. This means that, according to Bennett, the "vital forces" of materials are entangled with the agency of the human, forming an indeterminate and "open-ended collective" of actants. By recognising agency in materials, the human participant is decentred as the primary element in the assemblage. This means that agency is dispersed throughout the materials and that agency becomes "enmeshed in a dense network of relations" (Bennett, 2010, p. 13) – with each component, both human and nonhuman an equally present part of the network.

The assemblage represents the type of structure which emerges from the extended agency of material/human entanglement. The significance of the assemblage is that it can be used as an alternative to the idea of structure discussed in Chapter One, where DiY culture was said to resist social structures, such as identity, 'complete' technologies and 'community'. This gave the word 'structure' the connotation of a socially constructed entity, particularly in the context of the socially constructive definition of power, the force responsible for constructing and holding a particular territory. In this way 'structure' became enmeshed with a particular view of power as a social force, excluding the acknowledgement of possibilities of material agency. Compared to 'structure' as an enclosed container, the non-totalising assemblage is a transversal movement which cannot be 'totalised' or contained within a particular territory. The assemblage, like the transversal practices discussed above, has been *de-territorialised*, meaning that the borders of specific actants have been opened to participation.

In the context of this thesis the forms of organisation represented by the reversed Black-box, Bennett's "*distributive agency*" (2010, p. 31) of the non-totalising assemblage and the extended mind, are collated under the term 'extended agency' – since agency is extended from the exclusively human view of power, depicted in Chapter One, to include all kinds of actants. These altered concepts of 'structure', as non-totalised by social power, form a context for the following discussions of material entanglement.

2.1.3 Material engagement and entanglement: defining power and agency

The question for this section of Chapter Two is: 'What are the theoretical alternatives which can be used to overcome the limitations of the human-biased definition of 'power', used in Chapter One?'. To answer this question I will look at contemporary concepts of material agency.

One strategy discussed by Levi R. Bryant in his *Gravity of Things* (2013), is to substitute the word *gravity* in the place of *power*, so that materials are not biased against. For instance he states:

> If, however, I have chosen to speak of gravity rather than power, then this is because the concept of power within the world of philosophy and theory has come to be too anthropocentric, immediately drawing attention to sovereigns exercising power, class power, symbolic power, and things such as micro-power and biopower (Bryant, 2013, p. 13).

Bryant's use of the term gravity in place of power is an interesting shift, since the word gravity can be used in a variety of both human or nonhuman contexts: to gravitate towards something or someone; as a descriptor of the attraction certain materials possess towards other entities. This suggests that materials can exert an influence over events through a gravitational force which makes certain outcomes more possible than others. By articulating power as a type of gravity, Bryant manages to overthrow the anthropocentric connotations of power.

Whilst I do not exclusively adopt Bryant's concept of 'gravity', in place of the word power, the influence of gravity is inherent in the on-going definition of material agency which occurs in this thesis. The intention of including Bryant's discussion on the preferred use of gravity rather than power, is to highlight the anthropocentric connotations of 'power'.

In some ways, to say that materials possess agency seems to go against certain commonly held beliefs. Innate materials are unable to make conscious decisions and, therefore, how can they exert any form of power over living humans? Disputing the line of thought that agency requires conscious and, therefore, solely human 'intention', Lambros Malafouris uses the example of the potter's wheel to explain intention as a dynamic event negotiated between the human and the nonhuman. Malafouris defines agency as being "of actual practice and being-in-the-world" (2008, p. 30) so that intention is linked inextricably with action:

> Agency is not a matter of private thought and imagination but of actual practice and being-in-the-world… if an association between agency and intentionality can be made, it has to be with the type of intentionality here called 'intention-in-action' (p. 30).

This means that agency is more than just exclusively mental intention, but instead, exists in practices and action so that, "for example, an agent may act differently or even in a manner contradictory to his prior intentions" (Malafouris, 2008, p. 30). As I understand, agency for Malafouris is the material enactment of expressive capacities and potentials which emerge through the entanglement of potter, clay and wheel. In the case of Malafouris' potter's wheel, the potter may have prior intentions to make a particular shape with the clay, but the actual shape depends on a complex *intra-action* and engagement between the potter, the potter's wheel and the material of the clay. The question is what happens when the potter gains sufficient skill to reproduce an almost identical clay form at each sitting? Malafouris answers this question by making the point that the prior intentions of the potter are made from prior material engagements with the clay and wheel technology. This means that the potter's intentions, even if he has decided to make the particular form which emerges, are formed through previous repeated engagements and practices between the potter and the clay. For Malafouris, agency is neither a human or nonhuman quality, but lies in the "grey zone" *between* the human and the material:

> There is no way that human and material agency can be disentangled. Or else, while agency and intentionality may not be properties of things, they are not properties of humans either: they are the properties of material engagement, that is, of the grey zone where brain, body and culture conflate (Malafouris, 2008, p. 22).

Material engagement is therefore more than the human engaging with the nonhuman material but instead a two-way process, where the human is entangled with the materials they work with: the material of the clay and the intention of the potter being two elements which are contained *within* agency,

as an *intra-action* of entangled actants. In this sense agency occurs within the intra-action of material entanglement.

This idea of agency which cannot be isolated as an exclusively human trait, differs from the implicitly human trait of the definition of 'power' used in Chapter One and is significant in allowing a view of DiY culture as an entanglement of multiple actants.

Levi R. Bryant has a similar example of agency existing as a material engagement, in which the sculptor's intentions are located within the action of "encountering" the material (2014, p. 50). The action of sculpting becomes situated as a negotiation between the intention of the human sculpture and the "wants" of the material:

> Take the sculptor working with marble. They might begin with a vague idea of what they want the marble to become and even select specific pieces of marble to execute this local manifestation, yet as they begin to work the marble, encountering its grain and veins, they'll talk about how the marble 'wants' to become something else (Bryant, 2014, p. 50).

Here Bryant is suggesting the same "intention-in-action" (Malafouris, 2008, p. 30) as Malafouris' example of the potter and the wheel, where intention is something negotiated between the sculptor and the material of the marble. However, Bryant goes further in saying that the marble "'wants' to become something else", suggesting a closer material engagement than 'intention-in-action' and indicating a stronger sense of material agency. This example of the sculptor and the marble is applicable to the strategies of the DiY practitioner, as demonstrated in the first case study, Chapter Four, where Larsen-Jensen works with discarded materials from the local rubbish dump: starting with a vague idea of what he wants to make; selecting materials which are close to his intention; and allowing his intention to adapt to whatever other options and *participatory potentials* are available. In this way, material engagement can be seen as an important strategy of DiY practitioners to produce artefacts which have emerged from the space between the human and the nonhuman: in the "betwixt and

between", to use Victor Turner's phrase in a less anthropocentric view of agency; or, in a less separated view as an *intra-action* within the human/material engagement.

However, there is a problem with the connotations of the phrase 'material engagement', since it subtly implies a separation between the human and the material, that there is a separate something, or someone, which *engages* with materials. I view this separation *between* human and material, subtly implied by the idea of material engagement, as a potential limitation on the development of concepts which can be used to examine and analyse the material emphasis of DiY culture. Although the phase 'material engagement' is useful in describing the ways in which the human practitioner approaches the material environment, particularly when data is predominantly drawn from human-to-human research tools such as interviews and observation, there is also a connotation of human-bias. One way to avoid this would be to substitute the term human *entanglement*, but rather than change words it is important for the reader to note that the definition of material engagement is situated within the encompassing concept of agency as a material-human entanglement. This means that, within this thesis, the 'material view' of DiY culture is situated within the larger conceptual paradigm of the entanglement of human and material actants, therefore, the two terms 'material entanglement' and 'material engagement' have often been used interchangeably. The concept of agency as contained within a sense of the inseparability of human and material is discussed below.

As a signifier of the inseparability of human and material, Jane Bennett adopts Bruno Latour's use of the word actant, to describe agency which is both human and nonhuman. In Bennett's view, agency is also a matter of entanglement and is neither located in any particular isolated entity:

> An actant never really acts alone. Its efficacy or agency always depends on the collaboration, cooperation, or *interactive interference* of many bodies and forces. A lot happens to the

> concept of agency once nonhuman things are figured less as social constructions and more as actors (Bennett, 2010, p. 21).

In viewing actants as multiple "bodies and forces" (p. 21), agency moves away from being a trait or property of a single object and towards a more action/engagement situated perspective. "Nonhuman things" (p. 21) cease to be subsumed beneath the "social constructions" (p. 21) of human-biased ideas of 'power', meaning that agency is decentralised or, as Bennett's "*distributive agency*" (p. 31), dispersed amongst multiple actants. Bennett's concept of actant, as including both human and nonhuman entities, signifies a merging of the practitioner and the materials. The *intra-action* of the DiY practitioner and the material, like the non-totalising assemblage, emerges from *within* the combined characteristics of all available and participating actants, both human and material entities.

In terms of this thesis, the phrase *intra-active interference* seems better suited to the material view of DiY culture, (rather than Bennett's "interactive interference" (2010, p. 21)) and is signposted here as being significant to the contribution to knowledge offered by this thesis. *Intra-active interference* combines Jane Bennett's idea of the actant, discussed above, with Karen Barad's notion of *intra-action*. Intra-action, and its relationship to agency, is significant to the development of the 'material view' of this thesis in terms of viewing agency as occurring within the 'action' of material entanglement. In this sense, actants are not separate entities which possess attributes of agency, as the potential to affect change, but that agency *emerges* through the intra-action of assemblages of actants:

> Intra-action signifies the mutual constitution of entangled agencies. That is, in contrast to the usual 'interaction', which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognises that distinct agencies do not precede, but rather *emerge* through, their intra-action (Barad, 2007, p. 33).

The *emerging* of agency from intra-action, as a "mutual constitution of entangled agencies" (Barad, 2007, p. 33), suggests that agency comes from some form of 'structure', organisation or assemblage of multiple 'actants'. In this case, the notion of intra-action implies that some form of 'engagement' is occurring within the space of the agency, an engagement of "entangled agencies" (Barad, 2007, p. 33) which cannot be isolated as distinct (human or otherwise) "individual agencies that precede their interaction" (p. 33). Barad's view of agency draws parallels with Malafouris' "intention-in-action" (2008, p. 30), in which "there is no way that human and material agency can be disentangled" (Malafouris, 2008, p. 22). This entanglement of agencies, vital to the concept of Barad's intra-action and agency, highlights the importance of *configuration* and the 'way' that actants are 'put together' to allow agencies to emerge. This presents a useful conceptual tool in which to view DiY practices of material engagement, and the ways in which the configuration of materials increases the participatory potential of material agency. The emphasis on intra-action, as agency emerging from the particular *configuration* and *intra-actions* of human and nonhuman actants, suggests the significance of 'structure' and also, importantly, the need to find concepts of configuration which are not constrained by the connotations of the 'human-biased' view of agency, such as suggested in the word structure.

For Jane Bennett agency exists in the particular configuration of the *assemblage*, highlighting the DiY concern with ways of 'organising' and structure (discussed previously as the DiY ethos concerning structure and the disruption of structure). Bennett's assemblage, links agency with the ability to *do* things and as a series of intra-actions between functioning entities as actants or agents. Bennett views "nonhuman things" as "actors" (p. 21), and defines agency as: "a source of action that can be either human or nonhuman; it is that which has *efficacy*, can *do* things, has sufficient coherence to make a difference, produce effects, alter the course of events" (Bennett, 2010, viii). By recognising the participatory potential of materials, the human participant is decentred as the primary element in the assemblage. This means that agency is dispersed throughout the network of

actants, a "theory of *distributive agency...* [which] does not posit a [human] subject as the root cause of an effect" (p. 31). For Bennett, therefore, agency is not the trait of an individual entity but emerges from the assemblage, or network, of interconnected interactions of actants "inextricably enmeshed in a dense network of relations" (p. 13). In the 'material' view of DiY, agency can be defined as: the *intra-active interference* of both human and nonhuman actants "enmeshed" (p. 13) within an assemblage which is 'non-totalised' due to the lack of a "root cause" (p. 31) of agency.

Bennett's "*distributive agency*" (2010, p. 31) can be linked with Andy Clark and David Chalmers' idea of the "extended mind" (1998). From a perspective of cognitive psychology, the "extended mind" disputes the idea of a human-centred mind and instead recognises a form of *distributive* or *extended agency* involved in the processes of cognition. *Extended agency* is agency which extends beyond the human subject and into the material environment, allowing materials to exert agency as part of what Bennett calls the "dense network of relations" in which both human and materials are "inextricably enmeshed" (2010, p. 13).

Clark and Chalmers argue that the physical environment is an active participant in thought processes, extending the space of the mind and representing agency as emerging from the material environment:

> 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 & Chalmers, 1998, p. 7).

In "*active externalism*" (Clark & Chalmers, 1998, p. 7) the area of the mind extends beyond the physical borders of "the demarcations of the skin and skull" (p. 7), and includes external materials as active agents in the cognitive process. In terms of a view of agency which transverses the human/nonhuman divide, *active*

externalism argues that processes of the mind can take place externally to the human body, incorporating external devices within the thought processes. According to Clark and Chalmers, the human cognitive system, our way of creating meaning and ideas, is composed of an engagement between internal and external actants. An interdependency which Clark and Chalmers establishes 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. All the components in the system play an active casual role, and they jointly govern behaviour... If we removed the external component the system's behavioural competence will drop, just as it would if we removed part of its brain (Clark & Chalmers, 1998, pp. 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" (pp. 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 centralised controller that manipulates representations, but rather minds are extended out into the physical media of the world" (2014, pp. 86-87). Clark and Chalmers' "two-way interaction" (1998, pp. 8-9), between the mind and the material environment, can be compared to the entanglement between human and material operating as a "two-way street, an encounter between bodies human and non-human" (Bennett, 2010, p. 47).

Taking the idea of agency further towards materials is Bennett's account of a "neo-animist ontology" (Bennett, 2011, p. 120), which suggests that materials have the ability to initiate, animate or influence events through "thing-power... [: as] the curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle" (p. 6). This is noticeably leaning more towards material agency than the above discussions on Malafouris' material engagement. Material engagement occurs as a result of intra-actions of the human and the material,

with intention situated “in-action” (Malafouris ,2008, p. 30), whereas, for Bennett’s “neo-animist ontology” (2011, p. 120), as I understand it, agency has the potential to emerge from within the intra-actions of nonhuman actants of the assemblage.

Jane Bennett’s “neo-animist ontology” (p. 120) is influenced by actor-network-theory (ANT) developed by Bruno Latour and John Law (Latour 2005; 1987; Law & Hassard, 1999). ANT is a way of looking at networks and assemblages with a non-hierarchical distinction between human and nonhuman elements. Agents can equally be human or nonhuman and there is little distinction in the importance between the two types of agents. In ANT, power is defined as agency: the ability of various objects to affect other objects. This definition of power de-emphasises the human/social elements of the socially constructive definition of power (see Chapter One). In ANT, power ceases to become an exclusively social construct and instead becomes embodied within objects, which exert agency over both the human and the nonhuman. The shift from power to agency is implied in the less hierarchical arrangement of agents, disabling the bias of the human as the principle agent of change. The less hierarchical structure of an ANT network encourages a view of materials as being, not only interconnected, but also closely entangled and enmeshed with the human agent.

Whilst the less hierarchical practices of DiY are inherent in the selection process of materials - easily available, free, discarded, unwanted, Lo-Fi materials: the materials and objects which almost ‘find’ the practitioner in a process of extended agency involving the material environment of the workshop, there are some limitations in terms of applying Latour’s ANT theory to DiY culture. One reason is that, due to the scope of this thesis, situated between the social and material views of DiY culture, the human actant is never entirely removed from the assemblage. In this thesis, the definition and use of the concept of agency incorporates the influences of both Malafouris and Bennett, and in some applications leaning more towards the idea of *intra-action* and the merging of human and nonhuman actants within the “*distributive agency”* (Bennett, 2010,

p. 31) of the assemblage. In other places in this thesis it is difficult to completely exclude the human, particularly in the case studies, where data has been drawn from human sources such as interviews. Therefore, this thesis' use of agency does not entirely embrace the more extreme exclusion of the human actant in Bennett's "neo animist" approach (p. 120), nor the application of non-hierarchical distinction between human and nonhuman actors in Latour's actor-network-theory. This reservation is due to the situating of this thesis within a perceived gap in knowledge between the 'human' view of the DiY ethos in Chapter One and the material view of DiY strategies which emerge as part of the trajectory of this thesis.

So far we have seen several different ways to describe the part that materials play in the processes of action: Malafouris' *material engagement* as an agency which emerges in the action of engagement; Bennett's *actant* (derived from Latour) as a progressive move away from the more human/social connotation of agent and the idea of "*distributive agency"* (Bennett, 2010, p. 31); Clark and Chalmers' 'extended mind' which influences an idea of *extended agency;* and Latour's *actor network theory* which emphasises the less hierarchical intermeshing of multiple actors. The aim of this chapter has been to present concepts which allow a shift away from the social orientated discussions of Chapter One, which used a Foucauldian influenced concept of knowledge/power as its basis. To understand material engagement has necessitated a shift from the human-based *power,* via *agency* and *actor* to an actant-based definition which will be more useful in understanding a human/nonhuman intra-action.

In the context of this thesis, the idea of participatory culture shifts away from the social and becomes instead an event occurring between both human and nonhuman entities. In Chapter One we have seen ways of describing participatory spaces *outside* and here in Chapter Two, with material engagement, participation can be seen as occurring *between* the material and the human, and also as an intra-action *within* the merged human/material actant. In the next section, the idea of the machine and "*reciprocal*

determination" (Bryant, 2014, p. 50) is introduced, whereby function and transversality again becomes the emphasis and agency is shifted closer to Bennett's "neo-animist ontology" (2011, p. 120).

2.1.4 Function and re-function: the machine.

Whilst the Black-box can be said to be enclosed in an subsuming function, Levi R. Bryant's *Machine Oriented Ontology* (MOO)(2014) emphasises function as a way in which material agency is brought to light. According to MOO, every object, human and nonhuman entity can be viewed as a 'machine': as a series of inputs and outputs which connect with other machines, via functions and processes, to create complex machine assemblages. However, rather than the machine being another descriptor for the functionality of the Black-box, Bryant's machine is never a "simple machine" but, a machine which is also made of other machines:

> There is no such thing as a simple machine. Rather, every machine is simultaneously a unit or individual entity in its own right and a complex assemblage of other machines. In short machines are composed of machines (Bryant, 2014, p. 75).

Therefore, according to Bryant, the machine can always be broken down into other machines, whilst at the same time remaining an "individual entity in its own right" (p. 75). The assignment of the term *machine* to everything which performs a function, living or non-living, becomes a way of de-emphasising the properties of individual things whilst retaining the emphasis on intra-action and the importance of configuration. In the concept of the machine, the divide between material and human is less pronounced: for example, a human musician is not a collection of properties contained within a physical body and controlled by a central brain, but instead, the meeting point of various converging functions, internal and external machines, working towards the 'output' of music production. In this way the human musician can be seen to incorporate the

inputs and outputs from all kinds of external machines, and the process becomes as Jane Bennett describes: "[a] two-way street, an encounter between bodies human and non-human" (Bennett, 2010, p. 47). This becomes relevant to this thesis in Chapter Six, in which participating musicians are seen as part of the *Bingodisiac machine* assemblage.

In terms of DiY practices, the extension of agency from the human into materials describes a participatory culture in which agency is shared between human and the nonhuman actants, not as Black-box media but as an intra-action between multiple agents and components. Bryant's view of *machines within machines*, discussed below using the example of the frog-machine, can be used as a conceptual tool to reverse Black-box media technologies to reveal the complex operations and functions enclosed within. When we get to the case studies of this thesis we will find several examples of the way that 'machines' transverse perceived human/nonhuman borders: Larsen-Jensen's workshop, the local recycling centre, malfunctioning components and Larsen-Jensen's hands and feet become part of the machine which outputs musical oscillator instruments (Chapter Four); 'Machine talk' is a phrase used by DiY practitioner Greg Locke to describe the intra-connection of elements and sounds produced by material actants within the assemblage of the robot band *The Trons* (Chapter Five); and in *Bingodisiac* (Chapter Six) the random selections of the cueing system, the materials of DiY instruments, the human musical machines, the images from the screen, the audience, and the interactions between randomly selected musicians becomes a machine of participation.

Whilst there are machines which are semi-mechanical devices of limited or fixed function, according to Bryant, a machine also operates within varying degrees of *plasticity* of function depending on its context and intra-actions within the machine assemblage (2014, p. 46). Simple machines placed in new or unfamiliar contexts may also acquire additional plasticity of function, such as what happens when DiY practitioners re-function simple machine components into performing more complex operations.

In this thesis I have a preference for the use the word *malleability*, rather than plasticity, to describe the re-functioning capacity of materials, although occasionally the two words are also used interchangeably. Malleability of function implies an 'openness' of materials to be effected by other actants, so that, more malleable functions represent an increase of the participatory potential of materials.

Re-functioning of materials, such as occurs when discarded components are salvaged and placed within new contexts, can also add agency to previously insignificant machines: "machines can also gain and lose powers as a result of the operations that take place within them as well as encounters with other machines" (Bryant, 2014, p. 45). This means that the agency of machines is not so much individually determined, or fixed, but rather collectively determined, or as Bryant suggests later in this section, resulting from "*reciprocal determination"* (2014, p. 50). Bryant's machine is of particular importance to the concept of re-functioning, as used in this thesis. Re-functioning of simple objects and materials is a common practice of the type of DiY this thesis focuses on. Re-functioning, via Bryant's machine, emphasises the intra-connection[45] of machines and the affect that each machine has within the machine assemblage.

The 'machine' differs from the Black-box because the basis is not to obscure the processes and operations of the multiple components under a single machine function, but to recognise the intra-connection of machines within machines. For example, Bryant uses the example of a frog, as a machine that:

> Engages in all sorts of operations for catching flies and insects. Its body is a machine that engages in operations to deftly traverse river currents and eddies. Its body is a machine that engages in operations transforming inputs of air into strange songs that

[45] The word intra-connection is used instead of inter-connection, suggesting an 'internal' connection between non-separated entities. This is an adaptation of Karen Barad's idea of "intra-action" (2003, p. 815).

> attract mates... a machine that produces certain outputs such as carbon dioxide and other wastes that are taken up as inputs for machines like algae, lily pads... a machine that produces copies of itself as outputs through reproduction (2014, p. 39).

In this way the frog can be seen as a series of operations to produce outputs and intra-connections with other machines, such as algae and lily pads and also to transform basic materials such as air into more complex outputs such as "strange songs" (p. 39). From Bryant's example it is clear that a machine exists as a complex intra-action with other machines, for example there can be no simple connection between the input of air and the output of "strange song" (p. 39), but instead, the suggestion of numerous machines operating within the machine of the frog, such as a frog lung machine, frog throat machine, and frog brain machine all acting together to produce the sound. Bryant's ontological view of 'reality' is that "being is composed of machines all the way down" (2014, p. 38), so that there is no point at which a machine exists as an essential 'thing' in itself, but can continue to be broken down into other smaller intra-acting machines "all the way down" to the smallest perceivable level and beyond.

Whilst the Black-box is a process which centralises agency to a single enclosure, MOO is a decentralising factor for agency, in which the multiple actants are seen as machines which endlessly modify the inputs and outputs of other machines, as part of a process of *reciprocal determination:*

> There is a sort of *reciprocal determination* between flows and inputs and machines exercising operations on these flows...There are many instances in which the machines that flow through a machine modify the machine that operates (Bryant, 2014, p. 50).

This means that Bryant's machines are not fixed in their functions, but instead, act reciprocally to modify the functions, outputs and operations of each machine. This is explained by Bryant as the three different ways that machines produce outputs as "manifestations": 1. *qualitative manifestation*, in which qualities of the machine are altered (p. 42); 2. *agentive manifestations*, where machines alter the behaviour of other machines (p. 44); and 3. *material*

manifestations, an output which leaves the machine to become a separate material output (p. 44). In the example of the frog, a *qualitative manifestation* might be the operation of certain frog machines which alter the qualities of the frog, for example the intake of certain foods might change the physical colouring qualities of the frog. An *agentive manifestation*, on the other hand, may be seen in the ability of external machines to influence the behaviour of the frog machine, perhaps an external threat which causes the frog to cease producing its song. Finally a *material manifestation* is an output which produces a machine which exists independently and externally to the frog, such as a reproductive function to produce further frog machines which exist independently of the originating frog machine. The concept of "*reciprocal determination*" (p. 50) and the different ways in which machines connect to other machine to alter the function of the machine, is developed throughout the case studies of this thesis using the concept of *Machine-talk. '*Functional' *Machine-talk* is developed from Greg Locke's version of audio "machine talk"[46] in Chapter Five, but the concept is also applied and developed in the case study of Chapter Four, where Felix Larsen-Jensen's oscillators demonstrate a "reciprocal determination" (Bryant, 2014, p. 50) between materials which indicates a form of Machine-talk.

To engage in all of the nuances of Bryant's discussions of the operations of machines is beyond the scope of this thesis, particularly the depth of the philosophical considerations. Of significance to this thesis is that by viewing human and nonhuman objects as machines, the intra-action of functions are emphasised as a "*distributive agency*" (Bennett, 2010, p. 31) extending into the machine assemblage. This not only means that agency is extended beyond the human, as the central point of control, but also that agency includes all kinds of diverse and complex actants, or machines within machines. As shown in Chapter One, DiY culture's ethos to reveal the process and to include visible processes in

[46] Interviewed by author 07 December 2012 duration one hour twenty minutes.

the presentation of cultural artefacts, as a means of encouraging open participation, starts to take on a new meaning: where, rather than being a social movement, participatory culture becomes a strategy of participating with technology, materiality, and Bennett's "*distributive agency*" (2010, p. 31) which takes into account the vibrancy of 'things'; extending beyond the confines of the human/social and into a world of entangled materials, machines and actants of which the human is only one part of all that is included.

2.2 Conclusions: Conceptual tools of the material view

In this chapter there has been a shift of emphasis from the 'human' view of DiY culture to the 'material' view. Shifting to the material view means that the human and the material have both been recognised as actants responsible for change, and in addition the dichotomy of human and material has also been lessened. Due to this change of emphasis several core concepts associated with the human view have been re-defined or associated with other concepts that allow for material agency and/or assist in lessening the dichotomy of the human/material.

The emphasis on function and transversality, in this chapter, has meant that DiY strategies, ways of doing something, have taken the focus, rather than the DiY ethos. This has been seen in the shift from attempting to define *what is* DiY culture, in terms of its attitudes to the functional-based enquiry of what does DiY culture *do* and how does it operate. This shift in emphasis towards *functionality* has been influenced through the adoption of the transversal, as a strategy of cutting across areas of discipline rather than occupying a particular space 'outside'. The transversal becomes a strategy of DiY culture, rather than an ethos or attitude, describing the various strategies of de-territorialising 'enclosed' technologies and distinct areas of 'validated knowledge', increasing the participatory potential of materials.

In the shift towards the functionality of materials, 'enclosed' technologies have been emphasised over areas of 'validated knowledge' and are described through Bruno Latour's Black-box: as a containing structure which obscures the processes and functions of multiple actants under the single subsuming function of the Black-box. One of the ways to de-territorialise this containment is the strategy of *reverse Black-boxing,* where error causes a shift in functionality, allowing the multiple actants within to become visible, or as Latour describes an "[un]folding of time and space" (1999, p. 183), in which actants emerge from within the obscurity of the Black-box. This strategy of reverse Black-boxing can be seen as a way in which the *participatory potential* of materials can be increased and is marked as being a significant process in relation to the discussion of DiY practices in the case studies of this thesis.

The distinction between the Black-box and the non-totalising assemblage echo the discussions of the differences between negative-space and 'validated knowledge' in Chapter One. The Black-box functions as a container, just as the disciplines of 'validated knowledge' are contained within the knowledge/power relationship. The non-totalising assemblage differs from negative-space, in that, functionality rather than space is the emphasis. The non-totalising assemblage works as a mode of refusing territorial space (de-territorialisation), whilst negative-space is entangled with the space of 'validated knowledge' through its untenable positioning as a space 'outside'. In this sense, de-territorialisation and the non-totalising assemblage offers a more effective conceptual tools for discussing the practices of DiY culture than negative-space, since negative-space is a 'structure' which is entangled with that which it seeks to situate itself 'outside' of.

2.2.1 Structure and the assemblage

There has been a common thread across both human and material views of DiY culture of resisting structure. This has been expressed by Susan Kelly's transversal, and previously identified as negative-space, as a "logic of refusal – of resisting visibility, or taking recognisable forms" (2005). The strategy of disrupting structures is implicit in the transversal, where connections cut across structures, such as spaces of 'validated knowledge', to "de-territorialise the disciplines, fields and institutions it works across" (Kelly, 2005), breaking down borders and opening up territories for participation. In this sense, structure is seen as a containing force, an enclosure which resists participation through the organisation of material within its borders, for example, a complex technological structure which organises components and materials within a structure to provide a particular set of functions. In contrast to structure, the transversal connections of Jane Bennett's "non-totalising" assemblage (Bennett, 2010, p. 24) uses de-territorialisation as a strategy of 'resistance'. In refusing the territorial space of both 'validated knowledge' and negative-space, the non-totalising assemblage removes the borders which limit the participatory potential of material agency.

In the material view the assemblage offers a way of looking at 'structure' without the emphasis of human agency and also without enclosing spaces as being specific areas held in place through structures such as 'validated knowledge'. The connection between structure and a human-biased view of power can be contrasted to the assemblage and an idea of agency which incorporates the notion of material agency. With Jane Bennett's "*distributive agency...* [which] does not posit a [human] subject as the root cause of an effect" (2010, p. 31) as an influence, the form of the assemblage emerges through the intra-action of multiple actants, without situating agency in any particular centre. Therefore, material agency is embodied in the form of the assemblage which is non-totalising in absence of a "root cause of effect" (p. 31). In contrast, 'structure'

acts from within a human-biased definition of power and is a way of imposing human-biased order onto the material environment.

The definition of 'structure', as used throughout this thesis, is connected to the human-biased idea of 'power', discussed in Chapter One, and the connotations of social construction[47]. In contrast, the assemblage is seen in terms of *extended agency*, meaning that agency is extended from the human. The concept of *extended agency*, developed throughout this thesis, is a combination of Jane Bennett's "*distributive agency*" (2010, p. 31) and Clark and Chalmers "extended mind" (1998). *Extended agency,* where agency is situated throughout the human and nonhuman actants, is also connected with the idea that structure emerges from the intra-action of multiple actants, immersing human agency into the agency of the material environment. The extended agency view is applied throughout the case studies of this thesis, where DiY practices are discussed in terms of material entanglement and engagement which acknowledges the participatory potential of materials.

The connection between the definition of 'power' or extended agency can be seen as central to the definition of the types of 'structures' created. The relationship of form to agency relates to whether a subsuming structure is created, such as the 'enclosed' spaces of the Black-box, or whether a non-totalising assemblage emerges from an extended agency which includes material as well as human actants. In terms of increasing the participatory potential of materials, the human-biased definitions of both structure and power need to be substituted with the assemblage and the idea of extended agency. This has been discussed also in Chapter One, where the language-biased view was seen as connected with structure and spaces of knowledge, such as the idea of DiY culture as situated 'outside' of 'validated knowledge'. Another limitation to the

[47] Social construction as the ability of human agency to organise material around the construction of useful, functional structures.

participatory potential of materials are ‘spaces’ of knowledge, including the negative-space of the DiY culture as being ‘outside’, since ‘spaces’ are entangled with the language-biased view. In this chapter, the ideas of space and structure are disputed through de-territorialisation, cutting across borders, opening up ‘enclosed’ spaces and acting as a counterpoint to the knowledge/power relationship discussed in Chapter One.

The differences between the human-biased view and the material view demonstrate the interconnectedness of concepts. In the ‘human view’, the definitions of structure, space and power can be seen as forming a theoretical framework which functions to situate the human as the exclusive source of agency. In contrast, the definitions in the ‘material view’ of the assemblage, de-territorialisation and extended agency can be seen as forming another theoretical framework, one which functions to distribute agency throughout both human and nonhuman actants. In addition to this, the material view also lessens the separation between human and nonhuman actant, situating the practitioner within the material environment and leading towards a view of material engagement.

2.2.2 Material engagement and entanglement

Bennett’s “interactive interference” (2010, p. 21) is significant to this thesis in terms of describing DiY practices of material engagement, however, a better descriptor is the *intra-active interference* or the *intra-ference* of various actants, incorporating Karen Barad’s idea of *intra-action* (2003, p. 815), which assumes that there is no separation between the human and the nonhuman actants. *Intra-ference* is defined within the material view as the flow of agency across actants, creating an assemblage of extended agency. When applied to the DiY practitioner Larsen-Jensen, in the first case study Chapter Four, *intra-ference* is observed within the material environment of the workshop, where materials and

the human practitioner form an assemblage of extended agency which functions to produce oscillator musical instruments.

In some ways the idea of *intra-ference* seems to go against the connotations of 'extended agency' and 'material engagement', both of which infer that agency occurs as an interaction *between* the human and the material. The idea of agency being situated *between* suggests a joining of two separate entities, whereas intra-ference implies there is no separation between entities. This highlights the language-bias of the concept of material engagement, implying that a *separate* something, or more likely someone, is engaging with the materials. Therefore, a better phrase is that of *material entanglement*, since this directly addresses the concept that human and material are not separate entities, in terms of agency, but that they are part of an intra-connected assemblage of actants. This is more in line with the thinking of Karen Barad who argues that "agencies are only distinct in relation to their mutual entanglement; they don't exist as individual elements" (2007, p. 33), implying a deeper intra-connection of human and material than Malafouris' concept of "material engagement".

Whilst this may suggest an ambiguity in the material view of agency, one solution is to adopt Levi R. Bryant's concept of the machine in which "every machine is simultaneously a unit or individual entity in its own right and a complex assemblage of other machines" (2014, p. 75). In this sense, actants are both separate entities and also part of a machine assemblage, depending on what level of scale they are observed at. This means that an actant may appear as a separate entity but this does not mean that it cannot be broken down into a series of complex interconnected components, just as the Black-box appears to be an individual entity until it is broken down to reveal a complex assemblage of materials within. This means that all actants contain other actants, depending on how we chose to view them, or as Bryant says, "machines are composed of machines" (2014, p. 75).

Throughout this chapter a recurring theme has been the mutual entanglement between the human and the nonhuman, as a material engagement in which agency is situated as occurring *between* human and nonhuman actants. This "reciprocal determination" (Bryant, 2014, p. 50), in which human and material jointly determine the ability to do something, has been influenced by Bryant's machine oriented view of agency. The machine places emphasis on 'function' rather than attribute, so that, the emphasis is not whether actants can be identified as separate entities but the function which occurs within an assemblage of actants. 'Function' is seen here as a problematic term, since there is the connotation that function creates a structure that 'encloses', as discussed in terms of Latour's Black-box and the obscuring of multiple material actants through subsuming function. In terms of the material view, the *re-functional potential* of machines is a more effective concept to employ in describing the intra-ference of machines. *Re-functional potential*, a concept developed throughout this thesis, implies that function is de-territorialised as a 'solid' or fixed state of being, as an opening of the borders of the subsuming 'function' of the Black-box to reveal multiple potentials for re-functioning. This re-definition of 'function' as a series of re-functional potentials contrasts the fixed nature of 'structure' and at the same time can be compared to the non-totalising assemblage. Like the assemblage, *re-functional potential* is also a non-totalising sum, since it suggests a state of malleability and flux whereas, 'function' implies a usefulness to serve a specific 'enclosed' purpose. In this case re-functional potential emphasises an indeterminacy of end result, as 'function' now ceases to be an exclusively human determined attribute and becomes entwined in the action of material engagement instead: an extended agency which situates the human within the larger network of the material environment.

In terms of answering the preliminary research questions of this chapter, various concepts have been discussed concerning the theoretical implications of material engagement. These concepts provide a variety of tools in which to frame and analyse DiY practices as acknowledging the participatory potential of materials.

In this chapter there have also been discussions concerning the differences and connections with the 'human' view of DiY culture depicted in Chapter One. The role of these discussions has been to identify the extent to which certain concepts limit the material view of DiY culture, preventing the expression of material agency through imposing a human-biased emphasis.

Having gained conceptual tools which support the 'material view' of DiY culture, the next step is to discuss the methods in which these concepts can be applied to the case studies of this thesis. In some sense, the conceptual tools presented in this chapter and its approach to understanding material agency are very different to the 'hands-on' approach of DiY culture, which engages with material agencies through a highly practical rather than theoretical approach. This raises the acknowledgement that in the actual practice of DiY culture there exists certain aspects of *tacit knowledge* which need to be made explicit. Tacit knowledge, according to Michael Polanyi, is knowledge which is "ineffable" (2005, p. 91) and "falls short of the ideal of precise formalization... [as:] unspecifiable knowledge" (2005, p. 55), meaning that it is knowledge which is contained within the practice, in the engagement between the practitioner and the materials, which is not necessarily accessible to the practitioner through a theoretical understanding. Tacit knowledge has been suggested in Malafouris' example of the potter's wheel, where 'knowledge' of the material engagement is located in the action. This means that tacit knowledge differs from theoretical or prescriptive knowledge, since it does not explicitly follow a particular logic illustrated by "the well-known fact that the aim of a skilful performance is achieved by the observance of a set of rules which are not known as such to the person following them" (Polanyi, 2005, p. 51). The question is: 'What strategies can methodology follow to enable the tacit knowledge of the DiY practitioner to become accessible to theoretical research?'. This question is addressed in the next chapter, in which the various implications and concerns of applying theory to practitioners in the field of DiY culture are discussed in terms of research methodology and approaches to knowledge.

Chapter Three: Methodology

In this chapter the concern is the method in which the conceptual tools of Chapter Two are applied to situations within the practical field of DiY culture, which takes up the remainder of this thesis. However, the development of conceptual tools, through which to analyse DiY practitioners in the field, are only part of the engagement with knowledge enacted by this thesis. There are other forms of knowledge which play an important role within this thesis, and the purpose of this chapter is to discuss their significance through the choice of methodology used. This is of particular importance when considering the ways in which a theoretical understanding of DiY is interconnected with an 'informed' observation of its practices and the relationship between theory and practice.

Since the form of DiY culture I wish to examine in this thesis is highly practice-orientated, the concern of this chapter is to determine the most effective way in which data can be accessed, analysed and presented within the literary constraints of the PhD thesis. The two main roles of the researcher are therefore: to maximise access to relevant forms of data in the field and also; to analysis these observations in respect to the theoretical perspectives articulated in Chapter Two. 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[48]', emerging from the

[48] According to Michael Polanyi, this personal or tacit knowledge is knowledge that "falls short of the ideal of precise formalization... unspecifiable 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, p. 55).

intra-action of material practices and theoretical considerations. 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, Woodsong, Macqueen, Guest, & Namey, 2005, p. 14). The role of this complementary knowledge is discussed in this chapter in terms of the tacit knowledge brought to the thesis by both the researcher and the researched.

The questions asked in this methodology chapter are: 'What types of methodologies have been used to maximise access to data and to enable an informed analysis of DiY practices within the field?' and 'What is the relationship between different forms of knowledge and how does this affect the application of the theoretical perspectives presented in Chapter Two?'.

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. This suggests a post-positivist paradigm and is discussed in the next section.

3.1.1 A post-positivist paradigm

A mixed methodology of multiple sources of knowledge, in which there is no single complete viewpoint (such as implied by the concept of 'objectivity'), suggests a post-positivist methodology. The positioning of the researcher is an important consideration throughout the post-positivist paradigm, since this provides an accountability of the academic process and a situating of knowledge within the particular context of the relationship between researcher and researched. Post-positivism offers a system of validating research, in which the researcher is positioned, to some degree, as an 'insider' of the field, generating findings which are less biased towards the production of 'universal' knowledge, but more towards offering situated and contextual knowledge. This seems more suited to an examination of the idiosyncratic practices of New Zealand DiY sound practitioners, rather than providing a 'universal' overview of DiY practices, which could be applied across a wide range of activities. In the case studies of this thesis, the field of enquiry is specifically limited to the activities of DiY sound culture, allowing parallels and comparisons to be drawn, but without suggesting that these findings can be applied across all DiY practices within a similar field.

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 recognising 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 Stephen Duncombe (2008), George McKay (1998) and Amy 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.

This chapter is concerned with the following five points, addressed in no particular order, which are the key points of the post-positivist methodology utilised:

1. Multiple methods and sources of knowledge are incorporated from a variety of approaches.

2. Interconnections are sought between different viewpoints and types of knowledge.

3. The development of theory is an on-going process.

4. Researcher is considered to be an active participant in the production and analysis of data within the field.

5. Researcher as *both* 'insider' and 'outsider' to the field.

In addressing the first point above, this research is a combination and interconnection of conceptual tools developed in Chapter Two and the concepts emerging from the informed observations of actual practices within the field. In this chapter I will highlight a selection of different approaches to knowledge, such as *tacit knowledge, grounded theory* and *participation within the field,* as additional viewpoints which have influenced the interconnection between academic research and the practices of DiY. Regarding the second point, the practical and tacit knowledge of the researcher, as a participant within the field, has allowed insightful connections to be made between theoretical concepts, concepts which emerge from practices and field data. In addressing point three, additional concepts emerging from the case studies have influenced the on-going development of theory, shifting theory from a human-biased emphasis towards conceptual tools more suited to an observation of material agency. In point four, my participation within the field of study is an active influence in the generation and analysis of data, through the selection of which practitioners to examine in the three case studies, in the varying degrees of collaboration and activity of the researcher within the field, and in the interpretation of the more tacit knowledge

of the DiY practitioners[49]. In the final, fifth point, the researcher is both 'insider' and 'outsider' to the field through access to data gained from practical experience in the field and through the ongoing development of more conceptual knowledge, as researcher-participant.

Part of the mixed methodology used in this thesis is to incorporate grounded-theory which emerges from the informed observations of the practices of DiY culture. 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, p. 78).

For Corbin and Strauss, "sensitivity" in the field of research means that there is increased access to data through "analysis" and "insight(s)" (p. 78), and also in the ability of the researcher to "pick up on relevant issues" (p. 78) which may be denied to other researchers. In the three case studies of this thesis "sensitivity" of the researcher comes from experiential knowledge of the particular aspect of DiY culture examined (Case Study One), a long history of collaboration (Case Study Two) and through the more participatory role of the researcher (Case Study Three) allowing insights into concepts which emerge from practices[50].

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[49] Meaning the less articulated aspects of practices which the researcher has accessed through being a participant within the field.

[50] This relates to point number four on the above list where the 'researcher is considered to be an active participant in the production and analysis of data within the field'.

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, p. 79-80).

My argument here is that "personal experience" (p. 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" (p. 79-80) and also between the observation of practices and more theoretical concerns[51].

In terms of this thesis, 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 studies, including direct collaborations with the practitioners being discussed. This means that I have different roles as researcher, collaborator, observer and participant in connected practices. These different roles of the researcher provide access to different forms of knowledge and viewpoints, meaning that the strength of the project is in the connections made between prescribed theory applied to the analysis of practices and also knowledge which emerges from practices, 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 & Strauss, 2015, p. 78). In allowing multiple viewpoints to influence the methodology of this thesis the "sensitivity" (Corbin & Strauss, 2015, p. 78) of the researcher becomes an active component of influence[52], with the aim of the researcher to balance sensitivity in the field with the more

[51] Relating to point number two of the above list of methodological concerns – where 'interconnections are sought between different viewpoints and types of knowledge'.

[52] Relating to point number four – active role of researcher.

rigorous application of prescribed theory[53]. These multiple viewpoints and consideration of the researcher as an active element is part of the post-positivist research paradigm acknowledged within this thesis.

As part of the multiple viewpoints that are incorporated into this thesis[54], action research, employed in the third case study, offers a methodology in which the researcher is seen as being more involved as "part of the situation they are investigating" (McNiff, & Whitehead, 2006, p. 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, p. 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, & Whitehead, 2006, p. 8).

As an alternative viewpoint to "outsider research" (p. 8), action research offers a methodology for analysing the influence of more participatory roles of the researcher. Action research is only really applicable to the third case study, in which the audio/vision project *Bingodisiac* has been initiated by the researcher and represents an ongoing practice. However, as will be seen in the discussions of the case studies below, the researcher is situated to some degree in all three

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[53] Relating to point number five – where the researcher is both 'insider', with access to insider data, and also 'outsider' in the more rigorous application of prescribed theory. These two approaches suggest a post-positivist 'variety of approaches' to knowledge.

[54] Relating to point number one – multiple viewpoints.

case studies, has been engaged in some form of DiY practice for twenty to thirty years, and is known to all informants as a researcher-practitioner.

In the less participatory role of researcher as participant there are varying degrees of active positioning of "participant as observer" (Bryman, 2001, pp. 289-310). This varying degree of active positioning is discussed in terms of the levels of participation of the researcher which occurs in each of the three case studies. 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.

3.1.2 Timeline of the research journey

Within the research journey of this thesis, the changing theoretical focus of the initial stages of research reflect the various influences of theoretical concerns. This is part of the on-going development of theory, indicating a post-positivist methodology, and also the way in which prescribed theory and data from the field of study are incorporated into this development.

My initial approach was based on a discussion of the two way interactive process of participatory culture driven by new media technologies, using Lev Manovich's concept of augmented space (2005). Augmented space was initially understood as the intersection and interaction between ourselves, the environment and technology: the idea that new forms of participation are made available through new technologies which extend the space of the human. These theoretical influences initiated the research process in 2011 and have to some extent become expressed in the concept of extended agency, discussed in Chapter Two. However, as the research progressed I became increasingly aware that the idea of a participatory culture built upon new media technologies was delimited by the containment of technology within an enclosed network. This is reflected in

my master thesis and subsequent publications (Snake-beings, 2013; 2010; 2009), in which the containment of social media and the perceived limitations of Web 2.0[55] as a participatory space, were discussed in terms of its delimiting effects on authorship. It was at this point that tacit knowledge of another form of participatory culture, DiY culture, began to exert influence on the theoretical concerns.

My own tacit knowledge of DiY culture has influenced the direction of research, through my perception that DiY exemplifies a different form of participatory culture to that of Web 2.0, in terms of its engagement with materials and technology. Through my own experience of the material, hands-on, approach of DiY culture, technology seemed to be less 'contained' within 'enclosed' forms, with a perception that the practices of DiY culture actively resisted the types of technological structures offered by the internet. Investigations in this area led to the publication of a journal article based on the political control of the internet and the non-participatory aspects of social media entitled: *From ideology to algorithm: The opaque politics of the Internet* (Snake-beings, 2013b), in which I argued that the internet was a structure built upon a power/knowledge relationship which delimited the participatory potential. As this thesis progressed it became apparent that the inclusion of an internet based participatory culture and its comparison with DiY culture would be too wide a scope for this thesis, and a decision was made to limit the focus to a comparison of the 'human' and the 'material' or extended agency view of DiY culture. The experiences below detail some of the tacit knowledge which has influenced the selection of literature discussed and the methodology of using case studies, for both the 'human' social-politicised view of DiY culture, and also as influencing the shift

[55] Web 2.0 was defined as the interactive components of the internet, using the example of Wikipedia as an interactive space of multi-authorship.

towards the 'material' view of DiY culture and the selection of theories discussed in Chapter Two and applied to the case studies in Chapters Four, Five and Six.

In the early stages of development of this thesis the 'human' view of DiY culture, as a politicised movement, was based on my own first hand experiences of squatting culture[56] in London between 1990 until 1998. These experiences were a major source of my tacit knowledge of DiY culture as being a more active form of participatory culture than the participatory culture of the internet, and later as the background experiences behind the 'human' or 'social' view of DiY culture discussed in Chapter One. In squatting culture I experienced a vibrant social network based on strong DiY principles and a large scale implementation of DiY culture[57]. Empty factories and warehouses were often re-functioned into spaces and venues for the collaborative making and exhibition of alternative culture and events. In some ways my personal experience, of the re-functional potential of the empty space of derelict factories and buildings, influenced the initial development of the idea of DiY culture as being a 'negative-space': as a space of uncategorised potential, discussed in Chapter One. In these early stages of the thesis the focus was on the social aspects of re-functioning and alternative culture, as a counter-cultural perspective to the perceived limitations of new media situated notions of participatory culture. These ideas were eventually compressed into the 'human view' presented in Chapter One.

The shift from examining participatory culture in terms of a 'social' engagement, represented by the media of the internet and the human-biased view of DiY culture, to the material engagement with technology in more contextual situations, indicates a shift in research paradigm. This is a shift from the desire to

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[56] Legal occupation of often derelict and abandoned houses and industrial spaces as a re-functioning of empty space.

[57] According to informal estimates by the non-profit organisation ASA (Advisor Service for Squatters) there was approximately 30,000 London buildings occupied by squatters in the mid nineties.

produce ‘universal’ knowledge, applicable to a wide variety of situations, to the more situated and contextual knowledge of post-positivist paradigms, as discussed previously in this chapter.

The transition towards the extended agency view of DiY culture was a combination of the influence of both theoretical concerns and knowledge which came from personal experience. This is discussed below in terms of tacit knowledge and my own experience of the practical elements of DiY culture. One example of tacit knowledge informing and being informed by theoretical knowledge comes from my own practices of using recycled materials, over several years, where materials would find their ‘own’ way into DiY sculptures. Whilst this process is difficult to describe or explain, practical knowledge suggested that materials somehow organised themselves with a ‘life’ outside of the ‘mind’. In my own practices I named this process of assemblage as ‘objects found without conscious effort’[58], a form of ‘techno-animism’ which I linked with Jane Bennett’s concept of ‘vibrant materials’ (2010) for a paper presented at the *Re-new* conference in Riga, Latvia in 2013. This paper was subsequently published in the peer reviewed journal *Acoustic Space 12* (Snake-Beings, 2014) as *DiY participatory culture - Allowing space for inefficiency error and noise*. Although initially derived from the experiences of practice within the field and ‘translated’ into an academic framework, the personal knowledge of the researcher had an influence on providing certain ‘insights’ into the theoretical concerns. Another peer review journal article focused on the use of garbage in DiY practices, explored a language-biased view and the initial stages of the material view of DiY culture (Snake-Beings, 2015), in which material agency was seen as participating in the observed use of garbage by DiY practitioners. These five peer-reviewed publications (Snake-Beings, 2015; 2014; 2013; 2013b; 2010)

[58] As cited from a zine self-published by the researcher and a semi-fictional account called *The occult powers of technology* in which materials played an active part in finding their way into DiY practices without conscious intervention by the human practitioner.

map the theoretical influences of the trajectory of the research from a human-biased view to the material agency view of DiY culture. The more experienced-based influences, incorporating the tacit knowledge of the researcher and situating the researcher as being a partial 'insider' to the field, are discussed in the next section.

3.1.3 The researcher as both 'insider' and 'outsider'.

An important point in a post-positivist paradigm, is that the researcher is considered to be *both* 'insider' and 'outsider' to the field, and that a dichotomy of either/or is avoided. In this case it seems important to define what an 'insider' researcher is, as well as identifying the potential problems of 'insider' research.

When the researcher is considered to be a full participant within the field of enquiry some degree of immersion within the culture, on its everyday level, becomes the basis for data collection and the researcher is considered to be an 'insider'. The aim of discussing the positioning of the researcher in terms of insider/outsider is to highlight the benefits and to recognise the limitations which can occur through dichotomising one or other position as being more valid than the other. The problem occurs if 'insider' research is placed as diametrically opposed to more conventional ideas associated with the researcher as being an 'outsider' capable of observing with the detachment, distancing and objectivity.

Similar problems can be anticipated between the 'insider' researcher and that of the ethnologist, where there is a danger of being so immersed in the field of study that analysis is deemed impossible, or with limited relevance to anyone who is 'outside' of the field of study. In this sense, a purely tacit understanding of the field of study would suggest that there are aspects of knowledge which will remain, as Michael Polanyi says, "ineffable" (2005, p. 91), inexpressible data which "falls short of the ideal of precise formalization... [as:] unspecifiable

knowledge" (2005, p. 55). This suggests the importance of finding connections between tacit knowledge and other forms of more 'validated' knowledge, with the processes of connections made between observed practices, grounded theory and prescribed theories made visible by the researcher.

Whilst a true 'insider' is someone who is a 'native' practitioner of the culture studied, a more effective researcher is a practitioner who can understand and communicate insights that may have taken many years to accumulate through practical immersion within the culture of study. In this case it is important that connections are made across different theoretical platforms, so that insights can be analysed and connected with more theoretical concerns[59].

'Insider' researcher is part of the methodology employed by McKay (1998), Duncombe (2008) and Spencer (2008), all of whom have originated as 'insiders' in the field of DiY culture and who have migrated to academia. The strengths associated with this methodology is that these researchers bring with them insights and theories which originate from practice and participation, rather than the positivist trait of using theory to provide a model of interpretation, as a framework for viewing practice.

According to Keith Halfacree is his essay: *'I could only do wrong': Academic research and DiY culture* (2000), DiY represents forms of knowledge which oppose that of academia. Citing criticisms of George McKay's approach to DiY culture, Halfacree identifies various "pitfalls, problematics and potentials" (p. 68) which accompany the study of this subject, due to the incorporation of opposing forms of knowledge. As I understand it, the tacit and academic forms of knowledge are not opposing types of knowledge, as suggested by Halfacree, which should only be represented within their respective worlds, but rather complementary data sources, which offer complementary viewpoints. The use of

[59] Referring to point two of post-positivist traits: 'Interconnections are sought between different viewpoints and types of knowledge'.

complementary data is a beneficial trait within a post-positivist methodology, as listed at the start of this chapter where viewpoints are obtained from a mixed methodology. Therefore, the emphasis of multiple viewpoints is to produce situated knowledge, rather than universal knowledge. Situated knowledge comes from a particular, clearly defined, configuration of multiple viewpoints, offering an original contribution to knowledge through being situated within the specific configuration of the interaction between the influences of prescribed theory, grounded theory and tacit knowledge of the researcher in the analysis of field data.

Rather than creating problems, as Halfacree (2000) suggests, the different types of knowledge represented in this thesis are seen as a 'mixed methodology', situated in the context of the experiences and collaborative practices of the researcher and, also situated within the academic and theoretical context of this study. This is colloquially expressed as 'having a foot in each world', meaning that the foundations for knowledge are multiple rather than singular. Multiple methodologies are a desirable trait of a post-positivist approach, which shifts the emphasis from 'objectivity' and the limitation of 'variables' in the production of universal knowledge, to an interpretive approach where the researcher actively incorporates various influences, such as tacit and experiential viewpoints as part of the research tools for accessing and analysing data. In the post-positivist sense, the strengths of research are in the ability of the researcher to access multiple viewpoints, both from the data field and also from their own relevant experiential knowledge of the field of study.

3.1.4 The influence of the tacit knowledge of the researcher

Whilst contextual discussions may be better situated within the introduction of this thesis, to explain how it was that I came to choose the field of study and the types of questions asked, the purpose of including the tacit knowledge of the

researcher within the methodology chapter is as an illustration of how the influence of different forms of knowledge[60] have been brought into this study as part of the post-positivist paradigm. These more contextual influences of the researcher are presented here, in the methodology chapter, as a consideration of the researcher as an active participant in the production and analysis of data[61] – indicating similarities with interpretive methodologies which consider the researcher as a visible part of the research instruments used.

My own practical knowledge of the material, hands-on, approach of DiY began in the making of electrical coin operated 'Shrines' between 1991 and 2001 (snake-beings, 2001), as featured on *Nightline television* in New Zealand in 2001. These experiences over a ten year period alerted me to the possibility of several theoretical concerns of viewing DiY as a material engagement. The Shrines, of which over thirty were made of varying complexity, incorporated numerous simple electronic circuits linked together with various electrical appliances such as A.M. radios, clocks and light bulbs, which were re-functioned to perform various functions for which they were not originally designed[62]. These experiences of re-functioning are relevant to this thesis in terms of the selection of case studies, where I have chosen practitioners with whom I can use the following experiences as a research tool to provide "insight(s)" (Corbin & Strauss,

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[60] Relating to point number one on the list of post-positivist traits at the beginning of this chapter – 'multiple viewpoints and types of knowledge are incorporated from a variety of approaches'

[61] Relating to point number four on the list of post-positivist traits – researcher as active (and visible) participant.

[62] The type of "circuit bending" discussed by Jussi Parikka and Garnet Hertz (2015) in their essay *Zombie media: Circuit bending media archaeology into an art method*, where objects of discarded and 'dead' technology are experimentally 'tinkered' with to create new functions.

2015, p. 78), increasing access to data through informal dialogue of shared experiences in the field.

Of particular interest was the naive approach I had in regards to electronics and electrical wiring, with an often chaotic and barely functioning layout of cables leading to the experience of re-functioning electrical appliances through a process of trial and error. As part of the tacit knowledge influencing my approach to this study of DiY culture is my own personal discovery of the effects that 'decay' and 'error' had on electronic circuits. The role of 'error' has been discussed in Chapter Two and is also a major aspect of the practitioners featured in the case studies. For me, these personal experiences of using 'error' indicated that some form of material agency was present, since the effects which occurred appeared to be beyond human control. The argument is that, in some ways these personal experiences have made the researcher more responsive to concepts of material agency, sought out and developed in Chapter Two, which in turn has influenced the design of the case studies, so that practice and theory have developed in a cyclical manner, discussed as "hermeneutic cycles" (Shklar, 2004) later in this chapter.

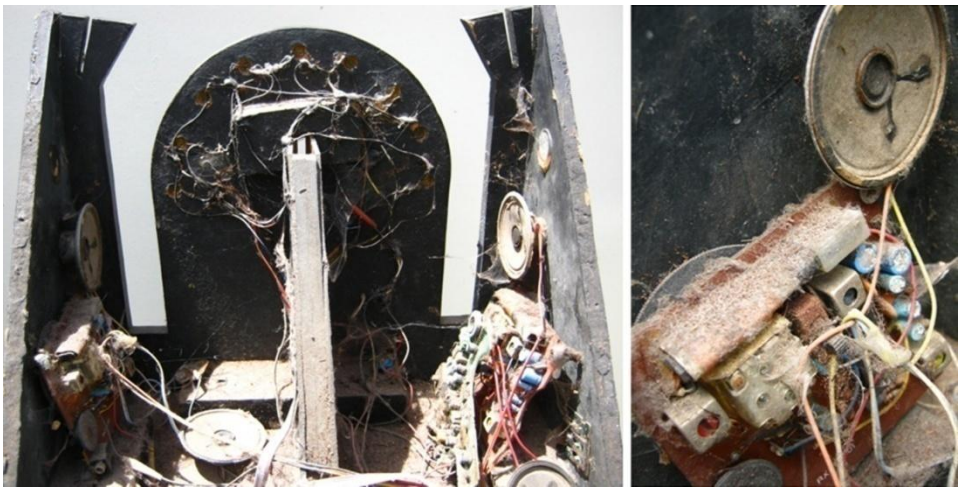

Figure 2 "Radiomancy device" made by author (image by author).

Of relevance to accessing data through an informal dialogue between the experiences of the researcher and the practitioner, in Case Study Two, the radio circuits pictured above (Figure 2), in the 'workings' view of an electrical Shrine made in the year 2000, illustrate a process in which the circuits have been left exposed to the elements for a period of time, altering the qualities of the radio reception to introduce electrical interference and 'noise' into the sound[63]. Other experiences have included the discoveries made when re-wiring the electrical circuits of the radios so that the devices were made to interact with each other, creating often unexpected results which have been difficult to 'consciously' produce. When Greg Locke speaks of his observations of 'machine talk' in his practices in Case Study Two, where different components of his musical robots interact together to produce unexpected results, my own personal experiences have in part influenced the reception and analysis of such data.

My own experiences in building electronic oscillators have in part influenced the choice of case study towards which theoretical discussions are directed (for example, Case Study One which discusses the DiY oscillators of Felix Larsen-Jensen). The practical experiences have also made me more receptive to the idea of DiY as a material engagement, influencing the focus and choice of concepts in Chapter Two, so that my own tacit experiences offer the potential for "insight(s)" (Corbin & Strauss , 2015, p. 78) to the field of study, possibly denied to other researchers.

As another example of the interconnection between different forms of knowledge, the oscillator (Figure 3) was made by the researcher through a series of 'modifications' between 2005 and 2012. This form of oscillator, using a variety of unconventional methods of changing the notes and sounds, was the result of numerous experiments, alterations and 'add-ons' (see Figure 3). This can be seen

[63] The complete archive of electrical coin operated shrines of Snake-Beings is available at http://www.snakebeings.co.nz/shrines/.

in the internal view of the wiring, on the right side of the image, where various circuit boards have been haphazardly added over time to create wiring which suggests an ‘organic’ process of growth.

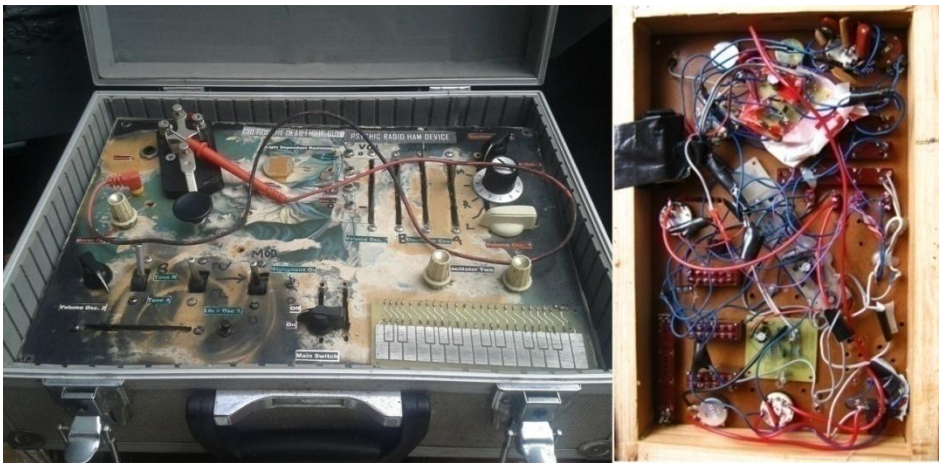

Figure 3: Oscillator. Internal view on right side of image (image by author).

In my experience of building the oscillator over a long period of time, I found that the ‘organic’ processes of modification meant that the device was kept in a constant flux, with continuous changes in functionality driven by something other than an exclusively human intention. This experience in some ways has influenced the development of the concept of the ‘perpetual prototype’, emerging from the observation of DiY practices in the first case study (Chapter Four). Through my tacit experiences of not ‘knowing’ the exact formula, or “prescription” as Polanyi says (2005, p. 55), with which to reach a particular outcome with the oscillator, there was a process of “feel(ing)” (p. 65) my way through the materials. This difference between ‘knowing’ and “feel(ing)” (p. 65) indicates the active role of the researcher in understanding or “sensitivity” (Corbin & Strauss, 2015, p. 78) to enable access to similar forms of tacit knowledge shared between the researcher and the researched.

Through the combination of prescribed theory, informed observations and participation, the case studies have been used in this thesis as a way of generating qualitative data which engages with the theoretical concerns of the

'material' view of DiY discussed in Chapter Two. The design and selection of the three case studies has occurred in conjunction with the development of theory, following a pattern of "hermeneutic cycles" (Shklar, 2004), in which the development of knowledge involves an oscillation between practice and theory. For Judith Shklar, the hermeneutic *circle* infers that there is a centre, around which the circle rotates, suggesting a positivist attitude and a paradigm linked with universal or essentialist knowledge (Shklar, 2004). The substitution of the word 'cycle', instead of 'circle', indicates an on-going process rather than an essentialist end-point. The hermeneutic cycle means that the development of knowledge involves an oscillation between the generalities of tacit knowledge and practical experience, and the specifics of theoretical knowledge. In this sense the role of the researcher is both practical and theoretical, two aspects which interconnect in the hermeneutic cycle, incorporating deductive 'top-down' approach with inductive 'bottom-up' approach. 'Top-down' means that research design is directed from the earlier development of theory, whereas 'bottom-up' suggests an on-going development of theory and a closer connection between theory and practice. According to William Trochim, the inductive model is "bottom-up" starting with "observation" (of practice), identification of "pattern" (common elements such as the DiY ethos), "tentative hypothesis", and "theory" (derived from practice), whilst the deductive model follows the "top-down" path of "theory", "hypothesis", "observation" and then "confirmation" (or rejection) of theory (Trochim, 2006). The hermeneutic cycle is part of the methodology used in this thesis, where theory and practice are both interconnecting sources of data which influence each other.

By examining a particular aspect of DiY culture, within which I have enacted the various roles of researcher, collaborator, observer and participant in connected practices, the argument is that multiple viewpoints can be incorporated into the observation and analysis of actual practices. Through using case studies with which I have my own varying degrees of tacit knowledge, participation and

collaboration multiple viewpoints can be combined with the more rigorous theoretical knowledge, discussed in Chapter Two.

3.2 Case studies: methodologies, process and participation

3.2.1 Selection process – why sound culture?

As seen in the literature review in Chapter One, the field of DiY culture spans a diverse array of topics. This can be considered as part of the DiY ethos of anti-specialisation and transversal practices which resist the boundaries between categories of knowledge. In terms of the scope of this thesis, it has been necessary to restrict the field of study and to present several examples of practices within a similar area of knowledge which can then be compared. The aim of this thesis is not to present a 'comprehensive study' of DiY practices, but to explore situated knowledge generated within the context of a selected field of DiY practices. It seems relevant and appropriate that I choose a field of practice in which I myself have been involved as a practitioner. For this reason, I have limited my interest to DiY sound, a field I have been participating within for many years and in which I can be considered to have access to some of the 'insider' knowledge which would possibly be denied to other researchers. As well as making electronic instruments and recording sounds on home-made and Lo-Fi devices I have also collaborated on a variety of different levels with the people involved in each of the three case studies. My level of collaboration and participation increases with each case study: from the acquaintance of Larsen-Jensen through a mutual knowledge of each other's practices in DiY electronics; the audio/visual collaboration with *The Trons* on various music video projects; to the organisation and directing of the *Bingodisiac* case study involving the participation of over one hundred musicians over a ten year period.

Another reason for my selection of DiY sound, is that it is appropriate to the theme of participation which runs through this thesis. Participation in making sound, particularly in improvised music, embodies an immediacy of active participation which is difficult to match with more mediated mediums. This

emphasises a more performative approach of the practitioner, both influencing and following on from theoretical concerns in Chapter Two, and the concept of intra-action.

My choice of case studies reflects this active participation through the material engagement of the DiY practitioner, their on-going interaction with materials as a 'perpetual prototype' and also, in the case of *Bingodisiac,* the 'immediacy' of DiY sound performance. Rather than choose case studies from the media I have adopted a more personal approach, influenced by the 'hand-made', small scale distribution of DiY, utilising contacts from areas of my own participation and interaction in the informal network of DiY practitioners based within the geographical and social environments of Hamilton, Auckland and Wellington, New Zealand where my studies have been conducted. As part of the tacit knowledge that I bring to these studies, I have also incorporated the wider community spaces of my past collaborations in DiY music: Hamilton Fringe Festival, Hamilton Underground Film Festival, Vitamin-S in Auckland, the Venting Gallery in Melbourne and Brisbane, the NiNi Crù in Catalonia, Spain, The Frederick Street Light and Sound Exploration Society in Wellington and various other geographically diverse communities and individuals I have worked with collaboratively over the past 15 years I have lived in New Zealand.

The choice of using case studies based on collaborative or associative connections with the researcher is a way in which situated knowledge can be contextualised within the visible role of the researcher as participant. This is part of the participant-researcher positioning of the researcher which allows knowledge to be situated within the defined parameters of practice and participation within the field of study.

To allow the dual role of the researcher-participant to become more visible the connections and collaborations between the researcher and each case study are described in more detail below.

3.2.2 Design and chronology of the case studies

The case studies of this thesis have been selected as a catalyst to initiate further discussions on various aspects of the theories presented in Chapter Two. The preliminary questions for the following case studies are:

- What can DiY practices tell us about material agency and the participatory potential of the material environment?
- How do materials interact in the processes of DiY practices and what specific strategies are used to increase the participatory potential of materials?
- What can the ethos and strategies of DiY practices tell us about the link between the human practitioner and the material environment, and the types of structures which emerge from this intra-action?

The trajectory of the three case studies are as follows: it begins with an individual DiY practitioner and their various engagements with materials within the extended agency of the private workshop (Larsen-Jensen); progresses to a 'group' comprising of one human and four musical robots in which agency becomes shared amongst the five co-producers (*The Trons*); and concludes with an assemblage of multiple human and nonhuman actants within the context of several public performances. This shift across the case studies represents an engagement with different aspects of the various concepts discussed in Chapter Two, as part of the co-development of concepts and theory.

The first case study is that of DiY electronic instrument maker Felix Larsen-Jensen and his sound oscillators. The presentation of the practices of Larsen-Jensen focus on the following aspects of theory discussed in Chapter Two:

- The extended agency of Larsen-Jensen's workshop and the ways in which material agency becomes an element in the process of the practices.

- Entanglements between body and materials, discussed in terms of the interfaces of the oscillators.
- Technology and materials as agents of structuring and un-structuring: ways in which reverse Black-boxing occurs through Larsen-Jensen's engagement with material 'errors' which open the Black-box of technology.
- Re-functioning of discarded materials removed from the Black-box of technology.
- The non-totalising assemblage as a strategy of engaging in material agency.

In terms of methodology, my own practices of making electronic oscillators and DiY electronics are used to offer 'insights' into the direction of the research as well as the analysis of Larsen-Jensen's practices, although analysis is primarily through the concepts discussed in Chapter Two. In this case study the researcher is using tacit knowledge to direct questions, via interview, and to speak with Larsen-Jensen in a shared language of practice. Audio recording is used to allow the dialogue to remain as fluid as possible, with transcription occurring at a later date. Visual observation plays an important role in analysis of Larsen-Jensen's practices, and it is here that tacit knowledge of the field of simple electronics allows the researcher insights to observe the practices occurring in Larsen-Jensen's workshop. This means that data gathered from the interview is from both verbal and visual sources with the interview conducted within the workshop so that devices could be demonstrated with all the appropriate equipment available. Photographs and images play an important role in the research, including a soundwave image used as a tool of analysis of the audio observations of Larsen-Jensen's oscillators.

In the second case study Greg Locke's robot garage band *The Trons* is presented in terms of functionality, using Bryant's concept of the machine, and strategies used to incorporate material agency in the form of 'error' and unpredictability. Here the indeterminate qualities of the machine are discussed in terms of

diverting from human agency, linking the various strategies used by Locke to allow functionality to determine the 'structure' of his work and the conceptual concerns of Chapter Two. This is concluded with Locke's incorporation of the 'voice' of the machine, a material agency he calls 'machine talk'. Audio recordings were made of the informal dialogue between myself and Locke, with transcriptions made at a later date. Photographs and still images from the various music videos are used in the case study to accompany the interview dialogue, the content of which is structured around interconnected conceptual themes from Chapter Two and concepts which emerge from the practices of Locke.

- The machine as human and nonhuman.
- Engagement with material error as part of the process.
- The assemblages which emerge from Locke's practices of re-functioning.
- Machine talk.

In this case study my own tacit knowledge of numerous collaborations with Greg Locke are exploited in the gathering and analysis of data, gained from an informal interview with the researcher. Due to my own extensive knowledge of the workings of *The Trons* and a history of similar conversations and collaborations over a fifteen year period, the conversation-interview draws on a vast amount of shared tacit knowledge. Part of this personal knowledge includes witnessing the development of the robots over a long period of time, with the first prototypes of mechanical music machines made by Locke and shown to me sometime around 2005. Other collaborations include the making of several music videos for *The Trons* and the subsequent long conversations which occurred during planning, filming and editing. My argument is that this sharing of knowledge and history between the researcher and the researched, enables the interview to be more 'data rich' and to access areas of knowledge which would be denied to other researchers. In the analysis of data, this tacit knowledge has been used in conjunction with contemporary theories of material agency, so that

insightful connections can be made which draw on multiple viewpoints within a post-positivist methodology.

In the third case study the *Bingodisiac* project is discussed in terms of the following concepts:

- The *Bingodisiac* machine: complex machines within machines as an intra-action between human and nonhuman components and materials.
- A non-totalising assemblage of human and nonhuman actants.
- The transversal process across performer / technician and materials.
- Transversal musical forms and styles.
- Disruption of functionality as a strategy of reverse Black-boxing.

The *Bingodisiac* audio/visual case study features a larger degree of participation by the researcher than the other two case studies. In this case study the researcher was responsible for the initiation of the project, involving sixty three collaborating musicians over the span of five public performances in Auckland (June 2011), Hamilton (September 2011), and Wellington (October 2011). The participation of the researcher also includes the personal experience of six previous performances with the project between 2002 and 2004 and the collaboration with numerous people in the making of the film *Alchemical Pilgrimage* during 2002 to 2013.

As a background to the tacit knowledge of the researcher, the film *Alchemical Pilgrimage* is a work in progress, originating from footage filmed in a variety of locations in New Zealand between January and April 2002. Further footage was filmed in Catalonia and New Zealand in 2008 and 2010 and the editing process continued until 2013. The format is predominently Super 8mm, a Lo-Fi medium of amateur film stock with some inserts of equally low grade SVHS and MiniDv. In total the project has a history of twelve years and involves approximately one hundred and twenty collaborators.

As principle researcher my role in *Bingodisiac* involves various viewpoints gathered from practical knowledge and observations of the project combined with seven interviews conducted with collaborating musicians. Due to the large number of participants my initial method of data collection was by questionnaire, lobbying both musicians and audience on their views of the performance. However, after examining the results I realised that a more personal approach was warranted and so participants for more extensive interviews were selected on the basis of my perception of their involvement in the field of practice, knowledge within the field of DiY culture and availability.

In chronological terms *Bingodisiac* was the first case study conducted, performed in 2011 as five performances in Auckland, Hamilton and Wellington. Greg Locke was interviewed in December 2012, followed by Larsen-Jensen, who was interviewed in his workshop in February 2013. As the theoretical framework of Chapter Two became more developed it was decided that the initial data obtained from questionnaires after the *Bingodisiac* performances was to be re-written to include more in-depth interviews with a selected sample of participating musicians. These nine interviews with participants, of which seven were finally quoted, were recorded between 2011 and 2014. During this time the order of presentation of the case studies was altered by placing *The Trons* after Larsen-Jensen's case study. The reason for this was that it was deemed more appropriate to start with the lone DiY practitioner and proceed towards the multiple human collaborations of *Bingodisiac* via the robotic human/machine intra-actions of *The Trons.*

In terms of theoretical flow, the concept of the machine is seen to be developed throughout the flow of the three case studies to increasingly both human and nonhuman in terms of the functional qualities of the machine. Another flow is that of the role of researcher as participant, which is seen to increase from the first case study, via collaborations with *The Trons*, to the researcher initiated *Bingodisiac* case study. The individual case studies are described in more detail below.

3.2.3 Case Study One: Larsen-Jensen's oscillations of 'error'.

Primary data collection for this case study comes from a recorded, unscripted and informal conversation which took place within the context of Larsen-Jensen's home workshop on 22nd February 2013. Although there has been no direct collaboration between myself and Larsen-Jensen, I have personally known of his work for the past ten years through various mutual friends. The researcher is known to Larsen-Jensen as a fellow practitioner within the field of making DiY electronics and during the interview I found that this mutual knowledge of our respective practices meant that we often communicated in a form of short-hand, a shared common language of electronics in which it was felt unnecessary to explain certain common technical details, such as the operation of potentiometers, transistors or resistors. This resulted in data with a higher level of specialised knowledge of electronics but also meant that time was not spent explaining technical details and a surprising amount of ground was covered within the space of the interview. Since I was already familiar with the operation of Larsen-Jensen's work, having seen examples of his oscillators and also from my own experiences of building similar musical devices, the informal dialogue of the interview was more nuanced than if I had approached Larsen-Jensen from a place of less specialised knowledge. The practices of the researcher in engaging with similar materials and workshop environments meant that the conversation could be more easily guided by the materials Larsen-Jensen engages in. Since the researcher's own practice of instrument making is non-collaborative with the informant, the positioning of the researcher can be described as *informed semi-participant observer.* The interpretation and analysis of the practice was informed through a combination of shared tacit knowledge, grounded theory, emerging from the observed practices of Larsen-Jensen, and an application of contemporary theories of material agency, as developed in Chapter Two. During this case study the aim was to search for connections between conceptual tools and an informed observation of Larsen-Jensen's practices, as well as to develop

and extend these prescribed theories with the additional data from grounded theories emerging from practice.

3.2.4 Case Study Two. The machine talk of *The Trons*

Data collection for this case study was from various different sources: primary data from an informal transcribed interview with Greg Locke on the 7th December 2012 (duration one hour twenty minutes); secondary data through tacit knowledge generated through multiple conversations over a period of ten years as an ongoing involvement with the various developments of *The Trons*, and collaboration with Greg Locke in the production of three music videos and a DVD production; and thirdly, from two academic essays written by Locke on *The Trons* submitted as part of his Media Arts degree.

The case study draws on a series of still images taken from the three music videos: *The Tron's Theme*, *Times Up and Twister.* The videos were filmed by myself, in close collaboration with Greg Locke, over a three year period: *Tron's Theme* 2008 and *Times Up* and *Twister* in 2011. My involvement in the planning, production and editing of these videos is seen as central to a methodology of participant observer, where the researcher has an additional role as participant and collaborator in the project. In terms of examining *The Trons* as an example of a DiY culture, my participation in the making of the videos is an example of Patricia Adler and Peter Adler's "active membership" of a culture, in which "the researcher takes on some or all of the role of core members" (Adler & Adler, 1987 cited in DeWalt & DeWalt 2011, p.25). By taking on the role of video maker for *The Trons*, and assuming an "active membership" of the culture, the assumption is that I will have access to tacit knowledge which is not accessible by non-participating members of the culture. Tacit knowledge is based on experiential data and my argument is that this form of data is only accessible

from an active participation within the culture, drawing out insights which are beneath the surface of that obtained by verbal methods.

During the video making process I worked closely with Greg Locke, with several informal planning meetings serving the purpose of producing a loose story board of shots and movements. It was during the scripting, planning meetings and shooting days where lengthy informal discussions took place concerning Locke's ideas about *The Trons*. Field notes took the form of sketches and brief notes made in the creative journals I was using at that time. These experiences are not included directly as sources of data, except for the still images from the music videos we made, but act as influential agents, directing and informing the informal dialogue recorded in the interview through the shared tacit knowledge between myself and Locke. This is the shared language of practitioners who have worked within the same field, with similar experiences and a history of numerous collaborations.

The first video *Tron's Theme* was filmed without a script, relying more on lighting and the visual imagery of *The Tron's* mechanics, playing the song through multiple takes in Locke's lounge at his home. The other two videos, *Times Up* and *Twister* were more scripted and this process involved a closer negotiation with Locke's resistance to translate the usually static live performance of *The Trons* into movement and narrative more suited to the visual medium of video. This resistance to movement, brought about through conversations during the video making process, appears in the case study in the text of the interview as the idea that the robots should not be anthropomorphised, but remain as nonhuman materials. It was during these moments of collaboration where Locke revealed many of his motivations and strategies behind the design of *The Trons,* also recorded at a later date in two essays which are also quoted.

Over the fifteen year period of knowing Greg Locke, we have collaborated on a number of projects, beginning with playing music together and progressing through organising and hosting events in which the other was invited. During my

eight year period of organising the Hamilton Underground Film Festival (HUFF), a yearly event showcasing DiY filmmakers, *The Trons* were invited in 2010 to collaborate with a HUFF screening event in the Priorat region of Catalonia, using an internet video link to allow musicians in Catalonia to interact with sound and visuals of *The Trons* in Hamilton. This experiment in internet connection and collaboration with remote musicians, early in the timeline of the thesis, was part of my initial research into a PhD topic on based on Lev Manovich's augmented space (2005), in which *The Trons* were discussed as the augmented space of Greg Locke. Whilst the idea of augmented space was subsequently rejected as the focus of this PhD, during this time Locke and I had several conversations and discussions on the idea of *The Trons* as an extension of the human, ideas which later emerged as the extended agency of material engagement. These earlier discussions have not been directly included in this thesis but exist as the influence of tacit knowledge on the collection and analysis of data, particularly in the way that grounded theory is interconnected with prescribed theory. The dual role of researcher/participant suggests that the separation between theory and practice is potentially less pronounced than if an exclusively theoretical approach is taken.

The analysis of data for this case study is more influenced by the long history of shared tacit knowledge than the previous case study. The role of researcher is also more participatory, which has allowed a greater insight into the connecting of grounded theory, emerging from the observed practices of Greg Locke, with contemporary theories of material agency, as developed in Chapter Two. During this case study the aim has been to develop and extend the prescribed theories of material agency with the additional data from grounded theories emerging from Locke's practice.

Whilst not used in this thesis, the experience with Locke and the internet connection with the Catalonian festival provided some of the necessary knowledge, social connections and inspiration for the inclusion of remote musicians in the following *Bingodisiac* case study.

3.2.5 Case Study Three. DiY strategies of the *Bingodisiac* Machine

Bingodisiac is an on-going[64] audio/visual project which I initiated and have been involved with since 2001[65]. Over the years this project has included over one hundred DiY oriented practitioners in the role of musician/performer or as performers in the accompanying film, however, the primary data for this chapter comes from seven interviews and the observations of sixty four participants in the five 2011 performances.

By including *Bingodisiac*, a researcher initiated practice with a long history, this case study is influenced by an action-research methodology where theory and practice have a closer relationship. Action research allows a closer interaction between theory and practice and can, therefore, be used as an on-going practice to develop existing theories and generate new concepts. In this sense action research, as used in this case study, uses both inductive and deductive methodologies and works towards eliminating dichotomies between theory and practice. To provide other viewpoints data for this chapter also originates from nine interviews with participants in the *Bingodisiac* project, conducted between 2011 and 2014, of which seven have been selected and quoted. Other sources of data include observations and entries in my personal research journal, comprising field notes taken during and immediately after the 2011 performances. Outside of the research period there is also the tacit knowledge and memories drawn from ten years of the less documented periods of the practice (2001-2011), in which the cueing system and other strategies for allowing multiple musicians to interact were developed.

Analysis of data is from both grounded theory and prescribed theories, applying and developing the concept of the machine to the intra-actions of human

[64] The most recent performance was in 2012 in Melbourne.

[65] Also known as the Kaosphere Orchestra prior to 2011

musicians and material actants within the *Bingodisiac* assemblage. The interconnection of grounded theory, emerging from the observation of practices, and its interconnection with prescribed theories is informed by the influence of tacit knowledge gained through the practical experiences gained over the long history of the project.

Whilst initiated by the researcher, the work is a series of collaborations with different DiY communities in the various locations of Hamilton, Auckland, Wellington, Dunedin, Catalonia, New Plymouth and Melbourne. This has included informal and formal groups such as members from the *Vitamin-S collective* and *Audio Foundation in Auckland*, musicians from *Frederick Street Light and Sound Exploration Society*, *Suns of the Seventh Sister* and the *Venting Gallery* in Melbourne, members of the *Polybandery* group in New Plymouth via skype connection, the *NiNi Crù* in Catalonia via Skype internet connection, and participants gathered from the communities surrounding the Hamilton Fringe Festival. In addition to these named groups other participants have come from informal social connections within various communities and adverts placed on websites such as *The Big Idea* and *Star Now*, and invitations on several musicians networking email lists mostly connected with participating named groups.

As the case study involving the most participatory role of the researcher/participant, *Bingodisiac* offers the potential for more commentaries on the practices of the researcher in influencing the outcomes of the project. This is most evident in the use of the cueing system, which is a system of control imposed by the researcher onto the musician participants as a way of disrupting musical 'structure' using randomly generated cues. This form of intervention by the researcher into the field of study, represents a typical strategy of action research, whereby the researcher is seen as a participant and practitioner. Intervention by the researcher into the field of study presents a situation in which the researcher becomes a visible part of the practice being examined. Field notes which accompany the case study document the actions of the researcher and the affect which it has on the other practitioners and this

becomes part of the data which is used as a basis for discussions on material agency and the disruption of human agency. Intervention have also worked as a research tool to 'focus' the topic of interviews to generate data within a specific area of theoretical concern.

Methodology has been discussed in this chapter as a way of finding insightful connections between the theoretical concerns of DiY culture in Chapter One and Two, and the observation of practices presented in the following case studies. The link between theory and practice is a critical element of this thesis and its potential to engage with DiY material culture. The suggestion has been that DiY culture is an engagement with a different form of tacit knowledge to the theoretical, language-biased knowledge which the structure of this thesis 'gravitates' towards. This is indicated by the trajectory of this thesis towards an increasingly material-biased view of DiY culture, passing through the social and 'language-biased' viewpoints of Chapter One, via the theoretical concerns of material engagement discussed in Chapter Two, there has been a steady movement towards identifying DiY culture as a material engagement. The generation of insightful connections occurring between: tacit and theoretical forms of knowledge; between grounded theory emerging from practices and prescribed theory; and between the researcher and practices within the field of study, forms the basis of the contribution to original knowledge presented in this thesis. The claim of originality, argued within this methodology chapter, comes from the particular configuration of tacit knowledge brought to this study by the researcher, utilised through access to particular practitioners in the field of study, and in the analysis of data originating from insightful observations and connections between multiple viewpoints of knowledge. This in turn effects the type of knowledge generated as being situated knowledge, a post-positivist trait, rather than universal knowledge which can be applied without regard for the context within which it is situated. Having discussed the various methodologies and influences, the next step in this thesis is to examine the DiY practices presented in the following case studies.

Case Study One: Larsen-Jensen's oscillations of 'error' and the 'perpetual prototype'.

This chapter is the first case study based on an individual DiY practitioner and a view of participatory culture as an entanglement of the human and the material. This case study examines strategies used by the DiY practitioner to increase the participatory potentials of material agency. In this individual participation with technology, agency is seen to extend beyond the human practitioner to include the workshop environment and to influence the types of 'structures' of the work produced[66]. By examining the electronic sound oscillators of Felix Larsen-Jensen as transversal assemblages made from the interaction of diverse material components and the human, attention is drawn to a DiY ethos which values process over 'finished' work, described using a process I have termed the 'perpetual prototype'. There is a strong theme in which 'error' and the dysfunction of materials becomes an integral component of increasing the participatory potential of materials.

There are two aims of this case study: 1) to apply theories of material engagement and extended agency to actual practices, and; 2) to develop connections between theories and strategies which emerge from the informed observation of practices. The research questions asked include: 'what are the practices and strategies of Larsen-Jensen which increase the participatory potential of materials?'. To answer this question I have used interview and observation of Larsen-Jensen's practices, observing the artefacts as well as

[66] Whilst structure is used in this thesis with the connotation of a humanly determined organisation of materials, the aim is to identify types of organisation such as the non-totalising assemblage, which emerge from the intra-action of multiple actants.

directing questions towards the processes and ideas involved in the practice. A secondary research question concerns the effect of material agency on the types of structure formed: 'How does material agency influence the types of 'structure' of the work produced?'. This question will engage with the theoretical discussions in Chapter One and Chapter Two, concerning the differences between 'structure' and the non-totalising assemblage.

The concept of extended agency, and the way that the material environment of the workshop effects the type of work produced, has influenced the location of the interview within the workshop space so that observation of Larsen-Jensen's working practices and workshop environment can be included as sources of data.

Primary data was collected through a recorded, unscripted and informal conversation which took place within the context of Larsen-Jensen's home workshop on 22nd February 2013. The choice of using the studio space for the interview allows 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 and for the sound to be recorded along with the interview. Whilst most of the quoted speech for this chapter was collected in a single informal interview with Larsen-Jensen, one hour fifty one minutes duration, the wider sense of data can also be used to include the tacit knowledge and information which emerges as a result of my many years of personal interaction within Larsen-Jensen's extended 'community of practice' located in the Raglan/Hamilton region. The researcher is known by the informant as a fellow practitioner in electronics, musical instrument making and 'tinkering' in technology. I have met several times with Larsen-Jensen, visited his previous workshops, and been aware of the diversity of his continuous production of work over a ten year span. The close proximity of our respective towns has resulted in the occasional creative cross-over, having both performed in separate events with DiY electronic instruments in the 2012 Hamilton Fringe Festival, as well as several common social connections. This constitutes a *semi-participant* element to the positioning of the researcher, where there is a level of specialised

knowledge shared between researcher and subject. This level of semi-participant is contrasted with the following case study (Chapter Five) in which some of the data was collectively generated through more overt participation in the collaborative making of promotional videos with Greg Locke and *The Trons*. The third case study (Chapter Six) represents a further increase in researcher participation, since it discusses a series of events initiated by the researcher over a history of ten years.

In the first part of this chapter I look at the ethos which underpins the workshop space of Larsen-Jensen, the space where he archives his materials and engages in the design and construction of his DiY musical instruments. In section 4.1.2 the theme of extended agency continues with a wider view of the material environment. Here the extended agency of the workshop includes the environment of Raglan's rubbish dump, where many of Larsen-Jensen's materials originate.

Integrating what Larsen-Jensen calls the "Womble ethic" into the research, his attitude of working with the limitations of technologies is comparable to Amy Spencer's idea of DiY and Lo-Fi practices:

> The Do-it-Yourself approach to music making is all about producing your 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, p. 187).

In embracing a Lo-Fi approach to technology it becomes apparent that an important element throughout this chapter is Larsen-Jensen's embracing of error, either in the semi-functional and dysfunctional materials he uses in the construction of his musical instruments or through the use of re-functioned materials. In section 4.2, this material practice is described through the concept of utilising the *re-functional potential* of materials as active participants. The concept of *re-functional potential*, discussed in Chapter Two, is further

developed in this case study, drawing on Larsen-Jensen's practices to increase the depth of theoretical understanding.

In engaging with theory from Chapter Two, Larsen-Jensen's use of error is paralleled with Bruno Latour's idea of reverse Black-boxing, where error and failure of functionality are seen as initiators of the opening of the Black-box to increase the participatory potential of material actants. Developing this concept further, Larsen-Jensen's attitude of keeping his oscillators in the state of 'perpetual prototype' is suggested as a strategy of reversing the process of Black-boxing, through de-territorialising the enclosure of the instrument and allowing further modifications and interactions with the components inside.

Larsen-Jensen's engagement with materials is discussed in terms of comparing 'structure' to the creating of non-totalising assemblages. In section 4.2.2 the use of broken electronic components (the 'indeterminate pot') is discussed as being part of the strategy Larsen-Jensen uses to increase the re-functional potential of material agency. The deliberate use of dysfunctional components is discussed in terms of recognising how material agency influences the form of the sound assemblage created. This leads to the idea that the form of the assemblage is something which emerges from the materials and intra-actions of multiple actants, rather than something which is imposed upon from a human-centred perspective. Following on from this, the various interfaces of particular instruments are discussed in section 4.2.3, where Larsen-Jensen is seen to perform various strategies to create non-totalising structures and a transversal musical form which includes 'the notes between the notes'. The types of sound assemblages created by Larsen-Jensen's instruments are presented as being a result of material engagement and this is contrasted with a language-based idea of musical structure.

The chapter concludes with a review of findings and a collation of theoretical perspectives which emerge from the various discussions of Larsen-Jensen's practices.

4.1 Felix Larsen-Jensen: Workshop practices and ethos

Felix Larsen-Jensen has been making, recording and performing with home-made DiY oscillators since 2005 under various different group and solo names such as *The Migraine Sound System, Nufin-Yin, Felix Deluxe, Harmonica Lewinsky, The Baldwin Fun Machine,* and *Soul Agent:* a diverse selection of musical styles which are difficult to categorise under a single banner. The music has been distributed from Larsen-Jensen's own web-label *B-Side Beats*, at www.bsidebeats.com since 2006, and offers free downloadable MP3 music files alongside CDs available for sale. The musical styles of *B-Side Beats* varies from popular dub, such as *The Baldwin Fun Machine* to the less accessible 'noise' music of *The Migraine Sound System*, which uses the format of the self-help record to promote an ironic 'uneasy listening' environment. It is the more experimental music of *The Migraine Sound System* and Larsen-Jensen's solo performances and installations which are of interest to this study, since these are the more non-idiomatic practices. Non-idiomatic music, according to the Vitamin-S definition described in Chapter One, is improvised sound which does not follow a recognisable 'genre', such as blues, jazz or dub. In the next chapter section, "the Womble ethic" and the DiY ethos of Larsen-Jensen is discussed in terms of the perspective of extended agency, where the material environment of the workshop becomes an active component in the process of creating.

4.1.1 The 'Womble ethic' and the extended agency of the workshop.

Figure 4: Larsen-Jensen in his 'environs' of B-side studios (image by author, 2013).

Larsen-Jensen's workshop, *B-side Studios*, (Figure 4) is based at his home which has usually meant an ad hoc spare room with various additional functions, described by Larsen-Jensen as "rehearsal space, electronics workshop, [or] storage room for numerous large black boxes [meaning amplifiers]"[67]. The name B-side studios infers a 'flip-side' approach to music making, the b-side of the vinyl record and the b-movie both suggest 'b-grade', as well as the connotations of a less-commercial, obscured and 'underground' form of culture. This is evident in the 'about us' page from 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, circa 1973, about a group of anthropomorphic animals

[67] Recorded interview by researcher, 22nd February 2013. One hour fifty one minutes.

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, 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. Redundant technology is particularly malleable since the original function has either become obscured over time, or in the case of garbage, 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. When technologies become redundant and are reduced to disposable garbage, as discussed in Chapter One and Two, it can be seen that functionality is re-configured, since the material has been removed from the various technologies which supported this functionality. This reduces the object to its basic materials by removing the context of other interlocking functional objects. In this way 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 purpose. This could also be understood in terms of capacities to connect with other components and to create new functions: known in this thesis as the *re-functional potential* of materials. 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.

'Error' has the connotation of being a failure of function and also, as defined in this thesis, as a diversion from the human-biased function of the object. Falling short of 'error', the partial functioning of technology is seen by Larsen-Jensen as

the “limitations” with which he works: “Many of our methods and techniques have developed from the limitations imposed by the equipment at hand” (2006). Larsen-Jensen implies that obstacles, such as broken equipment, can be found to have the accidental advantage of modifying sound in ways which are somehow preferable to the ‘intentional’ sound made by using standard ‘functioning’ equipment. This suggests that Larsen-Jensen’s “Womble ethic” is an engagement with material agency which comes about through the disruption of human intention, as is further discussed below in regards to the workshop environment.

Figure 5: Materials awaiting re-functioning (image by author, 2013).

The appearance of *B-side Studios* is a mess of wires, equipment and dismantled components. Figure 5 shows various pieces of equipment, in various states of functionality, displayed as potential assemblages which can be used in the production of sound. On the central shelf in the image, reading left to right, there is a tape deck (circa 1980), a set of two aluminium pressure cooker steamer trays (circa 1970), and a commercially produced micro guitar amplifier. Above this shelf there are the various leads used to connect audio signals between pieces of equipment. The appearance of the cooking utensils seems obscure, until we look at the materials used in Larsen-Jensen’s musical

instruments later in this chapter, where diverse objects such as these are integrated into the construction of his oscillator instruments.

From observations made of Larsen-Jensen's workshop, my impression is that the connection between objects and their new re-functioned purpose is an 'organic' process, that is, a process which emerges or 'grows' from the practice of collecting, sorting and storing potential objects. By 'organic' I mean a process which imitates the self organisation of organic growth, that objects seem to find connections with other objects through an agency which is not entirely situated in human intention. I suggest that the workshop of Larsen-Jensen acts as the space in which structures form around the use of discarded objects, and that this is an important feature of Larsen-Jensen's DiY ethos: an engagement with technology which centres on the assemblage of found objects; using a process of construction which engages the agency of material components to determine the eventual 'structure' of the cultural artefacts produced.

By viewing Larsen-Jensen's workshop as a space of reverse Black-boxing, where technologies are dismantled and materials allowed to assemble in new re-configurations and functionalities, there emerges a sense of *intra-active interference* between the human and the material environment. *Intra-active interference*, or *intra-ference*, combines Jane Bennett's "interactive interference of many bodies and forces" (2010, p. 21), in which human and nonhuman actants interact, with Karen Barad's notion of "intra-action" (2003, p. 815). *Intra-active* suggests a lack of separation between human and nonhuman actants, rather than the word *interactive* which "presumes the prior existence of independent entities" (Barad, 2003, p. 815).

This means that the *intra-action* of the DiY practitioner and the material environment is something which emerges from *within* the combined

characteristics of all available and participating actants[68], both human and material entities, as discussed in Chapter Two.

In the seeming chaos of objects, the *intra-ference* of human and material actants is part of my impression of Larsen-Jensen's workshop. The overflowing mass of materials seems to resist visible 'structure' imposing its materiality onto the senses of the observer, and my impression is that this same *intra-active interference* is an integral part of Larsen-Jensen's process of DiY instrument construction. 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 potentials. My impression is that the workshop functions as an assemblage of extended agency, with materials acting as active participants which influence Larsen-Jensen's creative processes, through materials suggesting connections with other materials placed within the proximity of the workshop space. This suggestion is further developed below, with the example of the dismantled loudspeakers, in which sound becomes visible, and the example of the *Water Table* exhibition, in which sound waves are made visible across the surface of water.

As seen in Figure 6 below, the main entrance door of the studio is studded with excess supplies of dismantled loudspeaker components, serving the two functions of storage, awaiting re-use, and also as a way of visually displaying the processes behind the function of the loudspeaker.

[68] As defined in this thesis, an actant is a human or nonhuman entity which exerts an influence and has some form of agency to, as Jane Bennett says: "to make a difference, produce effects, alter the course of events" (2010, p. viii)

Figure 6: The 'transparency' of the open loud-speaker (image by author, 2013).

The removal of the casing around the speaker displays an attitude of malleability towards both technology and sound. By removing the casing which makes the process of the loudspeaker opaque, the Black-box is also removed and the material actants present within the speaker are made visible.

In following the concept of extended agency, developed in Chapter Two from Jane Bennett's "*distributive agency*" (2010, p. 31) and Clark and Chalmers "extended mind" (1998, p. 7), the visible display within the workshop of the inner workings of the speaker casing acts as a material 'notebook' of possible ideas and re-functions for the loudspeaker. The loudspeaker component, when removed from its casing, allows the sound waves to be made visible as the movements of the cardboard speaker cone. As the speaker cone is often hidden behind a protective wire mesh, the revealing of its movements promotes a material understanding of sound as movement and is part of the DiY ethos of 'revealing the process' through a transparency which allows material agency to become apparent. The reversed Black-box loudspeaker can be linked to other practices of Larsen-Jensen, such as the *Water Table* discussed below.

Figure 7: *Water Table* (adapted with permission from Felix Larsen-Jensen, 2012).

Larsen-Jensen's '*Water Table*' (Figure 7) was an interactive exhibition in the 2012 New Zealand, Hamilton Fringe Festival. *Water Table* featured several of Larsen-Jensen's DiY oscillators situated around a square tray of water which was supported on a table. Leads and wires connected the oscillators to a primitive DiY mixing desk and the combined sound of the oscillators was fed into a loudspeaker, placed under the water tray and driven by an amplifier. The loudspeaker was situated several centimetres from the thin metal of the water tray and this caused the water to ripple in response to the sound. The link between Larsen-Jensen's workshop and the participatory sound 'workshop' of the *Water Table* is that it display a similar attitude of opening sound out from the enclosure of the loudspeaker and making sound visible. The audience was invited to participate by playing the oscillators and observing the sound waves they produced on the ripples of water in the tray. Larsen-Jensen calls this visible process one of cymatics:

> Cymatics… is the field of describing wave motion through any sort of physical substance. So you could see the waveform

> through the water and all the conflicting waveforms and the relations between the different waveforms, from the different instruments, it was all coming through one speaker underneath the table… you get a lot of variation just between the low frequency waves and the tiny high frequency ripple… you get them combining in all different ways.

As Larsen-Jensen states, *Water Table* uses a loudspeaker placed under a tray of water to make sound visible. This is another way of opening the Black-box enclosure of the loudspeaker to see the visible processes of the sound waves through the air.

Figure 8: The materiality of sound seen in *Water Table* (adapted with permission from Felix Larsen-Jensen, 2012).

In allowing access to the visible effects of sound, via cymatics, Larsen-Jensen opens up an area of experience which is usually closed behind the Black-box of the loud speaker cover. This is a recurring theme throughout this case study, where the DiY ethos of revealing the mechanisms behind the processes allows a deeper engagement with materials.

Water Table (Figure 8) can be viewed as a non-totalising assemblage of human and nonhuman actants. The participants situated around the table are part of the process of creating the sound waves as much as the functions of the DiY oscillators surrounding the *Water Table*. The oscillators incorporate other actants as part of the assemblage, as several are controlled by variations in light, and others by a narrow touch 'ribbon'.

One of the driving attitudes behind Larsen-Jensen's approach to his practice is in working within the limitations imposed through the *intra-active interference* of materials and the practitioner. This material engagement between the human and nonhuman elements is expressed in Larsen-Jensen's attitude to the limitations imposed by "two hands and two feet":

> I'm trying not to do it with computers or having too much stuff pre-programmed. I'll use the drum machine for some stuff but I'm trying not to go any further into the digital realm than that…. the idea of it is to, sort of, be able to play it all with just two hands and two feet.

The material limitations of "two hands and two feet" means that Larsen-Jensen remains an active part of the process during a live performance and is counterpoised by, what Larsen-Jensen perceives as, the less physical realm of the digital computer, usually associated with electronic music:

> The idea is to do it all with your hands so you are not relying on, you know, stuff you're already written on a computer, playing by itself, which to me, gets a little bit boring… my philosophies on electronic music is that, there's so much stuff you can do in the studio pre-prepared and then you take it out, I see people playing it out live and I think, well that's D.J.-ing really, if the music, or half of it is all pre-prepared, it's not really a band it's a D.J. and a bongo player.

In this, Larsen-Jensen identifies the "pre-prepared" aspect of computer-based electronic music as removing the musician from the material engagement which comes from the "two hands" philosophy. For Larsen-Jensen the live performance is a space in which technology is physically engaged with, rather than the more "pre-prepared" use of digital technology. Larsen-Jensen's attitude presents the relationship between the musician and the technological instruments as a point of material engagement which is visible for the audience to see:

> I've just tried to go the opposite way to that and just, 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.

Larsen-Jensen is expressing the desire to reveal the process by allowing the audience to "see that the music is actually being made in front of them". This can be seen in contrast to the "D.J.-ing" style of electronic music, where the process of sound production is hidden on the personal space of the monitor screen and the music is "just being played back in front of them". This suggests that Larsen-Jensen's direct relationship with materials is an important part of his personal philosophy of electronic music.

So far we have seen how Larsen-Jensen's DiY ethos influences the participatory aspects of his practices, as a way of increasing the participatory potential of materials through making the process visible. In the next section the theme of extended agency continues in the wider material environment of Raglan refuse tip, and the 'dump shop' where Larsen-Jensen obtains many of his components and materials.

4.1.2 The extended agency of re-functioned materials

In Larsen-Jensen's engagement with materials, as discussed above, agency is extended from the exclusively human to include nonhuman actants. These nonhuman actants have included materials as well as the material environment, such as the role of Larsen-Jensen's workshop in the formation of the artefacts produced. Another way that Larsen-Jensen allows materials to suggest the form of his art is in his choice of using 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… that's like a bread tin, a lot of these are recycled old knobs.

This suggests that the environment of "the rubbish tip, [and] *Xtreme Waste*" play some 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 this 'before' and 'after' photograph supplied by Larsen-Jensen, showing the types of materials on the left which are used in the construction of the oscillators on the right side of the image:

Figure 9: Raw materials and resulting oscillators (adapted with permission from Larsen-Jensen, 2011).

Figure 9 above shows the raw materials which Larsen-Jensen collects for his oscillators (on the left side) with the finished oscillators on the right. As can be seen in 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. This site can also be seen as part of the extended agency of the workshop, in particular in the way that materials are sorted, categorised and made available.

Figure 10: *Xtreme Waste* in Raglan (image by author, 2013).

Xtreme Waste in Raglan is one of the few refuse sites in New Zealand which has a shop open to the public in which discarded materials can be diverted from landfill (Figure 10). The slogan of *Xtreme Waste*, "thinking beyond the bin", can be seen as an extension of Larsen-Jensen's "Womble ethic", discussed in the earlier section of this chapter (4.1.1) and can also be viewed as a possible influence in the formation of Larsen-Jensen's DiY approach to musical practices.

One interesting feature I observed at *Xtreme Waste* is 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.

Figure 11: *Xtreme Waste*: sorting of objects into material categories (image by author, 2013).

Figure 11 displays a section of the 'metal area' at *Xtreme Waste*, in which, objects are arranged depending on the specific type of metal used. In some ways this process of categorising has removed the functional context of the materials and re-functioned the objects in terms of material characteristics. In the categorised 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 the above image) are placed next to each other, and in the foreground, kitchen trays are placed next to drain pipes and sinks. 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 categorising 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.

As an environment used by Larsen-Jensen as a source of materials, I argue that *Xtreme Waste* offers what Clark and Chalmers calls an extended mind or "an *active externalism*, based on the active role of the environment in driving cognitive process" (1998, p. 7). This has been discussed previously in this chapter where Larsen-Jensen's workshop is viewed as exerting agency and being an active part of the process. The function of *Xtreme Waste* as an agent of Clark and Chalmers' *active externalism* is suggested 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:

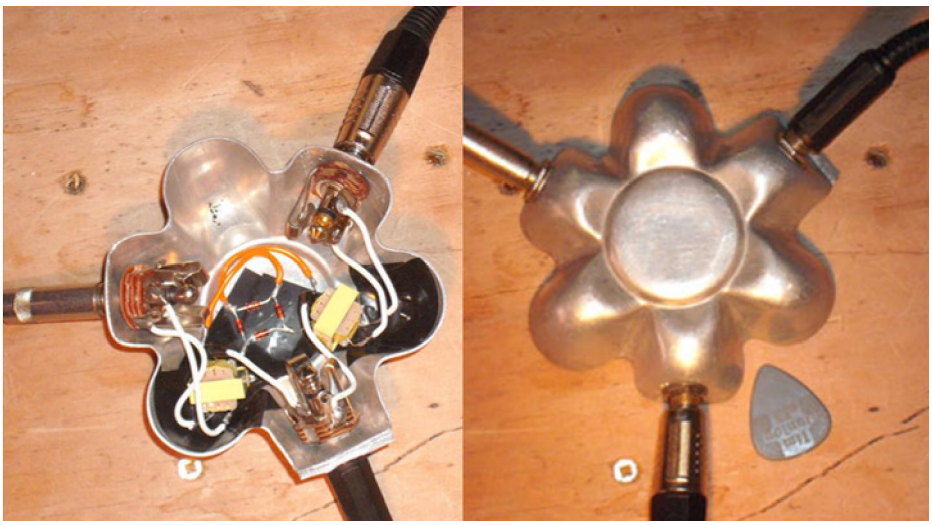

Figure 12: The re-used jelly mould as a guitar effects pedal casing (adapted with permission from Felix Larsen-Jensen, 2013).

The *jelly mould guitar effects pedal* shown above (Figure 12) uses a discarded jelly mould for the casing of the effects pedal. The light metallic material of the jelly mould provides an efficient electrical insulation from stray radio waves. The jelly mould casing provides an example of a discarded material which remains non-totalised, since it is difficult to look at the device simply as a guitar effects box without the previous function of the casing also being apparent. This is true of other Larsen-Jensen devices, such as the *bread tin audio mixer, pie-dish oscillator, tape-machine amplifier,* and other kitchen-ware instruments, where it is apparent that re-functioning has taken place and that the object is not a fixed

structure but has the potential to be malleable. This suggests that the availability of materials at *Xtreme Waste* and the way in which materials are removed from their familiar functionalities can be seen as partly responsible for the form of Larsen-Jensen's devices.

The viewing of garbage as 'error' has been touched upon briefly in Chapter Two, the idea being that the discarded materials found at *Xtreme Waste* are objects which have been excluded from the language of technology as less useful items. For example, perhaps the jelly mould has been deemed as less useful due to changes in home food preparation and shifts in commercial food production, where food items are bought ready-made rather than prepared in the home. Whatever the reason, objects found at *Xtreme Waste* are items which have been discarded by their owners and salvaged from being sent to the landfill: they are objects of more malleable functionality. As discussed previously, one of the ways in which reverse Black-boxing can be initiated is when the subsuming functionality of the Black-box is removed, either through an unintended error in the functioning or through some other means which affects the overall functioning of a device or object. In this sense, *Xtreme Waste* can be seen as an environment where materials are removed from the Black-box of original functionality. Individual objects and materials are dismantled from their usual environment, categorised through material qualities rather than by functionality, and re-assembled within a new context of other discarded materials.

In summary, there are several processes occurring at *Extreme Waste* which act as agents in Larsen-Jensen's DiY practices. The first is that objects are removed from their subsuming functionality by being discarded as worthless. Secondly, objects are salvaged and re-assembled with other objects in terms of materials rather than functionality. Thirdly, objects are made available and are selected by Larsen-Jensen as being potentially useful within the functional context of his practices.

The image below displays a selection of re-functioned objects in which Larsen-Jensen has used materials found at *Xtreme Waste*:

Figure 13: Fruit gum, tobacco and throat lozenge tin oscillators (adapted with permission from Felix Larsen-Jensen, 2011).

Figure 13 shows a small oscillator encased in a fruit gum tin (left), a tobacco tin (centre) and a throat lozenge tin (right). Each of these objects have been selected by Larsen-Jensen for their re-functional potential, since the metal of the tin provides a convenient electrical insulation to prevent interference from stray radio waves. However, in addition to functionality it is difficult to ignore other reasons why Larsen-Jensen may choose to make his oscillators from these recycled and re-functioned everyday objects. Part of this reason is almost certainly an aesthetic attitude driven by a DiY ethos, since the oscillators display a consistent DiY or "Womble ethic... [of] using whatever is available... [and embracing] the limitations imposed by the equipment at hand" (Larsen-Jensen, 2006). The use of everyday objects, as would be found in the kitchen, add to the Womble ethic since they are materials which are close at hand in everyday life. This can be related to Amy Spencer's discussions of the DiY approach to Lo-Fi music:

> 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, p. 187).

The use of “home-made or improvised instruments” does seem to conveniently encapsulate Larsen-Jensen’s use of re-functioned everyday objects, as does his use of older styles of technology. However, rather than being purely aesthetic, there is also a practical element in Larsen-Jensen’s use of materials in which availability plays a large role in the aesthetics of the design. This is the DiY ethos of using “whatever resources are available to you”, an important resource being the materials found at *Xtreme Waste*.

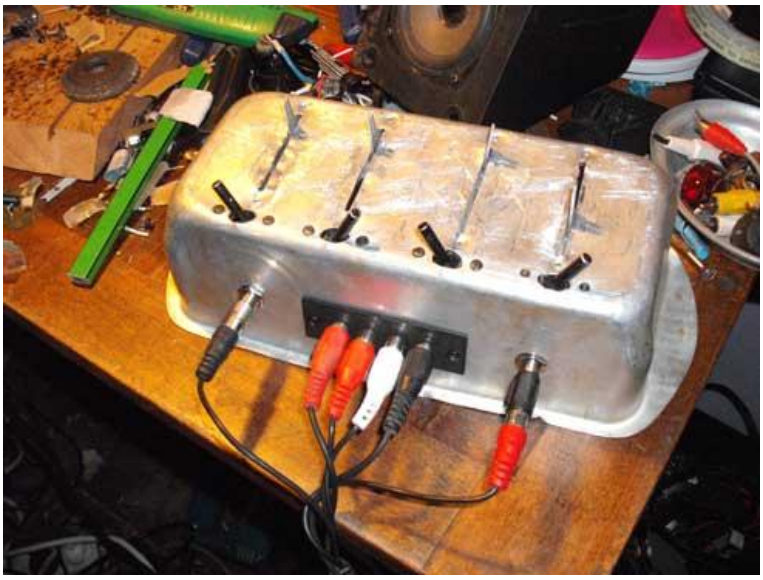

Figure 14: Bread tin audio mixer (image by author, 2013).

Another example of available materials can be seen in Figure 14 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. The choice of materials suggests that availability has played a role in the selection process, that the purchase of a discarded bread tin at *Xtreme Waste* has led to its incorporation into the workshop environment and eventual re-functioning as suited to the materials of the object. This represents an extended agency which incorporates *Xtreme Waste*, Larsen-Jensen’s workshop and the material qualities of the bread tin, all of which can be viewed as actants responsible for the process of re-functioning.

In addition to the bread tin casing, found at *Xtreme Waste*, there are other materials used in the mixer which have come from Larsen-Jensen's dismantling of discarded electronic devices which have ceased to function as their intended purpose. Part of the reason behind the re-use of materials is driven by economic factors, as many of the components he uses are expensive if purchased new, particularly the 'pots', or potentiometers which Larsen-Jensen uses:

> All the pots are recycled, some of the plugs are recycled, all those plugs, I took apart an old mixing desk a couple of years ago that wasn't working, and I just mined all the parts out of it that I thought I could use and I've still got a box somewhere with a whole lot of pots... I pull apart lots of stuff, especially things like pots and switches, they are really expensive to buy, if your are building something and you need six or seven pots then all of a sudden that's $50 that you're spending, so I always try and recycle pots and faders and switches, these little switches are like $4.

In this way, devices such as the 'bread tin mixer' can be constructed at a fraction of the cost of using new components. However, I suggest that Larsen-Jensen's practice of recycling is more than simply economic, but also an integral part of the DiY ethos to engage with materials. An alternative solution to finding a broken mixing desk would be to have it repaired by a qualified technician but instead Larsen-Jensen chooses to engage with the materials inside the Black-box, dismantling the mixer and using the components within to build equipment which has altered functions which are not commercially available. This represents a dispersal of agency away from the centralised Black-box, for example the option of the repaired audio mixing desk, towards a distributed agency which incorporates materials as active agents with the potential for re-functioning into different configurations.

The experimental forms of the oscillator, and the way in which everyday materials are re-functioned into unfamiliar contexts, are discussed in more detail in the following sections of this chapter which introduce the oscillators from the perspective of Larsen-Jensen's ideas and attitudes towards electronic music.

4.2 Materials as de-territorialising agents.

There has been a recurring theme throughout this thesis of the DiY ethos to de-territorialise structures. In this case study, Larsen-Jensen's various methods of using material agency as a strategy of de-territorialisation are discussed.

The first of these strategies is Larsen-Jensen's attitude of keeping his oscillators in the state of 'perpetual prototype', suggested as a way of reversing the process of Black-boxing. This is achieved through de-territorialising the enclosure of the instrument and allowing further modifications and interactions with the components inside. 'Perpetual prototype' is a phrase I have used throughout this chapter to describe the 'unfinished' state of Larsen-Jensen's oscillators. It is as if the oscillators are in a continuous state of adaptation, repair or modification whilst at the same time being used for recordings and live performances as if they were 'finished' items. As Larsen-Jensen says "a lot of them never really get finished... I just keep playing with them". This suggests an ongoing relationship with the changeable functions of materials, that function is never fixed and remains in a malleable state.

4.2.1 The 'perpetual prototype' and reverse Black-boxing

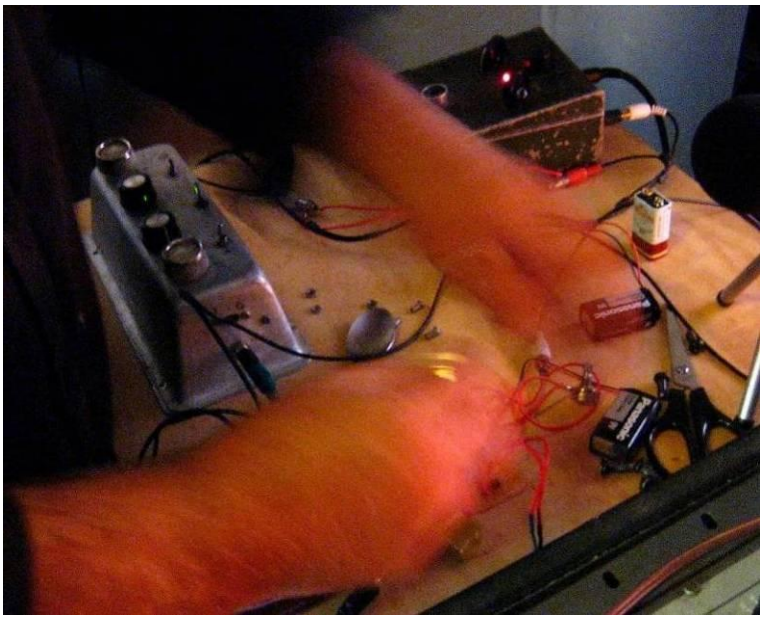

Figure 15: Larsen-Jensen adapting one of his oscillators (image by author, 2013).

Figure 15 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. The 'perpetual prototype' is one way of describing the unfinished state of many of the oscillators which Larsen-Jensen nonetheless regularly uses in recordings and live performances. The 'perpetual prototype' describes the playful experimentation with the electronic circuits, indicative of a practical method of 'trial and error', as circuits are made, re-configured and combined with other circuits:

> A lot of them never really get finished... I just keep playing with them, that's why a lot of them don't have [fixed casings], so, OK this one's finished, I know it's finished because I've put screws in it and [I've] bolted a bottom onto it. So I know that one's done. Most of the rest of them are like this, held together with bits of tape, because I might want to keep playing with it, and I don't want to have to keep opening them up with screwdrivers, or spoons.

For Larsen-Jensen, the finished state of the mechanism occurs when screws are inserted to hold the case together to hinder further experimentation with the

internal circuitry. Larsen-Jensen's desire to keep the oscillators "held together with bits of tape", so that modifications can continue to be made, displays evidence of a DiY ethos which values the ongoing process over the finished object. This can be expressed in terms of the Black-box as the finished object and the *perpetual prototype* as the process which allows a continually changing engagement with materials. I understand the *perpetual prototype* as a strategy of reversing the process of Black-boxing, through the de-territorialisation of the enclosure of the instrument to increase the participatory potential of the materials and components inside.

Another reason that the devices stay unfinished is the modular approach that Larsen-Jensen uses, building simple functioning blocks which are combined to create more complex devices. This relates to Larsen-Jensen's limitation of theoretical knowledge, whereby he uses a practical experimentation with simple circuits that are combined into more complex assemblages:

> With a lot of these they are really quite simple devices which only really do one thing, but […] I'm getting into things like this where you have a lot of different options [for example] at the moment its three or four simple machines hooked together... that will be one machine with a whole lot of knobs on it, so that will be one really complex machine (see Figure 16).

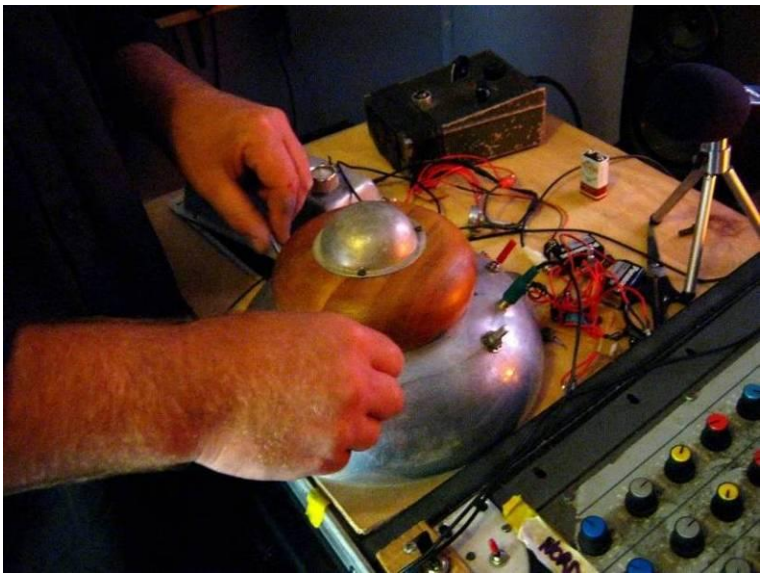

Figure 16: Adaption of instruments as perpetual prototypes (image by author, 2013).

For this reason the 'perpetual prototype' is a way of creating multiple options for material agencies to become active participants, working within technical limitations by prolonging the prototype stages of development. The modular approach means that each stage of the circuitry can be tested and evaluated for its expressive potential, duplicates can be made if required so that repeats and variations of experiments can be conducted on the same circuit. Larsen-Jensen offers another reason why particular oscillators are considered more finished than others, connected with the idea that each instrument is a 'song', a modular unit of a complete live performance:

> You have to take them out and do a few gigs with them, and recordings with them, before you know if they are finished really. […] I tend to build another one, I tend to keep that one so I can always play that song or go back to that song if I want to use that, and that becomes part of the set, then I know when I'm thinking about what to play at a gig I can go, if I take that and that then I've got that song, and if I've got the drum machine, and this thing and that thing then I've got that song, and so, […] I'll build different ones which do really similar things just because I don't want to mess with that song anymore, I want to be able to recreated that. I build another one and adapt it, a bit like when you're saving things when you are working on a computer and you save as it is now so you can always go back to it but you carry on working on it and then save another version and then save another version.

The 'song' which comes from each oscillator is part of the reason that some of the oscillators are cased and have a more 'finished' appearance, this also explains why Larsen-Jensen has built so many devices of a similar design, so that he can preserve continuity by allocating oscillators as 'songs'. In some ways this allocation of instruments as 'songs' provides a level of 'finishing', making the design more fixed around the characteristics of the structure of the song. This would appear to go against the idea of the perpetual prototype, since in this case certain instruments are finished and, therefore, function more within the realm of the Black-box and also within the idea of a fixed musical structure. However, there are also other strategies used by Larsen-Jensen in which error and

indeterminacy are used in other ways, and these will be revealed as this chapter progresses.

Whilst the allocation of songs to instruments seems to fix the oscillator within a Black-box, there is also Larsen-Jensen's strategy of combining the modular instruments into larger assemblages. This is a more experimental approach to the song as a structuring agent, since the song emerges as a result of the functional capacities of the devices used.

Figure 17: Various states between prototype and 'finished' (image by author, 2013).

Figure 17 shows an improvised 'song' configuration in Larsen-Jensen's workshop, demonstrating the interconnection of four separate devices, each of which displays various states between prototype and 'finished' boxed devices. In the interview I asked Larsen-Jensen if he had ever performed live with any of the oscillators outside of their protective casings, he replied that he had but that he didn't "recommend it" due to the high potential of complete breakdown of the fragile circuits. Whilst experimentation in a live performance means that the devices have, at minimum, to be boxed in some sort of protective cases, this does not mean that experimentation ceases:

> I have discovered new stuff live, but not by having them outside of boxes. Often it's just different interactions between instruments which I haven't actually tried playing together, plugging in the wrong plug basically, thinking you are going to get one thing [and then getting something else].

This demonstrates that even the connections between 'finished' devices are in a state of flux, as "interactions between instruments" are maintained as fluid and have the potential for accidental connections. For Larsen-Jensen, the process is a major component of the music and, in this, the prototype is the active component of the language of process:

> So, in a way they are all, sort of, 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.

This suggests that Larsen-Jensen is opening space for the materials and characteristics of the instruments to influence the kind of sound art he is making, this is the "language" of the process as expression. Capacities of materials, as a major part of the process, infer an engagement with material agency.

One of the observations I had, during the interview in Larsen-Jensen's studio, was that the high frequency position of the pitch control, on different oscillators, was either set fully clockwise or fully anti-clockwise. The 'conventional' allocation of control knob provides an increasingly higher frequency as you turn the dial clock-wise, one which is used in the volume control of most stereo systems: clock-wise implies an increase. When questioned about this, Larsen-Jensen stated that there was no fixed way of allocating the high frequency position, since: "it just depends on which way you wire the pot, you can wire them either way backwards or forwards… they have three pins on them, (so) you can choose". For me, this implies an experimental engagement with materials, the potentiometer component, which differs from a conventional approach to electronics. On the other hand it may imply carelessness on the part of the constructor, who afterwards discovers a use for wiring the component 'incorrectly'. The fact that many of the devices do have the 'incorrect' wiring

suggests that, whatever the reason, Larsen-Jensen has repeated his practice of indeterminate wiring, and that perhaps the reason is connected with the live performance of the oscillators. This practice suggests that 'error'[69] is being incorporated into the process, with the unpredictability of the instruments adding another dynamic to the performance in terms of material agency.

For Larsen-Jensen, the instrument's controls are a familiar territory, which he has learnt through the experience of building and playing them in live performance. This is evidenced by the inconsistency of labelling on the controls of the instruments:

> They are like any instruments, if you play them enough you just sort of remember where the bits are… you don't need all the notes drawn on your guitar, you just remember where the ones that you like are. If I was going to play something like this (picking up a complex oscillator), I would mark some of these off, I haven't used that one live yet. This [other] one I don't need to, just because I've spent so long experimenting with it in here that, I've sort of, I know it really well.

For an outside observer, the labelling system on the oscillators may seem erratic. It may be, that the more unfamiliar the device is, to Larsen-Jensen, the more chance it has of being labelled, with some of the earlier familiar models not needing labels at all. However, at one stage every oscillator is new or unfamiliar to Larsen-Jensen, so familiarity is connected to a process of experimentation: the oscillators which have undergone a certain threshold of experimentation, with controls altered several times, have remained in the 'prototype' stage and are therefore unlabelled because they are 'unfinished'.

The lack of labelling can be seen as a strategy of removing the obvious functionality of the device. By this I mean that the function of the oscillator, as well as the individual controls, is not necessarily apparent, even to Larsen-

[69] 'Error' is defined within this thesis as a diversion from the original human-intended function of an object.

Jensen. The removal of defining functionality can be seen as a strategy of reverse Black-boxing, whereby the multiple materials and components which are subsumed by the functionality of the Black-box are allowed to emerge as actants. Bruno Latour describes "Black-boxing, [as] a process which makes the joint production of actors and artefacts entirely opaque... completely determined by its function" (Latour, 1999, p. 183). This means that the functionality of the Black-box makes the process "opaque" and invisible.

The process of reverse Black-boxing, as discussed in Chapter Two, is usually initiated through an unintentional error or break down of the device. If the functionality of a device becomes indeterminate, as happens with Larsen-Jensen's oscillators through a lack of labels and indeterminate wiring of the frequency controls, then a process of reverse Black-boxing is initiated. Once functionality becomes indeterminate then the Black-box instead becomes a non-totalising assemblage of material actants. My argument is that Larsen-Jensen's approach to the construction of his oscillators, by keeping functionality indeterminate and fluid, engages with material actants through a strategy of reverse Black-boxing. When functionality is made indeterminate then engagement with materials becomes an *intra-active interference*: a transversal engagement of human and nonhuman actants rather than allowing functionality to impose a structure upon the multiple actants.

The DiY trait of acquiring practical knowledge through play and 'tinkering', even with seemingly complex electronic mechanisms is, for Larsen-Jensen, a way of by-passing the theoretical path of knowledge, as demonstrated through his description of the method he uses to indicate the controls of the oscillators he does label:

> Because I don't really know a lot about the theory of it, and often I don't really know what these things are doing so I'll just sort of, like I'm not sure if this is actually changing from a sine wave to a saw tooth wave or not but it kind of, the oscillator seems a lot sharper on that side [of the switch] so I drew a sharp thing. And this is just sort of up and down where it seems to make the sirens

> go, wrrrrooop (up sound) and this one seems to go wrrooo (down sound) and in the middle it goes sort of wrrrooo (middle sound) yeah, so [they are] just visual aids to remember what's doing what.

For Larsen-Jensen, the labels which do exist on the machines, which are very few, are devised as a form of shorthand: a visual indicator of his interpretation of the sound each control makes. Another reason why oscillators have not been labelled is linked to Larsen-Jensen's attitude of 'playfulness' in which oscillators remain in the state of experimentation: the 'perpetual prototype' in which modifications, adaptations, repairs and even the chance that experimentation will damage the components and create new functionalities are all reasons why individual oscillators remain 'unfinished'. The role of material agency in influencing the form of the assemblage, which emerges through the intra-active interference of material actants, has been discussed in Chapter Two. This was contrasted with the human-biased view of structure as a form which is imposed onto materials by human intention. As part of the DiY engagement with the available resources and limitations of materials, material agency has an active role in guiding the creative process, as Larsen-Jensen states:

> There's that element to the music, where 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. You just have to try to plug it up right so that the machines can play.

Working within the limitations of the basic materials Larsen-Jensen's role, as suggested above, is to facilitate and maximise the "play" of the machines between each other. This suggests that Larsen-Jensen's engagement with materials involves maximising the participatory potential of materials so that the machines can *intra-act* with each other: so that human and nonhuman agency are integral parts of a non-totalising assemblage where there is no single dominant structure except for that which emerges as a result of the *intra-active interference* of multiple actants. This resonates with Levi R. Bryant's "*reciprocal determination...* in which the machines that flow through a machine modify the

machine that operates" (Bryant, 2014, p. 50), discussed in Chapter Two, indicating an *intra-ference* between machines within a machine assemblage:

> This kind of stuff where you've got the machines that will, things that can, talk to other machines in a way, rather than just the things you can play directly, things that will play themselves or play other machines.

This indicates that part of Larsen-Jensen's practice to allow the machines to "talk to other machines", for "things" to "play other machines", is a process of reciprocal determination that increases the participatory potential of material agency. This links with the discussions of '*Machine-talk*', in Chapter Five, in which Greg Locke's phrase "machine talk" describes the sounds from the mechanical processes incorporated into the finished sound of *The Trons*. In terms of material agency, Larsen-Jensen's practice places value on allowing the material characteristics of the instruments to emerge as part of the 'structure' of the music, as a part of the process which defines its distinctive characteristics. This is based in an engagement with materials which recognises its organisational agency, that is, the ability of materials to extend beyond human defined a languages of expression:

> I think when you build stuff you definitely have a different relationship with it [technology]. It sort of has its own language. It's becoming more important [to me].

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. There may be some confusion here between Larsen-Jensen's use of the word 'language' and the definition of the word discussed in Chapter Two as a human-biased construct. As I understand the way Larsen-Jensen uses the word 'language' he appears to indicate that the 'language' of the "stuff" which he builds emerges from the expressive capacities of the materials: "its own language" which is material rather than human-biased in origin; indicating the use of materials as an organisational agent. The

acknowledgement of the expressive capacities of the materials are part of the extended agency which occurs in DiY practices.

By *intra-acting* with materials and technologies on a more basic level, the DiYer is allowing an extension of agency away from ideas of human-centred agency: this material engagement creating forms which come from the characteristics of materials rather than from a 'top-down' centralised controller of agency. Ways in which this different perspective on participatory culture are disseminated, and therefore spread to other practitioners, is through making the process of technological interaction apparent and visible. The process of adapting material to different purposes, and the allowance of agency to materials to dictate the qualities and nature of the music produced, is important to Larsen-Jensen's DiY practices. The following section goes into more depth about the construction of Larsen-Jensen's oscillators and the various strategies he uses to employ the re-functional potential of materials, a process which allows materials to become active participants in altering the function of the oscillator.

4.2.2 The re-functional potential: Materials as non-totalising actants

Figure 18: Larsen-Jensen's 'pie-dish' oscillator used with tape-machine amplifier (Reprinted with permission from Felix Larsen-Jensen, 2012).

Re-functional potential[70]*,* a concept developed in Chapter Two, is further developed in this case study, drawing on Larsen-Jensen's practices of incorporating indeterminate material characteristics to increase the depth of theoretical understanding. These indeterminate capacities of materials represent Larsen-Jensen's engagement with material agency in the form of complex functions which emerge from broken technologies and re-functioned materials. The phrase *re-functional potential* is used in the discussion of the above *pie-dish oscillator*, which incorporates a faulty electronic component to determine the pitch of the instrument. Re-functional potential describes the way in which materials *intra-act* to produce complex and unpredictable functions. This section discusses the various strategies used by Larsen-Jensen to increase the re-functional potential of materials used in the construction of his oscillators.

[70] *Re-functional potential* is de-territorialised 'function' suggesting malleability and flux and emphasising an indeterminacy of end result.

Figure 18 shows an untitled 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. Other recycled materials are used in the *pie-dish oscillator,* and these will be discussed below. The cassette tape-machine below the oscillator has been re-functioned as an audio amplifier. Tape-cassette machines like this are readily and cheaply available in the 'dump shop', the refuse centres, of both Hamilton and Raglan. The re-functioning of a tape-machine as an amplifier incorporates qualities of sounds which are not part of the general equipment used by musicians. The indeterminate frequency response, which occurs as a result of re-functioning, is indicative of a Lo-Fi ethos, in which sound is produced using whatever materials are available. On the other hand, the availability of materials also dictates the qualities and nature of the sound produced and this forms part of the extended agency of Larsen-Jensen's practice which incorporates the workshop, as discussed above, and also other environmental actants such as the dump shop. 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].

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 1980's. The re-functioning of this basic logic circuit means that the type of audio output is limited to a series of 'on/offs', that is, it produces the "simple square wave" which is the most basic sound wave possible from an electronic means. By 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 is discussed below in terms of two 'machines' *intra-acting*. The complex output obtainable from the intra-action of these simple components brings to mind the characteristics of Jane Bennett's non-totalising assemblage, discussed in Chapter Two, where the effects of the assemblage are: "distinct from the sum of vital forces of each materiality considered alone" (2010, p. 24). I understand this to mean that, the way materials intra-act creates an output which is 'greater than the *sum of its parts*'[71]*, suggesting that this additional 'vitality' emerges from the assemblage which functions to increase the participatory potential of materials.*

The following image shows the sound of the oscillator when fed into a waveform application, magnified until the details of each oscillation can be discerned. Due to the 'worn-out pot' the waveform of the oscillator is very different to the simple square wave which the circuit is designed to produce. The "wobbles", as Larsen-Jensen calls them, between frequencies means that the sound is of varying and indeterminate pitch. Due to this faulty component, when the 'pot' is turned the *pie-dish oscillator* produces an intermittent 'noise' effect, varying

[71] 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.

from harsh metallic grinding sounds to a sound similar to fluctuating hissing steam which sporadically and unpredictably resumes a pitched tone:

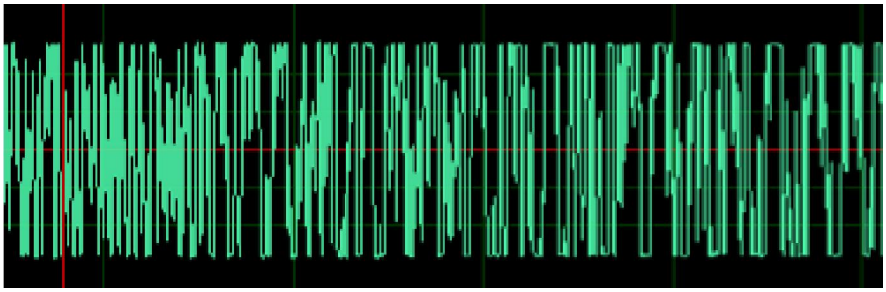

Figure 19: Pie-dish oscillator waveform resulting from 'error' (image by author, 2013).

Looking at the visual representation of the sound above (Figure 19), whilst 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 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.

Although Larsen-Jensen has not intentionally tried to produce this effect he 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).

The *intra-active interference* of 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". As a material actant the faulty component provides a non-structural element to the sound, de-territorialising the simple square wave functioning of the circuitry and introducing a complex re-functioning of the sound waves.

Another way of viewing the faulty component is as a machine which accepts the input of the oscillator circuit, performs a complex function, and then returns an output which alters the pitch of the oscillator. Levi R. Bryant's machine oriented ontology (MOO) emphasises function as a way in which material agency can be explored through "*reciprocal determination*... in which the machines that flow through a machine modify the machine that operates" (Bryant, 2014, p. 50). In this sense the 'machine' of the square wave circuit flows through the faulty 'pot' component which acts as a "machine [to] modify the machine that operates" (p. 50). This has been discussed in Chapter Two as Bryant's second form of machine "manifestation" known as "*agentive manifestations"*, where machines alter the behaviour, and therefore *functioning*, of other machines (p. 44). This intra-action between machines, within a machine assemblage, is an example of '*Machine-talk*', a concept which emerges from the discussions of Greg Locke's practices in Chapter Five. In Larsen-Jensen's practice, *Machine-talk* occurs across the machine assemblage of human musician, faulty 'pot' component and the square wave output of the oscillator, altering the behaviour of the oscillator to produce complex sound waves.

Whilst simple machines perform more predictable functions, complex machines can also alter their functions depending on inputs from other machines. By viewing materials as machines there is an emphasis on functionality and the interconnectedness of material actants. Since an assemblage such as the *pie-dish oscillator* is composed of multiple interconnected functions and machines, some of which are complex and unpredictable such as the faulty 'pot', there is less emphasis on human agency and agency is instead extended throughout the assemblage of actants. For Bryant machines can be both human and nonhuman, so that the human practitioner Larsen-Jensen can also be viewed as a processing 'machine'. By extension this situates the workshop practices of Larsen-Jensen as a human-material engagement, in which the 'tinkering' and experimentation of Larsen-Jensen becomes a complex functioning machine which has the ability to alter the functions of other more simple machines.

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 a bit 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, like, 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) it's still got the off position but there's just no hard stop on it… it's just like this one here but I've adapted it to go all of the way around.

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.

In the second image of the waveform below, I have included a closer view of the sound produced by the 'indeterminate pot' and the *pie-dish oscillator*. This image shows more clearly the combination of pattern and random elements which comprise the sound:

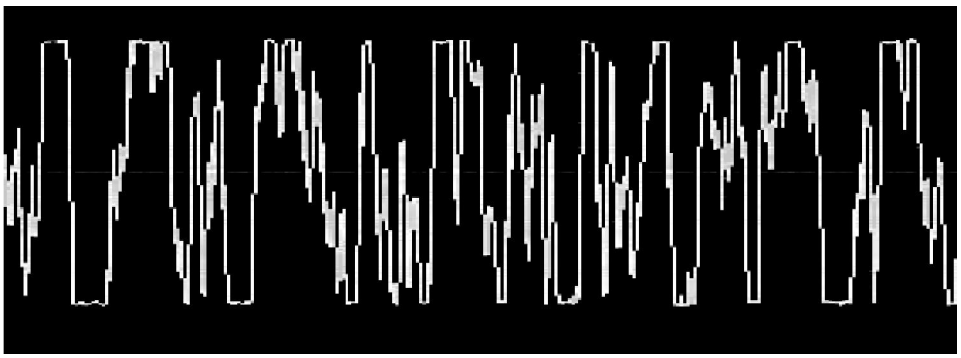

Figure 20: The chaos and pattern of the *pie-dish oscillator* waveform (image by author, 2013).

Figure 20 makes it easier to view the *intra-actions* of simple and complex machines. The simple machine is the square shaped waveform which causes peaks and troughs to occur at regular intervals, this is the logic-based circuitry of the *pie-dish oscillator* which Larsen-Jensen has re-functioned as a sound source. When the oscillator function of this circuit is passed to the more complex machine of the faulty 'pot' the two machines *intra-act* to create an output of complex audio tones. Whilst a regular square wave can easily be categorised as a particular waveform, the complex output from the combination of the two machines contained within the *pie-dish oscillator* can be viewed as a non-totalising assemblage of sound waves.

Whilst it is Larsen-Jensen's decision to continue using the faulty 'pot', its inclusion introduces material agency into the control of the sound. In this case material agency emerges from the 'error' of the material to follow the prescribed function for which it was originally humanly intended. The 'error' of the material also represents a process of reverse Black-boxing, whereby the material qualities and characteristics emerge from being subsumed by an overall functionality to exert a form of agency which is non-totalised. Non-totalised agency is therefore extended agency which is diverted from exclusively human intention, with error being a strategy in which to achieve this.

In the next section further strategies are discussed in which Larsen-Jensen uses material actants to emerge as an agent of organisation: engaging with materials to co-develop the type of sound produced.

4.2.3 Material agency, assemblage and structure

Figure 21: Light dependant Oscillator (Reprinted with permission from Felix Larsen-Jensen, 2011).

One of the characteristics of Larsen-Jensen's instruments is the unconventional interfaces between the musician and the instrument. For example, Figure 21 shows a light dependant oscillator made by Larsen-Jensen, in which the level of light falling on the sensor, on the left top of the pie-dish, determines the pitch of the instrument. In this way the instrument can be played using the hands to vary the degree of shadow falling on the instrument. This is a simple design of interface similar in operation to the Theremin instrument, which uses a more complex circuit to allow proximity to determine the instruments pitch. Like most of Larsen-Jensen's instruments the pitch can be varied between frequencies without the instrument delimiting set points of 'notes', meaning that there is no set scale of musical notes which are imposed by the design of the instrument and the user is free to select frequencies *between* conventional piano scale notes. This allows the instruments to access 'the notes between the notes', de-territorialising the intervals of the musical scale to access notes which are between the notes on a conventional piano keyboard.

Although this would make the instruments more flexible in terms of musical styles, with skilled players able to use them in any genre of music, Larsen-Jensen's intention is not to be able to add sound to any genre of music nor to create a 'universal' instrument which can be inserted into any existing musical structure. The aim of flexible tuning is not to enable the instrument to tune to musical scales and to 'speak the language' of any musical structure, but to develop an organisation of sound which is unique to the characteristics of materials Larsen-Jensen has chosen to use, allowing materials an expressive capacity and increasing the participatory potential of materials. This expressive capacity of materials comes from the acknowledgement of the influence of extended agency.

Each instrument is a unique *assemblage* of *intra-acting* materials from which form emerges, rather than through an imposed *structure*. This point is highlighted in the following anecdote by Larsen-Jensen, presented in two parts, in which the organisation of the sound emerges from the characteristics of the material agents comprising the instruments:

> I remember years ago this friend of mine was building traditional Maori flutes and instruments and people kept asking him to come and play with their bands, and they wanted him to add this layer of things Maori over the top of [this] very kind of ordinary music, and he sort of explained to me that, it's like: you can kind of do it, but those instruments have their own language... there's *something else* in those instruments.

In the first part of the anecdote Larsen-Jensen describes an intercultural interaction between the Maori instrument maker and the people playing a "kind of ordinary music". In this situation the Maori instrument maker felt that, whilst it was possible to play along with any type of music, the "language" of the instruments was something which was negated by the dominating structure of the "ordinary music", the "*something else*" which was taken away when musical structure was imposed onto the *sound* of the instruments. In this, Larsen-Jensen suggests that the "*something else*" comes from the sound of the instruments

that would be subsumed by the 'enclosed' space of the musical structure, a situation he applies to the characteristics of his own, hand-made instruments, as expressed in the second part of the anecdote:

> I didn't really understand until I started doing this stuff, and I came across the same thing, people would see it and go 'oh can you come and put some of that oscillator stuff over the top of my punk rock band'… [but] it's got its own language. It's got its own life. This stuff makes its own music in a way and it doesn't, to me, it doesn't really work to sort of impose that, *superimpose* that onto something that already has its own reason for being… That's just a sound being added to an existing structure whereas *this stuff creates its own structures*.

Therefore, what Larsen-Jensen is suggesting is that his instruments are not intended as devices of universal tuning, as discussed previously, but as devices which create their own "structures" of sound, as Larsen-Jensen says above: "*this stuff creates its own structures*"[72]. I understand this to mean that "ordinary music", as Larsen-Jensen says, has a particular 'language structure' which is imposed upon the *sound* of the oscillators, with *sound* emerging from the material agency of the instruments in the form of "its own structures" of assemblage. The constraints of the language view is that it limits agency to a human trait, as discussed in Chapter One and Chapter Two. In contrast to *musical structure*, the *sound assemblage* extends agency to include both human and nonhuman actants. As I understand it, Larsen-Jensen is saying that the specific assemblage of materials present in the oscillator instruments creates a particular *sound assemblage* which differs from the idea of *musical structure*. As Larsen-Jensen says, the material has "got its own life", evoking Jane Bennett's 'vibrant materials' (2010, p. 23), where "vital forces... [create] an open-ended collective, a 'non-totalizing sum' (Bennett, 2010, p. 24). The 'life' of the materials, which really means the agency of the materials, is that which is responsible for creating

[72] Larsen-Jensen's use of the word 'structure' goes against this thesis' definition of 'structure' as being human-biased, as discussed in the conclusion of Chapter Two.

the particular “open-ended collective” (p. 24) of the *assemblage*, rather than the ‘enclosed’ *musical structure* which results from human agency. The ‘life’ of sound, as an active participant, results when agency is extended through the de-territorialising of musical structure.

In contrast to the sound assemblage, musical structure seems to be a space of ‘fixed’ agenda: “something that already has its own reason for being” as Larsen-Jensen says, suggesting a specific structure of musical language which denies the vibrant ‘life’ of the sound created through the assemblage of materials. This suggests that *sound,* as a component in the assemblage, displays similar traits to *material*, in fact, sound in this sense, *is* the material. This identifies a strategy of Larsen-Jensen to resist the imposition of human-biased structure and to allow agency to be extended from the exclusively human.

Another strategy of extended agency, to include non-human actants, is the use of environmental variables to control the pitch of the ‘light-dependant oscillator’. This extends agency into the environment and allows different lighting sources to affect the functioning of the oscillator, as described by Larsen-Jensen:

> It’s all dependant on what the light in the environment is like, which is why candles are nice because its soft and diffused, you get it under light bulbs or PAR Cans on stage and you are either in the light or out of the light. with candles you get a nice range [of frequencies].

By granting agency to environmental conditions, Larsen-Jensen can be seen as breaking down the barriers between the performer and the surrounding space, also, this is a way of breaking the concept of control as being exclusively centred on the individual. This extends agency to the material environment, increasing the participatory potential of materials and distributing agency away from the exclusively human. The indeterminacy which arises from this “distributive agency” (Bennett, 2010, p. 31), has been discussed in the previous section of this chapter as the *re-functional potential*, as a cause of indeterminate output resulting from the characteristics of the frequency control mechanism. In this,

the light dependant oscillator uses the re-functional potential of environmental light so that output is determined by elements of chance brought about through environmental factors. According to Larsen-Jensen, the oscillator can be varied through several different factors:

- Uncontrolled environmental light.
- Controlled environmental light (by using hands to control pitch).
- Changes in lighting conditions during performance.

Of these three categories each have a controlled and un-controlled element. For example, 'controlled environmental light', with the hands of the musician using varying amounts of shadow to control the oscillator pitch, has an element of inaccuracy in which certain notes will be difficult to obtain due to the limitations of the hands, and a failure to achieve the movements required to accurately control the amount of shadow to achieve the intended pitch of the oscillator. Whilst this may be true of any instrument involving a level of skill, the control of the pitch through light intensity, I argue, is a method designed to be more prone to accidental pitching and error, and is a way in which the characteristics of the extended material environment is used to determine the output of the instrument. This can be interpreted as a "*qualitative manifestation"* (Bryant, 2014, p. 42) of the "reciprocal determination" (p. 50) of machines, in which environmental light becomes a machine which alters the frequency *qualities* of the oscillator machine. In this example, 'machine talk' occurs across the machine assemblage of environmental light, light sensor and the frequency controller of the oscillator.

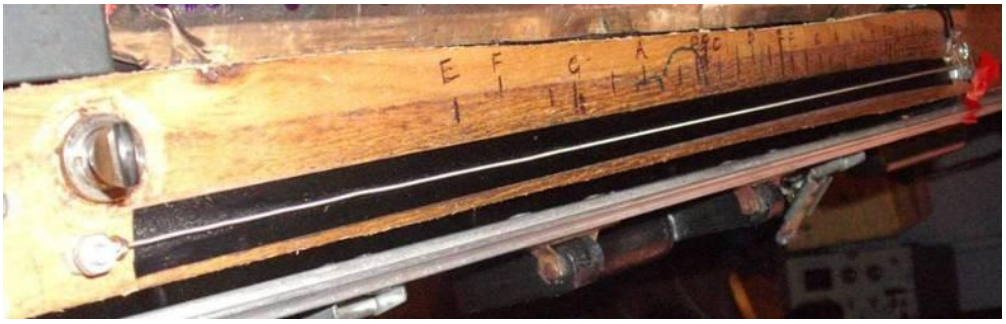

Figure 22: The 'ribbon controller' method of controlling the oscillator (image by author, 2013).

Another method of altering the pitch of the oscillators is the 'ribbon controller' in Figure 22. The ribbon controller sets the pitch of the oscillator via a connection between the metal 'string' and the black conductive 'ribbon'. The string is pressed against the black ribbon at various points to create different notes, some of which are marked on the wooden surface "E", "F","G", "A" as seen in the image above. Although the pitch is not fixed as it is on a piano keyboard, the ribbon controller is the more conventional method of playing the oscillator and can be compared to a trombone, violin or guitar:

> It's pretty much like the frets on a guitar [the markings on the ribbon], down at this end you have quite a wide sort of difference between notes and up here it's much shorter, closer together… I guess just because that's a standard keyboard layout - there's no reason why you can't have them the other way around.

With the markings visible to the musician the suggestion is that the ribbon controller is a more accurate interface than the 'indeterminate pot' or the 'light dependant oscillator', however, since there is no standard tuning and it can also be played "the other way around" the ribbon controller retains some elements of the indeterminacy of the previously discussed methods of controlling the pitch of the oscillator.

The various strategies discussed above, are used by Larsen-Jensen to engage with material agency to control the pitch and ultimately to allow the instruments to form their own musical structures. This element of material engagement

means that the form of the assemblage is a characteristic which emerges from an engagement between human and nonhuman actants, environment and materials. In Larsen-Jensen's oscillators, I argue that the organisation of sound is a function which emerges from multiple actants, rather than a structure being something which is imposed onto sound. The use of indeterminate materials as part of the control of sound means that agency and the ability to organise sound emerges from materials rather than from a human imposed idea of what music should sound like.

This can be seen clearly in Larsen-Jensen's anecdote above that illustrates his attitude to structure as emerging from the materials rather than from a subscribed musical structure, so that: sound is seen as resulting from a material engagement, distributing agency between the human and nonhuman actants, whereas music can be viewed as an engagement with structural forms which contain sound within a human-biased view of music as a "language".

In this section the participatory role of materials has been discussed as emerging from the various strategies Larsen-Jensen uses to allow material agency. The various strategies and their connection to the theoretical framework of the 'material view' in Chapter Two are further discussed in the conclusions to this chapter which follows.

4.3 Conclusions

In this chapter the following research questions were asked: 'what are the practices and strategies of Larsen-Jensen which increase the participatory potential of materials?', and also; 'How does material agency influence the types of 'structure' of the work produced?'.

As discussed in section 4.1, there is a strong theme in Larsen-Jensen's ethos and practice which indicates the importance of material engagement. Material engagement can be seen in section 4.1.1 where Larsen-Jensen values the

interaction between the body, “two hands and two feet”, and the interfaces of his home-made instruments, a material engagement between the human and the instruments occurring during playing the instruments. However, material engagement is also evident in the practice of construction, starting with the “Womble ethic” of section 4.1.1, where materials are engaged with at the functional level, modified, repaired or left ‘broken’ so that unexpected functionalities emerge from nonhuman agency. Another form of material engagement is the way that Larsen-Jensen integrates the complex characteristics of the materials, such as the *re-functional potential* in section 4.2.2, engaging with materials to determine the form of the sound assemblage.

Larsen-Jensen’s practices of engaging with unfinished and broken equipment can be seen as strategies which ‘open’ or de-territorialise the Black-box of technology and allow material engagement. This indicates that ‘error’ is a strategy of the DiY practitioner to de-territorialise human intention as the exclusive structural organiser of the world. By incorporating error it appears that DiY culture offers a view of the world in which the human is situated as part of the material environment.

Another way of initiating reverse Black-boxing, of de-territorialising technology, has been demonstrated in the increasing of the re-functional potential, allowing an emergent assemblage of material agency. This is evident in the various strategies of material engagement, used by Larsen-Jensen, to de-territorialise the functions of technology: using technologies which are broken (the broken potentiometer 4.2.2); or broken-down into material components (the use of garbage from *Xtreme Waste* 4.1.2); or through re-functioning and the placing of components amongst different configurations to which they were designed (the *tape-machine amplifier* 4.2.2).

One of the main themes which has emerged from this chapter is Larsen-Jensen’s attitudes to structure and also the way in which material agency becomes an organising force to alter the types of ‘structures’ created. ‘Structure’, as defined

in this thesis, has the connotation of being human-biased: connected with the types of structure discussed in Chapter One resulting from a human-biased definition of power as a socially constructive force. On the other hand, the assemblage incorporates the potential for material agency and is therefore considered less human-biased than the initial idea of structure. The findings and conclusions drawn from this chapter's examination of Larsen-Jensen's practices, concerning structure and assemblage, are discussed in detail below.

4.3.1 Structure and assemblage

The definition of two types of 'structure' have emerged from the discussions of Larsen-Jensen's practices, these are: human-biased structures and material-biased assemblages. Structure is associated with the form of enclosed technologies of the Black-box, whilst the assemblage is an increase of the participatory potential of materials, so that materials become part of the determining factor of the type of 'structure which is created. These two types of structures, material and human-biased, both place different emphasis on the capacities of human and nonhuman actants: the Black-box emphasises the human-biased idea of function as a structure which subsumes material agency, whilst the forms of the assemblage create an emphasis on the participatory potential of material agency and the functions which emerge from the intra-action of materials.

Central to the definition of a material-biased assemblage is the idea that materials are not contained or 'closed' within a structure which limits their functionality, but instead, materials are kept in an 'open' state which enables complex functionalities to emerge from their characteristics. This is discussed in the concept of the *perpetual prototype,* a phrase which I use in section 4.2.1 to describe Larsen-Jensen's attitude of leaving his musical instruments 'unfinished', in an assemblage which maintains an 'open' state. The unfinished condition of the instrument, as evidenced in the discussions on indeterminate labelling of

controls and functions and the continuous adaptations made possible by not securing the casing, demonstrate the tendency to maintain a constant state of malleability: as 'prototypes' rather than finished objects, and as such, 'open' to mutations and re-functioning at the participatory level of material actants. The unfinished state of the instruments keeps the process open, ensuring that materials contained within the casings of the instruments are made available for engaging with, and also, that functions of materials are not limited and contained within a final subsuming structure.

The de-territorialised attitude to technology, as seen in the assemblage of materials, creates a particular *sound assemblage* which differs from the idea of *musical structure*. The DiY approach to 'structure' using the non-totalising assemblage has been demonstrated in Larsen-Jensen's attitudes to *sound assemblage* in preference to *musical structure.* Sound in this way, is seen in correlation to material actants and the forms which emerge from the intra-action of human and nonhuman actants.

Larsen-Jensen's practices suggest that the sound assemblage results from a 'bottom-up' approach. This has also been a theme throughout Chapter One where DiY culture has resisted 'top-down' structures in favour of more distributive forms of agency. In the 'bottom-up' approach the starting point is the basic materials and elements of technology, with structure forming as a result of basic characteristics and material qualities of the components used. This differs from an engagement with technology which organises agency as a purely human intention, with a structure imposed by a 'top-down' engagement. Instead of a 'top-down' human-biased structure, the assemblage is perceived as emerging from an engagement between human and nonhuman actants, distributing agency amongst the material environment and the intra-actions of materials.

Machine-talk, also introduced in this chapter, has been a way of looking at the intra-actions between 'machines' within a machine assemblage. Influenced by

Levi R. Bryant's definition of the machine as a functional entity, *Machine-talk* identifies the reciprocal action of materials to alter their functionality, and is linked to the means and strategies of re-functioning used by Larsen-Jensen. Through re-functioning it can be said that the participatory potential of materials is increased, allowing function to emerge from the qualities of materials. When function arises from materials, agency is emergent rather than something which is imposed from a central figure of determination, meaning that agency, in terms of a human-bias, is indeterminate. This emergent agency is paramount to the DiY practices of Larsen-Jensen, in which the practitioner is an interconnected element within a material environment.

In examining Larsen-Jensen's practices, this strategy of re-functioning, through allowing configurations of material actants to influence each other through reciprocal *Machine-talk,* has been seen to alter the functionality of materials. The vibrant materials of *Machine-talk* are identified by Larsen-Jensen when he says, the sound made by his instruments has "got its own life" and also "*this stuff creates its own* [types of] *structures*". In this way the sound assemblage produced by the oscillators emerge as result of what Jane Bennett calls, the "vital forces... [creating] an open-ended collective, a 'non-totalizing sum'" (2010, p. 24), which de-territorialises musical structures to create its own non-totalising assemblage.

The differences between structure and the types of assemblages created by Larsen-Jensen's practices indicate strategies of engaging the participatory potential of materials. The potential for materials to organise independently from human agency, represents a non-human-biased approach to technologies and the material environment. This develops the theory of extended agency, introduced in Chapter Two, where the material environment becomes an active component in the process of creating cultural artefacts.

Machine-talk is developed further in the next case study, Chapter Five, where similar strategies of material engagement are discussed, using the New Zealand built robot garage band *The Trons* as a focus point.

Case Study Two:
The Machine-talk of *The Trons*

Figure 23: The DiY robot band *The Trons*, shown in their natural environment of their lounge room (Reprinted with permission from Greg Locke, 2012).

In this second case study Greg Locke's robot garage band *The Trons* (Figure 23) is discussed in terms of the functioning of machine components and material agency. In this case study there are two approaches used: 1) to apply theories of material agency and functionality to the practices and strategies of *The Trons*, and; 2) to extend concepts from the observation and discussion of strategies which emerge from situated DiY practice. The research questions asked in this chapter are: 'In what way is the aesthetics of *The Trons* determined by material agency and the function of machines?'; how does material agency influence the

structures and organisation of *The Trons*? and; what is the role of intra-active interference, in terms of re-functioning, 'error' and material characteristics?

Functionality relates to Levi R. Bryant's concept of the machine, in which components are viewed in terms of functionality emerging from the intra-action of human and nonhuman actants. The *machine,* in this sense, relates to everything which performs a function, living or non-living, and becomes a way of emphasising the intra-actions between machines which emerge from the specific configuration of the machine assemblage.

The non-totalising assemblage is another conceptual tool which is applied to *The Trons*, focusing on the non-totalising aspects in the embracing of 'error' and unpredictability, and also with Locke's incorporation of the 'voice' of the machine, a material agency he calls "machine talk". The non-totalising assemblage is the type of 'structure' which emerges from the intra-actions of entangled human/material actants.

The Trons are four computerised mechanical 'robots' which play music to a live audience. They were created by one person, Greg Locke, working at his home garage in his spare time. Since 2008 *The Trons* have played over 80 'live' performances in New Zealand, Australia, Germany, Czech Republic, Singapore and Malaysia. They have been featured on national television and videos of them have been watched by over a million YouTube viewers. *The Trons* have also influenced a series of robot rock bands, although most of these bands have used the more recent Arduino technology (Flatley, 2009; Hicks, 2011), rather than re-function redundant technologies to allow musical instruments to be played. The technology and artistic design of *The Trons* represents a unique assemblage drawn from the DiY ethos, with Locke working outside of the technical and financial support of an institution to produce the world's first self-playing 'Robot Garage band'. *The Trons* follow in the DiY tradition of the 'independent', in that, they are the sole product of their own Hamilton based *Pie Plate Records* record company, retaining control over the rights of their songs, the methods of

distribution and production of recordings, and where and when performances occur.

Musical instruments and orchestras controlled by mechanical means are not an especially new idea, for example, mechanical barrow organs, pianola mechanical piano players and various fairground organs have been around for almost two hundred years: the 'new' is in the context of a robot powered 'Garage rock band' playing original songs, rather than in the mechanical reproduction of well known songs. According to Amy Spencer, Garage rock is part of a DiY musical movement which includes Skiffle and Punk music, influenced by an engagement with materials which is considered Lo-Fi. This is part of what Spencer identifies as embracing a Lo-Fi ethos:

> The Do-it-yourself approach to music making is all about producing your 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 (2008, p. 187).

Garage rock comes from a DiY tradition linked with the Skiffle music of the 1950's, which involved experiments with home-made instruments and later modified amplifiers and electronics. With *The Trons* there is a continuation of these experiments with home-made Lo-Fi robotics made from recycled materials, including re-purposed solenoids from cars, and improvised Skiffle-type instruments, for example the disposable tin pie-plate used for the sound of the snare drum, as shown below:

Figure 24: Pie plate used as part of the drum sound (adapted with permission from Greg Locke, 2011).

Figure 24 shows the bass kick-drum of *The Trons*. The drum sticks on the left side of the drum are made to move through the Meccano mechanism situated on the edge of the drum. One stick hits the bass drum whilst the other strikes the crumpled tin plate which has been gaffer taped to the skin of the drum. The sound of the pie plate being struck produces a rattling treble sound similar to a snare drum. This particular set up is discussed later in this chapter as a material engagement which allows the characteristics of the materials to exert agency over the sound produced

This type of ad hoc instrumentation, incorporating common everyday objects, was a trait of the Skiffle music of the 1950's: where it was common to see musicians using a wash-board as a drum with the player wearing thimbles on each finger tip: combined with a tea-chest bass, made from a broom handle attached to an empty wooden tea box with a string stretched between the two (Spencer, 2008, pp. 187-194). In the same way the mechanical and electronic workings of *The Trons* are made from components which are relatively common-

place objects, re-purposed and placed within different functional contexts. For example: the central controller of *The Trons* has been made from a redundant photo-copy card reader, a common object within libraries and universities; the music is made on a MS-DOS (Disk Operating System) programme, a Microsoft operating system which predates Windows; the computer is from the early 1990's, based on an Intel 486 processor, which would have been considered obsolete since around the year 1995; the computer operates common electronic components such as relays and transistors, which have been used since 1947. It can be argued that the out-dated computer, as an object of e-waste[73], is of equivalent commonality and ubiquity as the wash-board was of the 1950's. This use of simple materials is expressed by Locke in his "manifesto", a series of rules written by Locke and referred to throughout this chapter:

> 4. Keep the mechanics simple. The genre is Garage rock where many basic three chord songs with simple drum beats and melodies have been hits. There is no need to have every chord possible. It also keeps the band practical: easier to transport, less likely to fail, cheaper, easier for an audience to understand and relate to etc (Locke, 2011A).

The DiY aspects of *The Trons* are apparent in their mode of address, in particular, in the use of Meccano, a familiar children's building toy. The use of familiar objects, such as the standard electric guitar instrumentation and drum kit, combined with a simple familiar genre of music seems part of Locke's strategy of making technology accessible and "easier for an audience to understand and relate to" (Locke, 2011A). Part of this strategy appears to be in the use of simple mechanical engineering which gives *The Trons* an industrial quality reminiscent of the early technologies of the industrial revolution. The use of retro-style

[73] The average computer has a life span of five years, meaning that the 830,000 computer sold in New Zealand in 2005 alone are now redundant. Following the estimated figure that New Zealand has 10 million obsolete cathode ray tubes in storage awaiting disposal, this allocates 2 per head of population, in terms of computer monitors Source: http://www.zerowaste.co.nz/ - the obsolete washboard of the 1950s was generally one per household.

technologies has been discussed in Chapter One as the DiY influenced styles of the SteamPunk movement, in which it can be presumed that materiality is valued over the efficiency of more up-to-date digital technologies. The retro-industrial style of *The Trons* can be seen in the detail from the 'hand' of the guitarist, showing the Meccano wheels and pulleys (Figure 25).

Figure 25: Still image from the video *The Trons' Theme* (image by author, 2008).

The mechanical pulleys could be viewed as a symbol of an earlier era of technology which was more concerned with material engagement. This could be referenced as a SteamPunk attitude to technology and discussed through a set of theories concerned with a language-biased view of *The Trons.* However, rather than follow this language-biased path the aim of this chapter is to draw out the aspects of material agency which occur due to Locke's attitudes and engagement with technology and the way in which the 'form' of *The Trons* is determined by material engagement. This chapter begins, in section 5.1, by looking at Locke's attitudes to how he engages with materials, developing connections between the aesthetics and the functioning of the robots. This is followed by a more

detailed view of Locke's practices, in section 5.2, and the ways in which material agency is incorporated as an integral part of the process.

5.1 Functionality and the aesthetics of *The Trons*.

Between 2008 and 2011 my role as researcher was extended to working with Locke to design and film a series of promotional music videos for *The Trons*. During this process one of the aims, discussed with Locke, was to show that the mechanical movements of the robots was directly linked with the production of sound. This point was important for Locke, to link the mechanical functions with the sound of the music, since he wanted to display a message of 'honesty' to the audience, where every component of *The Trons* is functional:

> The horn is an interesting visual piece but it actually does sing out of it, so… it's not just for aesthetics it's actually got a purpose… it's actually for real, that's where the sound is coming from, and it's part of it being… open… transparent…it's being honest, presenting everything [that is actually] there.[74]

The strategy of revealing the mechanics behind the making of sound is central to Locke's design of the appearance of *The Trons*. Discussed in terms of the 'human-biased' view this is part of the honesty and transparency which propagates a participatory message to the audience. In terms of the 'material' view of DiY culture, Locke can be interpreted as indicating the importance of functionality over aesthetics when he says: "it's not just for aesthetics it's actually got a purpose… it's actually for real, that's where the sound is coming from". In this sense, the process of material intra-action, the "purpose" of the materials, determines the organisation of form for *The Trons*: the functioning of materials is an active agent in determining the specific *configuration* of the machine assemblage.

[74] Interviewed by author 07 December 2012 duration one hour twenty minutes.

The DiY ethos of allowing function to determine configuration, has been discussed in the previous case study (Chapter Four), where Larsen-Jensen displays a similar attitude to Locke in his self imposed rule of “two hands and two feet” (section 4.1.1), limiting the sounds in a live situation to those produced through the *intra-active interference* of the body and machine. In Locke’s version this *intra-active interference* is within the assemblage of the robot-body of the machine and the musical instruments being played. This is also apparent in Locke’s self-imposed limitation number seven: “7. All songs must be performable live with no intervention from outside” (Locke 2011A). This means that everything which is producing sound must be present on stage at the time of the performance. This strategy allows an openness of process to visibly evolve, a process which allows the materials which make sound to be viewed whilst challenging the “Black-box” approach of technology. In this sense aesthetic style is secondary to the functioning of the materials, or to put this another way, aesthetic style emerges from the functionality of the materials, indicating the interconnectedness of the DiY ethos and the forms which emerge from material engagement.

Figure 26: Still image from the video *The Trons' Theme* (image by author, 2008).

Figure 26, taken from a music video of the song *The Trons' Theme,* shows some of the aesthetic style which emerges from the functionality of the mechanical processes used to generate music. *The Trons' Theme* was the first music video made in collaboration with Locke in 2008. The brief of the video was to allow the viewers more detailed close-up shots of the mechanics of The Trons than the static mid-shot of *The Trons - self playing robot band* video. For Locke the aim of using close-up shots was to provide concrete evidence that The Trons were actually playing their instruments rather than miming to the song. Close-ups were intended to provide a visible link between the movements of the mechanics and the sound produced.

One of the themes which emerge from the mechanical materiality of *The Trons*, is the importance of creating an indexical link between the movements of the robots and the sound produced. For Locke, there appears to be value assigned to the 'honesty' which comes from the robots actually playing their instruments, as Locke says: "it's being honest, presenting everything [that is actually] there". This

honesty, which comes from the indexical link between the mechanics and the sound produced, is a way in which agency is shared with the materials of *The Trons*. In the video a close connection is revealed between the strumming sound of the guitar and the movements of the mechanism. Honesty can be read as Locke saying that mechanical function directs the appearance of the robots, so that materials are limited to those which perform some kind of function and that every visible movement is linked directly to the sound being produced.

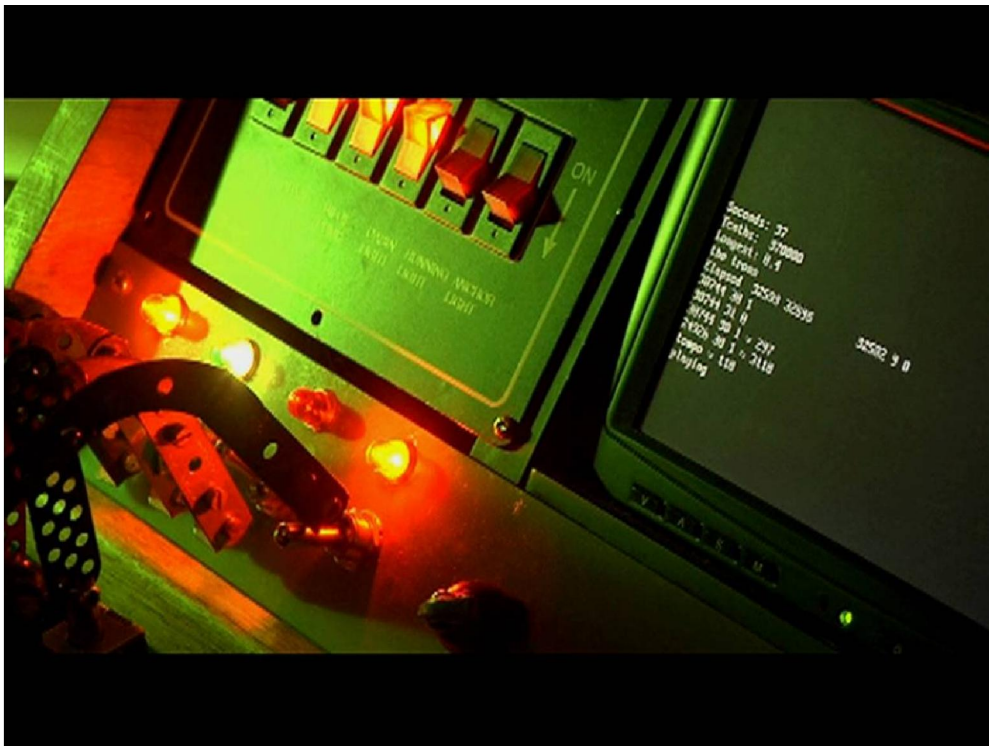

Figure 27: Animated hand of the keyboard player from a still from the music video Time's Up (image by author, 2011).

In the music video *Time's Up,* the movement of the robotic hand, Figure 27, is animated to activate the main switch of *The Trons* control panel, in place of the human hand of Locke, who would normally operate this switch (with his own human hand), at the start of each song. Whilst the movement of the hand is staged, the consul and the code on the screen is part of the machine which controls the robot's actions. In some ways the animation of the hand contradicts Locke's idea that every movement is authentically linked to the sound being produced, however, whilst this particular image is staged, it does mean that

more of the process is revealed, bringing to light the operation of the actual computer consol which controls the movements of the robots and revealing some of the actual basic computer code from which the music is written. This means that the animation of the hand is linked to a functional outcome, it is both anthropomorphic and functional, fitting in with point number nine of Locke's manifesto: "9. Anthropomorphic features must generally be for function also, e.g. the horn head actually produces a noise, the stick figure shape is primarily to support the guitar" (Locke, 2011A). As I understand it, part of Locke's ethos to link the form and movements of the robots to a function directly connected to the sound being produced, is a strategy of surrendering 'human biased' aesthetics to the 'aesthetics' which emerge through the configuration of materials performing specific functions. This is supported in the interview with Locke, when he says: "I sort of gave myself a rule that every action has got a musical reason for it… that each movement is related to... where the sound is coming from", meaning that the appearance and movements of *The Trons* are directly linked to functionality.

Another way of saying this is, that appearance is directed by the practical functioning of materials. The placing of functionality as a central agent is stated as number eight of Locke's Trons manifesto: "8. All movements of the band must be functional, directly making or modifying the sounds" (Locke, 2011A). There appears to be two things going on here: firstly, that the form of the material configuration (the appearance of *The Trons*) emerges from some aspect of material agency; and secondly, that functionality is central to Locke's engagement with materials.

The aspect of material agency influencing the appearance of *The Trons* can be seen in the assemblage of materials: the way that materials direct the 'structure' of the cultural artefact; the material configuration which emerges from the intra-active interference of machines performing functions to create sound.

This centrality of function is apparent in Locke's strategy to limit non-sound producing movements and to have a reason for every movement of the robot's physique:

> If I added a fake thing… [such as] his head turns backwards and forwards now and again, it would be an interesting visual thing, and it would create a more dynamic connection to the audience, but it's not real… why would the robot want to turn its head, it can't see anything… then it's supporting our expectations of what humans think that robots do.

Locke identifies that movements which may be interesting for a 'human' audience, have little significance for his particular engagement with materials as the functioning of machines, after all, the robot "can't see a thing". Therefore, Locke is saying that he is avoiding the human expectation of robot behaviour, the 'human-biased' view of "what humans think that robots do": avoiding human traits and mannerisms in exchange for allowing configuration to be determined by the functionality of the robots.

Whilst the human form of the robot is not something that Locke is particularly interested in, as a element which distracts from the functionality of producing music, there are reasons for the inevitable anthropomorphic shape which is again driven by the materials used:

> I don't really care about robots I just want to make some music... I wanted to make the guitars to play themselves and to experiment with that it just that they happened to be robots, the robots weren't the aim... the sort of anthropomorphation (sic) that just sort of comes automatically too, because the instruments are made for people to play them so when you design the mechanics to play the instruments they almost, sort of, take on a human looking form anyway because they were designed [for fingers].

This means that, according to Locke, "the [anthropomorphic] robots weren't the aim" but that the "human looking form" of the robot is driven by the function to play "instruments[...] made for people" and the human form. In this sense, the configuration of *The Trons* is determined by the shape necessary to hold the

guitar and also that some form of mechanical 'fingers' are required as interfaces between the machine and the musical instrument. This displays a form of indirect material agency, in which the materials of the instruments drive the appearance of the machines to play them: indirectly because human form intervenes as an agent involved in the shaping of the musical instruments for whom they were intended to be played by. Viewed as Levi R. Bryant's machines (2014), the human and nonhuman agents at play are "simultaneously a unit or individual entity in its own right and a complex assemblage of other machines" (2014, p. 75). This complex assemblage of machines, both human and nonhuman, are entwined within a process of "*reciprocal determination"* (Bryant, 2014, p. 50), an *intra-active interference* of materials as machines, which determine the configuration of *The Trons.*

As has been seen in this section, the shape and form of *The Trons* is directed by the functions of materials used in the construction. In this sense, functionality and material agency, rather than a 'human-biased' aesthetic, is the driving agency. The emphasis on function has been discussed in Chapter Two as a recurring theme in the context of material engagement. Function and re-function is also important in the next section, where the characteristics of discarded and recycled materials are looked at in terms of their re-functional potential in the machine assemblage of *The Trons.*

5.1.1 Garbage and re-functioning

An important element of the construction of *The Trons*, is the re-use and re-purposing of discarded materials. Locke's use of 'garbage' as major components can be seen in: the use of a pie-tin for a snare drum; a public address amplifier horn for the functional head of the 'singer'; stands made from recycled square tubing; broken discarded microphones for the head of the guitar playing robot; and a broken speaker cone for the head of the drummer. Re-functioning is also

present in the re-use of the aluminium pie-dish in the ‘records’ released by *The Trons*, as seen below:

Figure 28: Lathe-cut record of 'Sister Robot' using a discarded aluminium pie-dish (adapted with permission from Greg Locke, 2008).

Figure 28 shows Locke’s re-use of an aluminium pie-dish as the material for a lathe-cut record. The grooves of the record have been cut into the aluminium of the pie-dish using an antique vinyl lathe-cut machine by Locke’s own ‘pie-plate records’. The copy of the record I have is playable, although it is advised that the sound does deteriorate after several plays. By recycling materials from garbage, Locke is engaging with characteristics of the material of the pie-plate, allowing the re-functional potential of the material as discarded matter.

Garbage, prior to being used as components in *The Trons*, is material which has been removed from its context of intended functionality. According to John Scanlan, “Garbage is the formlessness from which form takes flight… garbage

indicates the removal of qualities (characteristics, or distinguishing features)… [and] a return to some [basic] material condition" (Scanlan, 2005, p. 14). It is as if garbage, as a material which is denied characteristics, is a non-substance, a basic but undefined material: for example, the discarded pie-plate in its context as garbage, becomes a material which shares the same characteristics with other disparate objects sharing the same space of the discarded. As discussed in Chapter Two, Scanlan's idea of garbage is based within a 'language' view, that is, a way of looking at the components of DiY culture as occupying a particular 'space' or territory. In a 'material' view of DiY culture, Locke's use of recycled material is drawing something new from the potential of these materials which have been stripped of their function-defining characteristics: referred to in Chapter Two of this thesis as the *re-functional potential* of enclosed technologies which emerge through a process of de-territorialisation and/or *Reverse Black-boxing.* Within the context of *The Trons*, the re-functioning of materials becomes a moment of de-territorialisation, in which, the indeterminacy of materials are integrated into the technology of *The Trons* through the re-contextualising of technologies which have been stripped of their value and meaning. This is also a characteristic of 'noise' and 'error', which Locke incorporates within the audio channels of *The Trons*, the mechanical and electrical noise of the relays, solenoids and mechanisms used to control the instruments, which Locke has termed "machine talk", discussed later in this chapter.

5.1.2 The prototype and the materials at hand.

Figure 29: Detail from a poster featuring *The Trons* with the Hamilton band *The Shrugs* (adapted with permission from Geoff Doube, 2011).

Figure 29 is a detail from a poster advertising a concert between two bands, influenced in different ways by Garage rock, *The Trons* and *The Shrugs*. In my interpretation of *The Trons* as a complex assemblage of machines, the combination of the human hand and the robot hand, made from the distinctive outline of the children's toy Meccano, highlights the intra-active interference of human/nonhuman actants, discussed in this section.

Figure 30: Still image from The Trons' theme music video (image by author, 2008).

Figure 30 shows the Meccano 'fingers' of the keyboard player. In this image one can see the mechanics of the solenoids connected to the levers of the fingers which play the keyboard. For me, the Meccano and the visibility of the connecting cables creates an impression of a transparency of mechanical operation, a prototype construction which reveals the re-functional potential through the contingent, unfinished appearance of the mechanical fingers. Rather than present a finished product, the malleable prototype qualities of the robot mechanics suggest the contingency of the prototype.

In the previous case study Larsen-Jensen displays a similar attitude to the prototype, preferring this to the finished technological object. The prototype offers an increase in the re-functional potential of materials, in that technology is not enclosed within a final functionality. It is useful to link Latour's process of reverse Black-boxing with the use of the prototype, discussed in Chapter Two, where the multiple material actants of technology become unfolded and visible. In the case of The Trons this lack of enclosure, or de-territorialisation, reveals the multiple actants responsible for functionality, rather than subsume them under

the functions of an opaque Black-box. In this way the contingent forms of the prototype allow a suggestion of 'error' to remain within the process, as if the process of reverse Black-boxing has revealed a multitude of machines within the machine.

The prototyping capabilities of Meccano are apparent in its multiple holes which allow different positions for bolts and connections. These structures have been left unadorned, so that the mechanics are not concealed, as a prototyping mechanism stripped down to the basic parts necessary for a basic functionality. The prototype suggests a process which is not finished, an assemblage of raw mechanical devices displaying functionality, and a participatory experiment yet to be completed.

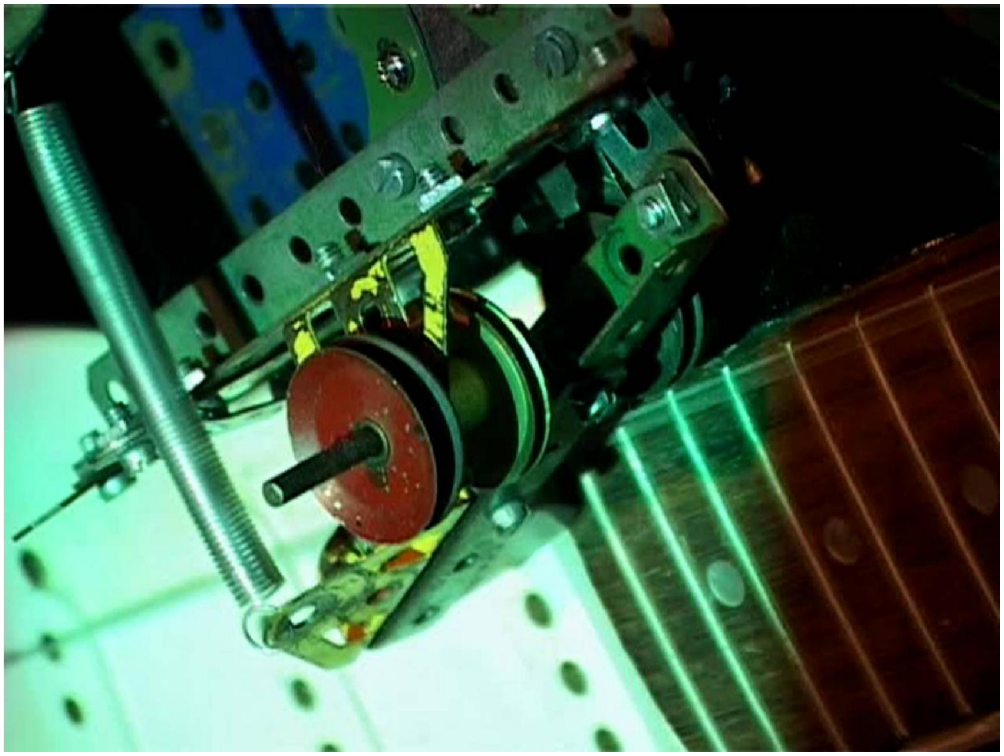

Figure 31: Still image from *The Trons' theme* music video (image by author, 2008).

Figure 31, taken from *The Trons' Theme* music video, the mechanism used to strum the guitar is revealed in close-up and shown to incorporate the same Meccano material as the keyboard fingers. The use of Meccano means that other

possibilities and other functionalities are also present and this is seen in the potential to reconfigure the construction of the prototype into diverse forms. These diverse functionalities and possibilities demonstrate that materials within the Black-box have become what Bruno Latour calls “unfolded in time and space” (1999. p. 183). It also means that the re-functional potential has been increased from an ‘enclosed’ technology to one in which materials suggest multiple functionalities.

Locke’s choice of using Meccano, a child’s construction toy, adds a sense of accessibility and promotes the idea that anyone can do it. This is part of a DiY ethos to reveal the processes which make the sound, as Locke says:

> It visually looks interesting and then also its got connections to people’s pasts so they relate to it and they look at it and think, they understand it as something they could have done themselves, they look at it and go , “I used to make stuff out of Meccano when I was a kid, this is just the same thing ” whereas if it was engineered by a, you know, an engineering shop, they’d go “oh well yeah, interesting but this is all out of my league” part of the message of the band is that we can all do these sorts of things too.

Locke’s use of the toy means that the mode of address is at the level of the child rather than from a hierarchical mode of address. This forms a basis for participation in the functionality of *The Trons* which would be lacking if, as Locke says, *The Trons* were made by a professional engineering shop. In this way, the use of materials creates a DiY message of the uncomplicated nature of the robots:

> Part of the message is that, this isn’t that complicated, um, it’s a lot of carefully thought out ideas but it’s not actually, it’s not like university or NASA or something like that where things are really, you know, ah, un-fathomable to try to do it. You know, you look at a space rocket and go, well yeah, I’d never do that, but if the space rocket was made out of Meccano you would do it.

The Meccano “space rocket” suggests an image of free experimentation which defies the prerequisites of formal institutional learning: “university”, “NASA” and

the “engineering shop” are, for Locke, professional entities which reject the naïve self-made possibilities of the Meccano space rocket. In essence Locke is saying that he has deliberately chosen materials for the prime reason of involving the viewer through the potential of participation, however, when questioned more closely Locke admits that his choice of Meccano was more from the perspective of the maker than the audience:

> Partly just because it’s what was at hand, quicker, you know when you get a creative idea often by the time you go around and purchase the correct stuff the effort required destroys the idea a bit so if you’ve got lots of stuff around, which I happen to have, it’s easier to just pick up appropriate things and use that so it’s cheaper and its faster.

As part of the creative process Locke is inferring to a technique of trial and error in which the prototyping capabilities of Meccano are ideally suited. In this scenario Locke would adapt whatever available materials were “at hand”, engaging with the “lots of stuff around... [to] pick up appropriate things” from the mass of available materials at Locke’s studio/home. In this sense, the mass of available materials acts as a ‘reservoir’ of re-functional potentials, a material environment of extended agency in which to quickly build prototypes.

The material of Meccano offers a ‘ready-made’ malleability, so that the ‘prototype’ appearance of Meccano is less a strategy of presenting a DiY message to his audience, than a way of simplifying the mechanical processes involved:

> I had used it a lot in the past and it is sort of modular, you know, you can bolt things together in different ways and if it doesn’t work first time it’s not like you have to reengineer you know, you just change it to a different bolt hole and try it there.

Although Meccano itself is a particular technological product, in a sense it is also a way in which the process of the Black-box is reversed. The fact that there are various options to “bolt things together in different ways” means that instead of being a ‘complete’ functionality, such as presented by the Black-box, Meccano allows a multitude of functionalities to be revealed. For Locke, Meccano offers a convenient process of trial and error, combining cheapness, malleability and

availability. However, these designed and intended traits of Meccano are not the full story, since its unfinished prototype 'appearance' is secondary to its actual re-functional potential which Locke exploits in the form of 'error', and more specifically in the 'inefficiencies'[75] of the material.

Locke's original plan was to use Meccano as a first stage prototype, and then to improve the design using a professional engineering company:

> I initially thought I was just going to use that [Meccano] to prototype it and then get an engineering company to make a proper thing better, yeah, that's right, that's what I initially thought.

Whilst Locke's original idea was to have the mechanics re-built professionally, Locke soon found that the characteristics of the Meccano material was difficult to imitate through professional engineering and that "error" was to play a larger part in the creative process. Locke discovered that the material characteristics of flexibility, fragility and inefficiencies of Meccano was a more complex configuration of material agency than first suspected. This complexity contained within the material prevented Locke from having *The Trons* re-engineered by a professional company. The use of these characteristics and errors as material actants is discussed in the next section.

[75] Like 'error', 'inefficiencies' are seen as diversions from the intended function of the material.

5.1.3 Extended agency and error.

"I know that often the mistakes sound better than what I was thinking of"

– Greg Locke.

Figure 32: Construction of the Meccano fingers of Fifi, the keyboard player (reprinted with permission from Greg Locke, 2007).

In the previous case study Larsen-Jensen's workshop was viewed as part of an extended agency responsible for co-creating his oscillator instruments. The extended agency of Larsen-Jensen also included the 'dump shop' of Xtreme Waste where his materials were sourced. The DiY practitioner can be viewed, in this sense, as being part of their extended material environment: with agency situated throughout the human and nonhuman actants (Figure 32). Locke's use of Meccano as a prototyping material, discussed in the previous section, suggests that the material has been used as a form of Clark and Chalmers "*active externalism*" (1998, p. 7) (as discussed in Chapter Two). Active externalism is a way in which materials are used as an extension of cognitive processes, externalising cognitive processes to make active use of materials and objects around us. This can be seen in the way that Locke uses Meccano as a 'notebook'

to develop his ideas, in which material agency is an important part of the reciprocal processes involved in making *The Trons*. The use of Meccano as a prototyping material, the way in which ideas are passed reciprocally between human intention and the characteristics and capacities of the material, is part of this active externalism.

It could be argued that all prototypes are a form of active externalism, a notebook sketch in material form to aid the process of developing the project. The difference with Locke's use of Meccano as a prototype, is that he realises that there is something intrinsic to the intra-action of materials, a certain 'inefficiency' and 'error', which he finds very difficult to translate into intentional engineering terms, as will be discussed below.

Another way to describe this process is to look at Locke's practice as involving a material engagement, defining the link between human intention and agency as "intention in action" (Malafouris, 2008, p. 30), whereby agency is a reciprocal process which emerges from material engagement: "Agency is not a matter of private thought and imagination but of actual practice and being-in-the-world" (Malafouris, 2008, p. 30).

Locke's practical approach displays a high degree of material engagement, to the extent that material agency is part of the ingrained process in which Locke works. Part of this material engagement is Locke's use of material 'error' as a strategy in which material agency becomes an integrated part of the process:

> I initially built them using whatever I had lying around, expecting to have to build them really well for it to work ok, but realising that the crappy build was actually better… the crappy build seemed to work well and so now I purposefully don't build them good… [I just add] more tolerance.

For Locke, the "crappy build" which Meccano produces is "crappy" because of the high degree of "tolerance", meaning that it is not a material which lends itself easily to accurate and precise mechanical operations. So, whilst Locke expected that *The Trons* would have to be built using higher engineering

tolerances, it was a “happy accident” (Locke, 2011) which allowed the “crappy build” to be the better build. This means that the “crappy build” is more effective than a precise engineering based on purely human intention, and that there is a particular characteristic of the wider tolerances, or looseness of construction, which diverts human intention to create something that “was actually better”.

By viewing the “crappy build” of Meccano as engaging with material characteristics, “error” is defined as a ‘diversion from human intention’. This definition of error is built upon from Larsen-Jensen’s use of error in the previous chapter and also in the following *Bingodisiac* case study, in which random elements are used to divert from the human intentions of the musicians. When agency is diverted from a purely human intention, through the strategy of introducing ‘errors’ arising from the characteristics of materials, extended agency can be said to become part of the process. The extended agency of the material environment has been discussed in the previous case study, where Larsen-Jensen’s workshop became a ‘notebook’ for developing his ideas and practices (section 4.1.1) using a process of *intra-active interference*, which combines Jane Bennett’s “interactive interference of many bodies and forces” (2010, p. 21) with Karen Barad’s notion of “intra-action” (2003, p. 815) discussed in Chapter Two. The error and low precision of Meccano can therefore be viewed as an agent of *intra-active interference*, meaning that a multitude of actants, “many bodies and forces”, are engaged with.

The “error” characteristics of Meccano construction and its inability to accurately replicate repetitive movements are what interests Locke:

> That’s why I thought Meccano is good to try, it turned out to be really good because it had the right level of flexibility, of, you know, *error* in the pivots and bearings, there’s no bearings, you know, so things just rotate really loosely… I think trying to rebuild it anyway more perfect, might not necessarily make it any more better anyway, I actually think it could make it worse.

This engagement with the “error” characteristics of Meccano, displays a material engagement between Locke and the multitude of actants involved in producing

the ‘error’. This can be viewed in terms of Levi R. Bryant’s machine, in which the complex functions of the material are seen as a machine. In this sense, the indeterminate “error in the pivots” and the “flexibility” of materials reciprocate to alter the function of the machine assemblage of the mechanisms playing the instrument. This form of material agency, created from a complex assemblage of machine, is the particular function of Meccano which would be impossible to replicate if the mechanisms were moved from prototype to fully engineered product. This indeterminate function of the Meccano machine is a specific operation which forms an integral part of the processes involved in the functioning of *The Trons*, so much so, that the material becomes an indispensible actant. This use of error came as a surprise for Locke who, given his engineering background, was more accustomed to reducing error through accuracy to gain better, more efficient results:

> They are quite inaccurate, and they are flimsy, so they are not always doing exactly the same every time, so there’s vibrations and play in the sort of, in the pivoting parts, which means that every time they hit the keys or snare or strum the guitar its slightly different.

These slight differences of timing are of value to Locke who, as an accomplished musician, recognises the expressive qualities of flexible timing to add a unique material agency to the sound. This also means, in terms of Bryant’s machine, that the various machines which *The Trons* comprise, are *intra-acting* together, for example, the precision of the computer controller is intra-acting with the indeterminate characteristics of the materials. This form of intra-action was discussed in the previous case study, where the precise square wave of Larsen-Jensen’s oscillator was intra-acting with the imprecision and error of the ‘indeterminate pot’ to create an output which emerged from the intra-action of simple and complex functions of various machines. In this case the more ‘simple’ precision of the computer used to control *The Trons*, via *intra-active interference*

of the complex machine assemblage, creates an output which is more complex, indeterminate, and desirable than a purely human intention[76].

The combining of material and digital technologies is used to Locke's advantage, in that, he is utilising aspects of the qualities of materials to allow small "inefficiencies":

> I'm embracing the inefficiencies, which I didn't expect to do, to start with, I thought everything would have to be perfectly made… but it turns out that having things a bit wrong… is good.

Through allowing material agency to divert from an efficient, exclusively human oriented idea of agency, Locke has discovered that "perfectly made" machines produce less interesting sounds than allowing "things [to be] a bit wrong". This embracing of material error and "inefficiencies" is a process in which the precision of the digital computer is influenced by an *intra-active interference* to create an output which would be difficult to obtain through a purely digital

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[76] The background to the reason Locke finds the error of materials desirable is expressed in the interview, where Locke described a series of experiments he had carried out using samples of recorded drums played by some of the musicians that had most influenced the sound of *The Trons*. This was mostly of drummers since he wanted to look at the use of rhythms in music, including the 'robotic-like' drumming of Maureen Tucker from the band *The Velvet Underground* which was one of the original inspirations for building a robot garage band. He analysed the sound waves on computer software to determine the accuracy of their playing drawing the conclusion that it was a combination of accuracy, to "3 milliseconds" of the mathematically correct timing, and a use of deviations from the mathematical timing which created the musical expression he was after. The deviation he discovered, in the case of *Hamish* Kilgour of the New Zealand group *The Clean*, was a 3 millisecond variation used to deliberately move the timings of the snare drum forwards and backwards from the mathematically perfect in a slowly modulating frequency. From this Locke devised three positions in terms of timing: "there's complete rigid pattern [that is, the mathematically correct], then there's pattern that's varying according to another pattern [modulated pattern], and then there's just pattern that is varying chaotically", all of which have influenced Locke in his use of materials which allow variation to the mathematically correct patterns created by the digital aspects of *The Trons*.

means. This combination of analogue and digital technologies, with the intra-action of material agency, is a similar strategy to those used by Larsen-Jensen, in Chapter Four, to create complex machine assemblages which incorporate 'error' and 'indeterminacy'.

It can be useful to refer to Locke's use of 'error' as a strategy of reverse Black-boxing. Just as the Black-box becomes opened when there is an error in the functionality of the machine, through "embracing the inefficiencies" of the machines, Locke has allowed material actants to become part of the assemblage. This characterises the assemblage as non-totalising, since errors and inefficiencies are unpredictable and uncontrolled processes which are not totalised by an exclusively human agency.

For Locke, it is the involvement of material characteristics which provides a participatory element to the creative process. In some ways this means that Locke, too, is displaced as the primary controller of *The Trons*, allowing materiality, error and indeterminacy a space within the process:

> I'm not going to fix that, because… well, that's part of what's going on, and... because a lot of times I can't actually [fix it], it's more subtle than you actually hear... actually the mistakes are the good parts. I don't want to improve it because I know that often the mistakes sound better than what I was thinking of.

For Locke, the "mistakes" caused by material error become "the good parts" of *The Trons'* sound, elements that he will not fix because as he says: "I know that often the mistakes sound better than what I was thinking of". On another point as Locke says, sometimes the mistake is so "subtle" that he "can't actually [fix it]", suggesting that the complex functioning of the materials is something which is outside of his control. This suggests that *The Trons* is a complex machine assemblage of which Locke, himself, is just one machine amongst machines. In the next section of this chapter, the machine view of *The Trons,* influenced by Levi R. Bryant's idea of machines as both material and human agents, is discussed further.

5.2 The *Machine-talk* of human and nonhuman machines

In this section *The Trons* are discussed in terms of being a complex assemblage comprising of the intra-action of various functions of both human and nonhuman machines. Important concepts in this section are Levi R. Bryant's concept of the machine and the process of "*reciprocal determination"* (2014, p. 50), in which the functions of machines are altered and adapted by other machines. Developing this concept further, *Machine-talk* is introduced as an adaptation of Greg Locke's description of the audible sounds of the mechanisms of *The Trons*, which he allows to leak into the sounds of the music produced by the robots. Guiding these concepts is Karen Barad's idea of agency as an "enactment... [rather than] an attribute of subjects or objects... Agency is 'doing' or 'being' in its *intra-activity* (2007, p. 178). This more active idea of agency continues the theme of functionality and the emphasis on the 'things' that machines *do,* rather than the more 'static' characteristics of materials.

5.2.1 The intra-action of machines

As well as the more 'static' capacities of materials, traits such as weight and mass for example, there are also the more dynamic capacities which occur through performance. By 'capacities' I mean the participatory potential of materials to form connections and to intra-act with other materials to form complex functions. Dynamic capacities involve the material qualities of the instruments *intra-acting* with the mechanisms playing them:

> It's a subtle sort of change and also they [the mechanisms] respond to the instruments too, where every time it strums the strings, it starts hitting the strings in a different place, due to the natural vibrations of the string, that the contact point is slightly different and it sets off slightly different resonances each time it hits.

In identifying that "[the mechanisms] respond to the instruments", the subtle variations which occur "every time it strums the strings", Locke is suggesting that there is a "*reciprocal determination"* (Bryant, 2014, p. 50) within the assemblage of mechanisms and instruments which creates a complex functionality. The function of the guitar sound for example, emerges from an assemblage of strings and a machine to "strum the strings". The *intra-action* within the assemblage of these two machines requires what Locke calls a "contact point" which, due to the characteristics of materials, "sets off slightly different resonances each time it hits", meaning that the functions of materials change and are slightly altered at each strum: as Locke says "[the mechanisms] respond to the instruments too" suggesting a two way *intra-action* of multiple machines.

Levi R. Bryant's machine ontology (2014) is useful to further this discussion point, as a framework through which these *intra-actions* of machines produce a complex functionality. For Bryant, even the seemingly simple characteristics of materials, such as the flexibility of Meccano, becomes a "complex assemblage" of actants:

> There is no such thing as a simple machine. Rather, every machine is simultaneously a unit or individual entity in its own right and a complex assemblage of other machines. In short machines are composed of machines (Bryant, 2014, p. 75).

Using Bryant's idea of machines we can view Meccano as an assemblage of human and nonhuman machines, for example, the design requirements of the material to be able to be easily dismantled and re-constructed into different configurations becomes a functional element of the machine which creates the multiple holes in the length of the material. Other machines within the Meccano assemblage create other material characteristics, such as the light weight and flexibility of the material, another characteristic which is integrated into the assemblage. In this sense, Locke's computer system, the material of Meccano, and the musical instruments are all complex machines in their own right.

In Bryant's view the "complex assemblage" of machines, which make up Locke's guitar strumming device, are *intra-acting* and altering the functions of each machine component of the machine assemblage. As functions alter slightly between the guitar and the strumming machines, the output from the assemblage of the two machines also varies, meaning that the output emerges as a result of the *intra-active interference* within the assemblage of machines. This is supported by Bryant's machine ontology and the idea of "*reciprocal determination"* (2014, p. 50), the determining material agency which is jointly composed through the *intra-action* of machine assemblages:

> There is a sort of *reciprocal determination* between flows and inputs and machines exercising operations on these flows...There are many instances in which the machines that flow through a machine modify the machine that operates (Bryant, 2014, p. 50).

This means that the functions of machines are not so much individually determined, or fixed, but rather collectively determined by the "flow through a machine [which] modify" (p. 50) other machines. In the case of Meccano, the design aspects can be viewed as human-biased elements, and also as machines which affect the function of the material. The 'errors' of Meccano, as diversions from exclusively human agency, are material actants and also machines acting to increase the re-functional potential by altering the functions of the design elements. These machines, human and material, are part of the complex intra-action which occurs within the machine assemblage: as a multitude of machines which act together to reciprocally determine the function of the machine assemblage we call Meccano.

In *The Trons,* there are two different categories of machine which need to be identified. Firstly "at their heart [there is] a pre-programmed system" (Locke, 2011a), comprising the computer control as a fixed function machine which repeats commands programmed by Locke. Secondly there is the characteristics of chance and accident introduced into the system via the characteristics of materials Locke has chosen for his construction. *Reciprocal determination* can be

seen in the way that the various components *intra-act*. For example, the precision of *The Trons'* computer control, measured and operated within the accuracy of a few thousandths of a second (milliseconds), *intra-act* with the "variations" and "flimsy mechanicals" of the materials and instruments Locke has chosen to use:

> I'm providing the structure, the song structure... but I'm letting the un-connectedness of the mechanical parts, within with the instruments, be part of what creates the character of the music.

Therefore, "song structure" and the "un-connectedness of the mechanical parts" are identified by Locke as being two different machines working together to produce "the character of the music". This *intra-active interference* has the function of inducing variations in timing and tone of the sound, as Locke describes:

> There's heaps of little sorts of variations going on, which is what helps it stand apart from [purely] computer created music. So the use of the real instruments and the flimsy mechanicals interact together to provide sounds that are continuously changing.

Within the function of creating "sounds which are continuously changing", Locke identifies a multitude of actants, suggested when he says there are "heaps of little sorts of variations going on". Locke also identifies two machines: "the real instruments" and "the flimsy mechanicals", two machines which "interact together to provide sounds that are continuously changing". There is also the fixed preset functioning of the computer controller, the functional variations of the Meccano and the strings and materials of the instruments, representing different levels of functional plasticity, depending on the context and placing within the assemblage of machines. By combining these two different categories of machine function, fixed and plastic, Locke creates a complex assemblage of machines which he views as the "natural element" emerging from the materials:

> There's a natural element, that's a simple way of saying it… I don't want to tamper too much with it because that's the character of what those robots present.

Locke's "natural element" can be interpreted as describing the material complexity, emerging from the intra-action of the machine, which is seen as "natural" in contrast to human-biased intention. The agency of "natural elements" suggests a material engagement beyond an exclusively human agency, one which involves a complex assemblage in which agency is dispersed amongst its various components. Agency in *The Trons* in this sense, is akin to Jane Bennett's "*distributive agency"* (2010, p. 31), extending beyond the borders of human agency and into the material environment.

In his essay *Happy accidents,* Locke refers to "the mechanical rhythms that are 'natural' to *The Trons*" (Locke, 2011), referring to the nature-like complexity of material agency at play within *The Trons*. For Locke, accidental elements, emerging from material agency, becomes part of the output of the machine, linking the idea of 'nature' (material agency) and nonhuman agency: "chance seems to be the voice of nature" (2011). This suggests that material agency in *The Trons* emerges as a result of Locke's relationship with chance, accident and the 'nature' of complex functions determined by machine intra-actions, as discussed in the example below.

Figure 33: Pie plate used as part of the drum sound (reprinted with permission from Greg Locke, 2011).

The bass kick-drum of *The Trons* comprises an additional disposable tinfoil pie-plate, which has been attached to the skin of the drum, as seen in Figure 33 the large silver circle above the drum lettering in the image above. In its operation, one stick, driven by a solenoid, hits the bass drum whilst the other stick strikes the crumpled tin plate, producing a rattling treble sound similar to a snare drum. Material agency emerges in the fragility of the pie-plate, which causes it to distort and flex with each strike, as an example of 'plasticity' of function discussed above. The characteristics of the pie-plate are part of the uncontrollable "nature" of the material being used. The function of the drum is a reciprocally determined *intra-action* of various complex machines: the programmed structure of the computer controller *interfering* with the flexible tolerances of Meccano as discussed above, with a further *intra-action* with the characteristics of the tin-foil pie-plate. There is also, as Locke says: "the randomness just from the sticks not always hitting it correctly... which means that every time they hit the keys or snare or strum the guitar its slightly different". Together with other more subtle elements, discussed in the next

section of this chapter as “machine talk”, these elements form a complex assemblage of machine functionality.

The above examples suggest that the function of the complex assemblages within *The Trons* go beyond exclusively human agency and engage in an agency which de-territorialises any division between the human and nonhuman. This represents an example of DiY engagement with materials or an extended agency which is more enacted than human intention, as Locke identifies: “I soon realised there were many things happening that I hadn’t programmed. What’s more, often these were the things that sounded the most interesting” (Locke, 2011, p. 9). Through incorporating material agency, the complex operations of *The Trons* machine becomes something which is an emergent function of machines *intra-acting* with machines, rather than something that is under the control of its human creator. In following Bryant’s machine ontology, in which nonhuman materials and human elements are all equally functioning machines, Locke becomes another machine component within the complex assemblage, rather than a central figure controlling agency. This is reflected by Locke when he describes the deviation from human intention which occurs when he allows ‘error’ to be part of the building process:

> In fact, it was as if the worse I built the machines, the better they sounded. Investigating this revealed that the irregular inaccurate movements were introducing another layer of semi - random sounds over the top of the desired ones. The band was producing its own rhythms and colouring (Locke, 2011, p. 10).

This incorporation of error means that the “worse” Locke builds the machines the “better” they sound, meaning that human intention was only one part of the complex assemblage comprising *The Trons.* Therefore, Locke’s practice becomes an engagement with materials in which participation between human and nonhuman actants becomes integral to the functioning of the “band” (p. 10). Following this line of thought, *The Trons* becomes a musical group which co-create together, so that “the band was producing its own rhythms and colouring” (Locke, 2011, p. 10).

In the following section the co-creation of sound is further discussed in terms of developing the concept of *Machine-talk*: as an *intra-active interference* of machines.

5.2.2 Audible machine talk and functional *Machine-talk*

In this section there are two interconnected definitions of the way that machines within a machine assemblage intra-act or 'talk' to each other: audio 'machine talk' and functional-oriented 'Machine-talk'[77]. Audio "machine talk" comes from Locke's descriptions of the non-musical elements of *The Trons*, caused by the sound of mechanical parts, electrical components and electro-mechanical elements. Audio machine talk signifies the operation of the electrical and mechanical processes behind the sound. This is an expression of a DiY ethos, making the process more 'transparent', through revealing some of what would usually be excluded from the finished artefact. I have adapted Locke's definition of machine talk to include a functional aspect to the intra-action of machines, so that it is not just sounds made by the audible 'chatter' of the mechanisms, but also the intra-connection of functions which are adapted between different materials of the machine. *Machine-talk* evolves throughout this section using Locke's definition as a starting point, although, as will be seen, both audible and functional *Machine-talk* are interconnected.

For Locke, the sounds of machine talk are not something which need to be excluded as interference, or as 'noise' within the system, but are valued as an integral part of the characteristics of *The Trons*. By intentionally including

[77] Note the hyphen and capitalisation in functional *Machine-talk,* a concept developed throughout this thesis, whereas audio "machine talk" is quoted from Greg locke's concept of the word.

extraneous sounds originating from the process, Locke incorporates part of the mechanisms within the finished sound. This audio is the starting point for the development of machine talk:

> I just let [audio] spill happen... so there's a bit of randomness in the recordings just by ambient microphoning (sic)... The mechanical sounds of the fingers activating, or, there's various electronic clicks coming from bits of interference from the solenoid back-EMFs, there are all sorts of little clicks and bits and pieces… and also directly through the computer interface… I kept it deliberately… I guess it's the *machine talk*.

For Locke "machine talk" means the audible sounds of the mechanisms and electrical components used in the process of making music. Rather than exclude these sounds, Locke allows sounds of the processes to filter through the electrical system and also by using "ambient microphoning", that is, microphones which are placed to deliberately capture the sounds of the environment around *The Trons*. Following Locke's definition, audible machine talk can be seen as divided into three distinct types: mechanical, electrical and also electro-mechanical.

- *Mechanical*: "the mechanical sounds of the fingers" – the rattles of Meccano. Physical sounds of the mechanisms.

- *Electrical*: "directly through the… computer interface" – electrical control signals leaking into the audio channels and, as seen later, also through the re-functioning of equipment.

- *Electro-mechanical*: "various electronic clicks coming from bits of interference from the solenoid back-EMFs". Electrical interference generated by electrical-mechanical components such as the solenoids used to move the Meccano fingers.

The above distinctions allow the source of the audible machine talk to be identified, yet, if machine talk originates from the intra-actions between various elements of the mechanical and electrical components, then it is also useful to

identify which components are involved in each type of audible machine talk. This can also be seen as originating from three different intra-actions of components within the machine assemblage:

Type of audible "machine talk"	components of the machine assemblage	Method of capturing sound
Mechanical	mechanism and instrument.	Ambient microphones.
Electro-mechanical	computer signal and mechanism.	Electro-magnetic interference in cables leading to amplifiers.
Electrical	computer control signal and the audio channels.	Switches, relays and electrical devices connected to audio signal cables.

Table 1: Types of audible machine talk

Mechanical machine talk, as shown above, is introduced into the system via the deliberate positioning of "ambient microphoning (sic)", which Locke has placed near to the source of the mechanical sounds, as seen in Figure 34:

Figure 34: Ambient microphone capturing the "machine talk" of mechanical processes (reprinted with permission from Greg Locke, 2011).

This form of audible machine talk can be considered the most deliberate since it requires Locke to actively place a microphone to capture the mechanical sounds from the Meccano and the action of the mechanisms on the instrument. Audible mechanical machine talk is a combination of mechanical sounds, from the physical rattle of Meccano, the movement of the solenoid and the scrape of the pick on the guitar strings. Its inclusion can be consciously determined via the sound level attributed to the ambient microphone, during the recording process.

Electro-mechanical machine talk is generated by electrical 'noise' introduced into the system via, what Locke calls, the "various electronic clicks coming from bits of interference from the solenoid back-EMFs". These electrical signals, which originate from the mechanical operation of the solenoid, are introduced into the audio wiring of *The Trons* and are amplified along with the audio signals from the electric guitar pick-up. The "spill", as Locke calls it, occurring between the control circuits and the audio circuits, is caused by "the solenoid back-EMFs", which is when the electronic signal, originating from the computer, is made to strike the guitar string, the drum or the keyboard. The solenoid originates from the

mechanism used in a car's central locking system, the key is turned and the 'click' of the door lock is electrically applied to all four doors at once. In *The Trons* the solenoid, is re-functioned to transfer electrical impulses into a movement which strikes the string of the guitar or skin of the drum. The "back EMF" (electro-magnetic-field) causes a small spike of electricity to be generated which enters the amplifier system and is audible as part of the electro-mechanical "machine talk".

Electrical machine talk is a deeper engagement with the material characteristics of *The Trons*, incorporating the electrical 'noise' generated by the system. Electrical machine talk can also be viewed as a cross-over point between *audible* and function-oriented *Machine-talk*, since it can be caused through an intra-action of the re-functioned characteristics of recycled equipment and the original intended function of the equipment, as seen in the image of the tape-recorder amplifier below (Figure 35).

Figure 35: Electrical "Machine talk" in the home-made DiY amplifiers of *The Trons* (reprinted with permission from Greg Locke, 2011).

Locke's use of a tape-recorder as an amplifier, introduces an element of electrical-*Machine-talk* unique to the particular characteristics which emerge

from the complex cross-over of designed functionality and Locke's re-functioning of the device. The tape-deck has been designed by the original manufacturers to function efficiently in the amplification of signals from magnetic tape and therefore, its design has been optimised to maximise characteristics which are efficient and delimited towards this specific purpose. This means that when the tape-deck is re-functioned as a guitar amplifier there is a complex intra-action of optimised design functionality and its re-functioned purpose. The tonal characteristics of sound produced in this way results from a complex intra-action which is difficult to determine or deliberately re-produce, creating erratic 'spikes' and 'troughs' in the frequency response, which the original manufacturers have attempted to exclude from the amplifier when used for the specific designed purpose. The 'spikes' and 'troughs' of frequency response, when re-functioned equipment is used, allows a third sound to appear which is not simply a combination of the instrument sound and the frequency response of the amplifier, but a complex intra-action which allows the functionality of the amplifier to display non-designed characteristics.

In contrast to Locke's version of machine talk, functional-oriented *Machine-talk* occurs from an *intra-active interference* of the functions of different components within a machine assemblage. The theoretical basis for *Machine-talk* is a combination of the material agency of Jane Bennett's vibrant matter: the "interactive interference (of many bodies and forces)" (2010, p. 21); and the "*reciprocal determination...* in which the machines that flow through a machine modify the machine that operates" of Levi R. Bryant (2014, p. 50). There is also the influence of Karen Barad's idea of agency as:

> 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 (2007, p. 178).

Therefore, as a development of theory, *Machine-talk* is agency as an "enactment" (p. 178), and is contained within the functional aspects of the intra-action of machines to "modify the machine that operates" (Bryant, 2014, p. 50).

Using Bryant's concept of the machine, in which components are viewed in terms of functionality, the function of the tape-deck amplifier is dependent on various reciprocally determined *intra-actions* within the machine assemblage. Various elements within the assemblage of *The Trons* have characteristics inherent in their original intended purpose which have then been re-functioned through placing the material in connection with other materials. This has been seen previously in the Locke's use of Meccano, where the inherent characteristics of the materials intra-act with solenoids, designed for use in cars, combined with the human actants inherent in musical instruments made for humans to play. Each machine component has a particular set of functional characteristics which operate upon the particular functional characteristics of the other machines it intra-acts with. For example, the movement of the car solenoid, designed as part of the car door central locking system, operates upon the functional characteristics of Meccano, designed to function as a children's light-weight prototype model making material, this in turn operates upon the strings of the electric guitar – the design of which is intended for playing by human fingers. In this way, original design functionalities are altered by the placement of each machine within the assemblage. The overall functionality of the assemblage is a result of these intra-actions, tensions and resonances, between original intended functionality and re-functioned usage.

There is, however, a distinction which needs to be made between *functions* and *characteristics* of materials. Characteristics suggest a fixed property or quality of the material, and at the same time, a characteristic can also mean a particular functional *capacity* that a material has when operated upon. The characteristics of the Meccano material, as discussed earlier in this chapter, can therefore be viewed as a particular set of material functions and ways in which the material responds when operated upon. One of these functions can be the flexibility or

“looseness” which Locke has talked about, whereby the Meccano functions as an imprecise linkage between the exact logic of the controlling computer and the interface of the musical instrument. This function of imprecise linkage, valued by Locke as an integral part of the sound producing mechanism, comes as part of the designed characteristics of Meccano to function as an easy to use children’s construction toy: its components are designed to be repeatedly dismantled and constructed into different configurations, rather than functioning as a ‘fixed’ construction material.

The non-‘fixed’ design characteristics of Meccano, however, do not mean that this makes Meccano a particularly different type of machine to the car solenoid, or the tape-deck. The tape-deck is of ‘fixed’ intended functionality, meaning that it is intended by its designers to function solely as a tape-deck, rather than as a machine which can be altered and turned into other types of functional object. Many of the machines incorporated into *The Trons* are machines which are intended by their manufacturers as ‘fixed’ objects, it is rather the plasticity of function which is of importance in determining the flow of *Machine-talk*, whereby machines alter the functioning of other machines. This plasticity of function is in part demonstrated by the re-functioning that has occurred to materials within the assemblage of *The Trons.* Another way to understand this is through a machine’s capacities to be re-functioned when entangled with other machines, a re-functional potential which may lie dormant until a particular entanglement occurs.

The re-functional potential can be seen in the malleability of function which transforms: the aluminium pie-plate into a snare drum; the tape-deck into an amplifier; and the car solenoid into a robotic component. Each of these materials are machines which have had their functions altered, in most cases extremely altered, from their original design intention to the functionality which emerges through inclusion of the material into the assemblage of *The Trons*. This is the *Machine-talk* which has transformed the functions of the object through their inclusion within the *intra-active interference* of *The Trons* assemblage. Machine

talk, then, becomes the complex intra-action between machines through which material agency is expressed.

5.3 Conclusions: The DiY message

The research questions asked in this chapter were: 'In what way is the aesthetics of *The Trons* determined by material agency and the function of machines?'; 'How does material agency influence the structures and organisation of *The Trons*?' and; 'What is the role of intra-active interference, in terms of re-functioning, 'error' and material characteristics?'

Locke's DiY ethos of using simple materials and approaches allows *The Trons* to produce a far greater range of complex sounds through the extended agency of materials. This attitude of engaging with materials and extending agency incorporates various strategies which are discussed below.

5.3.1 Material engagement

Although *The Trons* are predominantly the work of one person, Greg Locke, without whom they would not exist, there is also a strong case to say that materials play a large part in the form the robots take. This addresses the research question relating to the aesthetics of *The Trons* as determined by material agency and the function of machines. In section 5.1 Locke's focus on functionality was a leading element in the aesthetic look of *The Trons*, where each object and component was determined by functionality, as expressed in point nine of Locke's 'manifesto': "9. Anthropomorphic features must generally be for function" (Locke, 2011A); and also from the interview transcript "it's not just for aesthetics it's actually got a purpose". Functionality also featured in

section 5.1.1 where the re-functioning of garbage was discussed in terms of materials removed from their usual functional context through failure and redundancy. Functionality plays a large part in discussing the research question: 'how does material agency influence the structures and organisation of *The Trons*?'

Functionality and the failure of functionality emerges as a major theme in section 5.1.2 where Locke's attitude of keeping The Trons as 'prototypes', described by Locke as the "crappy build" using Meccano instead of professional engineering materials, is linked to Bruno Latour's process of reverse Black-boxing. Reverse Black-boxing is a way in which the multiple material actants of technology become unfolded and visible (also discussed in section 2.1.2), occurring when the overall function of a device fails. Locke's use of the prototype material is partially linked to the DiY ethos of encouraging participation, summed up by Locke when he says "if the space rocket was made out of Meccano you would do it". However, the use of the prototype is more relevantly connected with Locke's own engagement with materials, rather than as a way in which the DiY ethos can be promoted to an audience. This is highlighted by the material characteristics of Meccano which Locke discovers and utilises. Meccano is a "crappy" material since it is imprecise and causes small errors to occur, this is similar to the inconsistent sound of the pie-plate, a particular function which Locke values and incorporates into the sound of *The Trons.* Locke's use of material 'error' is summed up in his statement: "I know that often the mistakes sound better than what I was thinking of". This leads 'error' to be defined as a diversion from a purely human intention and as a strategy in which agency is extended from being exclusively human. Extended agency is discussed further in section 5.1.3, in terms of the DiY practitioner being viewed as part of their extended material environment, as a form of Clark and Chalmers' "*active externalism*" (1998, p. 7). Extended agency means that agency is located throughout the human and nonhuman actants, as evident in Locke's engagement with Meccano as a prototyping material. In this chapter, extended agency is adapted, via Lambros

Malafouris' idea of "intention in action" and material engagement, to focus on the intra-action between machines and the "reciprocal determinism" of Levi R. Bryant, in which machines act upon other machines. The suggestion is made that the materials Locke uses in *The Trons* form an assemblage of actants which act upon each other reciprocally, therefore forming an 'environment' of extended agency.

Locke's engagement with materials can be viewed as part of a "reciprocal determinism", in which agency is dispersed among the assemblage of *The Trons.* In section 5.2.1, materials are viewed as machines, following Bryant's machine oriented ontology. Materials are identified as operating functions upon each other, so that, for example, the material of Meccano is a machine which has the function of providing a complex linkage between the computer controller and the musical instruments. However, Meccano can also be viewed as a multitude of machines, acting together to reciprocally determine the function of the machine assemblage we call Meccano. This means that the functions of machines are not so much individually determined, but rather collectively determined through "*reciprocal determination"*. Therefore *The Trons* represent a complex assemblage of machines in which the functions and characteristics of materials are interconnected together to reciprocally produce functions.

5.3.2 Machine-talk

The robotic nature of *The Trons* lends itself to a viewpoint which engages with Bryant's idea of the machine as a complex assemblage of functions. Locke's engagement with the functions and characteristics of the materials used in the construction of *The Trons* machine echoes Bryant's view that machines are made of multiple machine actants, which operate upon each other. Machine-talk is the interconnection and *intra-active interference* of materials acting upon each other as a complex assemblage of machine functions.

The research question: 'What is the role of intra-active interference, in terms of re-functioning, 'error' and material characteristics?' is answered in this chapter in terms of function and the Machine-talk which occurs within a complex assemblage of intra-acting machines. In section 5.2 of this chapter, a theory of Machine-talk (5.2.2) is developed as providing a model of how Locke engages with materials and material agency as part of the complex machine assemblage which *The Trons* comprise. *Machine-talk* is a development from Locke's idea of (audible) machine talk, and incorporates the idea of *intra-active interference* (as discussed previously). Machine-talk describes the way that different materials intra-act and affect each other in terms of functionality. This means that the complex operations of *The Trons* machine becomes something which is an emergent function of machines intra-acting with machines, rather than something that is under the complete control of its human creator. The emergence of structure from an engagement with materials has been discussed previously in Larsen-Jensen's case study, where the form of the music produced is a result of the functions of the materials and the instruments. In the case of *The Trons* the structure provided by the central control system is fed through the various machine functions of the materials, adapted and re-functioned through the processes of *Machine-talk*.

The conclusion drawn from this chapter is that Locke's re-functioning of materials initiates a process of *Machine-talk* to reciprocally determine the function of the object, as discussed in terms of the re-functioning of the tape-deck amplifier and the pie-plate snare drum. This places functionality as a quality which emerges as a result of complex intra-actions between multiple human and nonhuman actants. Each of these actants are viewed as machines, their functions altered from their original design intention to the functionality which emerges through the intra-actions of the materials within the assemblage of *The Trons*. *Machine-talk* is a key concept within this chapter, building upon Bryant's machine oriented ontology, which is used as a way of theorising the intra-actions between materials and the affect that materials have upon each other in terms

of functionality. Function and also the failure of function, 'error', is part of the interconnected concept of Machine-talk. In material terms, 'error' is simply a diversion from a humanly intended function, and is connected more correctly with a process of re-functioning.

As also seen in the previous case study, both Larsen-Jensen and Locke's practices involve the use of 'error' and re-functioning of intended functions. Error has been viewed as a diversion from humanly intended functions and has also been discussed as a tool which initiates reverse Black-boxing: a strategy in which the material actants within technology become visible and available for intra-action. In this sense, a complex assemblage of machines is similar to the reversed Black-box, in that, the material actants become an active element of its functionality. Through Locke "embracing the inefficiencies" and errors of materials (discussed in section 5.1.3), Locke's practices embody an attitude of material agency: an acknowledgement that agency is not centred within a purely human intention.

By "embracing the inefficiencies", Locke demonstrates a strategy of incorporating a partial failure of the intended functions of technology. This failure is caused through the re-functioning of materials which have been placed within a different machine assemblage to that which was intended by the original design. With technologies unable to function as intended, new functionalities are utilised as emergent qualities of the materials. This draws attention to a recurring theme, running through both this and the previous case study, as the DiY ethos of embracing the failure of technology to function in the way that it is humanly intended. By embracing 'error', a diversion of function from human intention occurs, allowing other actants to emerge and situating the human as part of a multitude of actants. When technology ceases to function in this human-centred way, agency becomes extended beyond the human and into the realm of the non-human. This extended agency has the effect that structure is no longer imposed from a human-centred position but instead emerges from the intra-action of material and human actants. This places the human as

situated within the material environment, with agency distributed across the various actants.

The placing of the human amongst a multitude of nonhuman actants changes our view of the world as a human-centred construct. This has an effect upon the viewing of language as the dominant structure through which we visualise the world. This has been a theme recurring throughout Chapter Two, as a conflict between a language-centred viewpoint and a theoretical framework which allows material agency to occur. By extending the conclusions of this chapter to a wider field, DiY culture can be viewed as a way of looking at the world which displaces language as the central structure of understanding. The practical nature of DiY culture, manifesting as a resistance to formal language-based learning and 'validated knowledge' discussed in Chapter One and Two, represents a method of understanding the world through material engagement, rather than through an engagement with language. Material engagement means, therefore, that the human is only part of the agency involved in DiY practices. Within this DiY ethos of material engagement, the importance of the material environment increases in value, until it is more evenly matched with the importance conferred on the human. This situates the human as an element within the material environment, neither human nor nonhuman controlling from a central position.

In the previous case study, Larsen-Jensen's use of material agency and error was discussed as an individual's engagement with technology. In this case study, the focus has been on the intra-action between multiple machines and material actants. The viewing of materials as functional machines has suited the robotic qualities of *The Trons* as machines making music, rather than music being a solely human trait. The robot in this sense has represented an intra-action between human musical instruments and machines. In the next case study the human/nonhuman machines of Bingodisiac are discussed in terms of a strategy of using error, in which random elements are used to divert from the human intentions of numerous participating musicians.

Case Study Three: DiY strategies of the *Bingodisiac Machine*

So far in this thesis case studies have focused on DiY participatory culture as an entanglement of individual practitioners and elements within their material environments. This has been seen in the assemblages of Larsen-Jensen's oscillators and in *The Trons*, in which materials participate in the process. Material engagement has used various strategies in which technologies are dismantled to basic components, re-assembled, and assigned new functions. In this chapter, the *Bingodisiac* case study acts as a means of interconnecting several of the concepts from Chapter Two, including the idea of 'error' and other strategies which act as disruptions of human intention. The use of error has been discussed in previous case studies as a strategy in which materials are given agency through the expression of material characteristics - for example, Larsen-Jensen's use of faulty components, the 're-functional potential' and Greg Locke's use of the indeterminate functions of materials, such as the inaccurate qualities of Meccano. 'Error' has been discussed as a strategy of initiating a process of reverse Black-boxing, a de-territorialisation of structures to create non-totalising assemblages which are not contained within a single totalising function. In this way 'error' becomes an intentional strategy used by DiY practitioners to increase the participatory potential of material actants, whereby agency is dispersed across multiple actants within the assemblage.

In this third case study, the aim is to examine a collaborative event involving multiple human participants as a focus on the de-territorialisation of boundaries between human/material actants. Research questions include: 'what strategies are used, in terms of creating structure and the de-territorialisation of structure?' and; 'what is the 'function' of the *Bingodisiac machine* in its capacity for increasing the participatory potential for materials and re-functioning?'.

With more human participants in *Bingodisiac* than the previous two case studies, there is more emphasis on the interconnection between the material and social-view of DiY culture. This is expressed in the initial differentiation between the social and material actants involved, and the eventual linking of human and nonhuman participants in the context of the theoretical framework of Levi R. Bryant's machine. Through the machine, *Bingodisiac* is viewed as a *machine assemblage,* an intra-connection of both human musicians and nonhuman actants in a non-totalising assemblage.

Another concern explored in common with the previous two case studies, is the DiY strategy of de-territorialising social structures, typically through the use of 'error'. In *Bingodisiac* a source of de-territorialisation comes from the cueing system, a random generator of signals to the musicians which organise and group sounds together. The unpredictability of the cueing system is one of the main strategies of de-territorialising human-centred ways of organising sound, to de-territorialise the musical structures created by the musician's methods of organisation. This is discussed as a strategy of "Prevent[ing] music... to encourage sound": the de-territorialisation of *music*, as a socially constructed form, so that the basic elements of sound can become actants within the non-totalising assemblage. The intervention of the cueing system means that de-territorialisation and 'error' play an active role in organising elements in the machine assemblage of *Bingodisiac.* In *Bingodisiac,* 'error', through the random signals of the cueing system, is a way in which the non-totalising assemblage replaces a human-oriented structure. This is a strategy of incorporating material agency in the form of indeterminacy and unpredictability.

Bingodisiac, is an on-going project, initiated by the researcher in 2001[78]. The project has involved over one hundred DiY oriented practitioners in the role of musician/performer or as performers in the accompanying visuals. This case

[78] Also known as the Kaosphere Orchestra prior to 2011

study draws data from the sixty four participants involved in the five experimental performances conducted in 2011. The researcher is situated within a more participatory role than the previous two case studies, borrowing elements of an action research methodology, where theory and practice have a closer relationship than the previous two case studies. Primary data for this chapter has been drawn from a series of nine interviews from the sixty four participants in the *Bingodisiac* project, recorded between 2011 and 2014, of which seven have been selected and used. Other sources of data include entries in my own research journal, comprising field notes taken during the 2011 performances, and also in the tacit knowledge and memories drawn from ten years of the less documented period of the practice (2001-2011), occurring outside of the research interval of this thesis.

6.1 Functionality and structure, de-territorialisation and error.

In this section the de-territorialisation of structure and function are discussed in terms of strategies of using 'error' to allow material agency to emerge. This brings to light, as in the previous case studies, the DiY attitudes to structure and the preference for the materials-biased 'structure' of the assemblage. As in Larsen-Jensen's case study, Chapter Four, 'sound' is equated to the basic 'materials' which are contained by musical forms, and so, to engage in 'sound' is also to engage in the basic materials of music.

The cueing system of *Bingodisiac* is discussed in terms of operations and also its intra-actions and influence on the functions of other 'machines' within the complex assemblage of *Bingodisiac*, including the altering of the functions of human musician-machines.

With the inclusion of numerous human musicians, this case study offers more possibilities of viewing the human and the material as less separate entities than

in previous case studies, which have so far only included one human and their engagement with materials.

6.1.1 "Prevent[ing] music... to encourage sound"[79].

The components of music, once broken down, can be said to be the multiple sounds which through various functions create what we recognise as music. In this case sounds are the basic building blocks of music, the basic materials which DiY practitioners value over the finished product of music. By engaging in the basic materials of sound the DiY practitioner under-emphasises formal training and expertise, as expressed by participating musician Paul Smith[80], who began his practice as a teenager:

> when I started making music I kind of believed that absolutely everyone could make music, absolutely everyone. There was no distinction between musicians and non-musicians. It's a sound you know, so I mean everyone makes a sound, and it's how you choose to make a sound.

Smith is suggesting that in addition to the lack of distinction between "musicians and non-musicians" there is also a blurring of the boundaries between music and "sound", with an emphasis on the participatory potential of sound: that "everyone makes a sound, and it's how you choose to make a sound". It is the participatory potential of "sound" which is of most interest in this case study and, as will be discussed later as the processes and strategies of 'opening' musical forms to the components and actants of sound in relation to the way the Black-box of technology has been opened in the previous two case studies.

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[79] journal entry dated 15th June 2011, summing up the basic strategy of Bingodisiac and its preference for sound over musical structure.

[80] Interviewed by researcher 19th November 2013. One Hour fifteen minutes.

The organisation of *Bingodisiac* consists of three elements: a film; musicians; and a cueing system which organises the interactions between the musicians through providing instructions of when certain musicians or groups of musicians will make sound or be silent. Over the years different cueing systems have been tried as strategies to de-territorialise the human-biased practices of musicians. The different variations of the cueing system work on the same principle of stopping or starting the individual musicians, dictating when they can and cannot play and also to organise musicians into spontaneous and unexpected groupings. The main aim of *Bingodisiac* is to prevent musicians from imposing a consistent structure of sound: to prevent a common ground of musical style and to open the Black-box of music to the potentials of the components of sound within.

The aim of using a cueing system comes from the experience of predictability which has occurred when large groups of musicians improvise together, whether searching for a common ground of consensus or that the sound is dominated by the loudest instruments, such as drums, creating a structure from which it is difficult to escape. Musical common ground can mean some form of variation of 'the blues' or another dominating musical style, but can also mean a consistent lack, or avoidance, of structure, discussed below, which can also be categorised as a particular musical form. The cueing system also functions to de-territorialise the volume of instruments, adding sound dynamics to avoid the potential of a homogenous density of high volume amplified sound which prevents quieter sounds to be heard. This strategy of avoiding a dominating musical style is reflected in my research journal dated 15th June 2011:

> The cue system attempts to break down the predictability of the 'musical jam'. *To prevent music and to encourage sound*... This is part of the paradox of control used to destroy control – to prevent structure.

If musical forms are seen as a 'container' for the various actants of sound of which music is comprised, then a strategy of "prevent[ing] music... to encourage sound" is a way of opening this 'container' and allowing sound to become the

focus. Music is viewed as a Black-box: a container which subsumes sound into a musical functionality of performing a particular musical genre. This is identified as the human-biased structure of the "musical jam", a territory of music 'enclosed' within socially determined traits, whereas, the aim of the cueing system is to de-territorialise the Black-box of music "to encourage [the participatory potential of] sound". As discussed in previous case studies, 'sound' is equated to the basic 'materials' which are contained by musical forms, and so, to engage in 'sound' is also a material engagement.

In the terms of *Vitamin-S,* discussed in Chapters One, Two and Four, the idiomatic forms of music can be compared to being enclosed by a Black-box: forms "concerned with the expression of an idiom" (Vitamin-S, 2013), whereas non-idiomatic improvisation emphasises the "other concerns":

> 1. Idiomatic improvisation: much the most widely used and concerned with the expression of an idiom - jazz or flamenco for example, and taking its identity and motivation from that idiom.
>
> 2. Non-idiomatic improvisation: here other concerns are fundamental. It is usually found in so-called 'free' improvisation (Vitamin-S, 2013).

The argument is that by de-territorialising musical styles and genres the emphasis moves towards the more basic elements of sound with the intention that the participatory potentials of sound are released from the Black-box. This strategy of removing the contextualising forms of musical style is reflected in *Vitamin-S* musician Paul Smith's view of the idiomatic musician as basically fulfilling the requirements of a set of skills needed to transform sound into music:

> The idea [is] that you take someone out of their usual context with the hope that they will not try to 'show off' basically, right, because if you're a trained musician, just to put it bluntly, and you're been learning your craft, it's like a joiner making a table, he's not going to make a naff table is he? He is going to try to make a really really nice table, to prove that he's really good at it,

> you know... well, you've created your own limit by doing that too.

In Smith's view, the idiomatic musician is compared to a carpenter, or "joiner", with the resulting "table" representing the successful completion of a musical form. According to Paul Smith, music is seen as a functional object, the performance of a musical style which also limits the musician and expels any sound which does not fit within the functionality of the musical form, as he says of the musician following a musical style: "you've created your own limit by doing that too" – this limit being, what I argue is, the Black-box of music, rather than the basic materials of sound.

However, on the other hand, there is also the risk of the 'non-structure' of non-idiomatic forms of music also limiting the sound of the musician: a conscious avoidance of structure by the human musician which results in the formulation of various strategies which become recognisable and repetitive over time, as expressed by Smith;

> So *Vitamin-S* is pretty much a bunch of people who do non-idiomatic improvisation and I mean it's just a long word for free improvisation, which means that it hasn't got a style, now, Interestingly I think it does have a style, because actually you can go along there [to the regular *Vitamin-S* night on Mondays] and think, mmm, that sounded a little bit like last week, but technically speaking it doesn't conform to music genre, so it's non-idiomatic, it doesn't have an idiom, that's all it means. If you wanted to be cruel you could [say] it can sound a bit predictable, it certainly can.

Therefore, according to Smith, the repetition of non-idiomatic music within the social structure of a regular weekly improvisation session, can result in a particular structure and predictability based on what could be termed the 'style-of-avoiding-style'. In this sense, structure occurs through the repetition of human strategies to avoid idiomatic structures and becomes, as suggested by Smith, another series of repetitive skills to perform a function. This means that the 'style' of avoiding musical style can, according to Smith, "sound a bit

predictable". Following on from this it seems that the common element is the 'human biased' processes of both Vitamin-S and also idiomatic genres of music.

As a way of avoiding human centred strategies of 'avoiding style' in *Bingodisiac*, the cue system involves a transferral of agency to nonhuman actants, since its operation is based on random elements generated by a machine. However, 'random' can also become a recognisable structure, or, to put this another way, the lack of conventional structure can also become a recognisable trait of sound. This concern is reflected in an entry in my research journal dated 15th June 2011: "Using conventional instruments combined and controlled in a chaotic way, but not to go too far so that another structure emerges: that of the 'predictably random'". If random means allocating agency to chance and accident, then, in this sense, control and order are also part of the truly random: since something which is consistently chaotic can become predicable in its repetitions of strategies to be non-structured. What this is saying is that the ordering effect of structure should also be a part of the vast pallet of possibilities opened up by accident and chance. This means that fragments of musical forms are also valid outcomes from the effect of a nonhuman random cue generator, just as 'random' also means occasional order may emerge from the seemingly chaotic[81]. Therefore, the design of an ideal cueing system would be a strategy of avoiding these two extremes: purely idiomatic musical forms and also the chaos of the 'predictably random'; creating something which transverses the containing structures of idiomatic musical forms and also the equally predictable human-based strategies of avoiding style. In the de-territorialising of structure, the cueing system is part of the strategy of allowing both random and structured actants to break the boundaries of 'music' and allow the multiple actants and

[81] Taking this line of thought too far is the dubious idea by French mathematician Émile Borel, that an infinite number of monkeys randomly striking the keys of a typewriter, over an infinite span of time, can create seemingly non-random results such as the complete works of William Shakespeare.

materials of sound to be made available for participation, rather than the completed form of an individual style of music.

In an idealised fashion this is also the aim of improvised music, to escape from musical forms and to enter into the realms of sound and noise, as expressed by Paul Smith:

> I know a lot of people that just think it's a noise [(improvised music)], they are convinced that it's noise, and actually they're right: it is just a noise, but so is structured music, structured music is just a noise, everything is just a noise, you know.... because it's about exploring sound.

Smith's comment above, that "structured music is just a noise", reflects an attitude of viewing all music as a potential for "exploring sound". Appearing to engage with the derogatory definition of noise as meaning a worthless residue of signal, Smith adds his own definition of noise as a strategy of exploratory sound: to say that all music is noise, suggests an attitude which does not differentiate between structured or non-structured sound, approaching all music in terms of the participatory potential of the basic materials of sound. It is this attitude of exploratory sound which underpins the social aspects of *Bingodisiac*, a human-based actant in the form of an attitude or approach, which enables sound to transverse idiomatic and non-idiomatic forms of music, treating all sound as valid components in a non-totalising assemblage.

6.1.2 *Bingodisiac* cueing system: de-territorialising assemblage

In a social sense *Bingodisiac* utilises some aspects of a 'community of difference' as referred to by Stephen Duncombe in his study of DiY zine culture (2008). In the community of difference there is a constant conflict between the individual and group identity which resist the building of defining aspects and coherency of the community identity (pp. 56-58). In this sense the community of difference

can be paralleled with the non-totalising assemblage, since they are both ways to describe a collection of entities which resist to be totalised or subsumed within an overarching concept or functionality. The limitations of the community of difference, however, is that it tends towards a socially biased, anthropocentric view, as discussed in Chapter Two, which excludes the possibilities of material agency, an important factor in viewing DiY culture as a material entanglement. Since *Bingodisiac* differs from previous case studies as a project which involves multiple participants, it becomes relevant to view the social strategies which are used to create a non-totalising assemblage from the disparate musical abilities and styles of the participants. This involves viewing human actants which are non-totalising.

As discussed in Chapter One and Two, one of the traits of DiY culture are the strategies used to resist structure. The strategy of the transversal means that elements from different areas of knowledge are assembled and utilised without being subsumed under any particular area of knowledge. This same strategy is present in the *Bingodisiac* project, where musicians playing different styles of music, with different levels of skill and different volume levels, are intercut so that elements of any particular style of music become components and materials to be engaged with. The encouragement of a diverse level of skill, style and instrument volume can be seen in the invitation placed on *The Audio Foundation* mailing list:

> The work is experimental in nature… Open to musicians / non-musicians / sound makers / noise musicians / classical / jazz /etc /… In fact any style is welcome... The idea is to create spontaneous musical fusions so a diverse range of styles is welcome. We will try to match instruments based on sound level amplified acoustic etc so that everyone can be heard (Snake-Beings, 2011).

In this sense the social and aesthetic aims of *Bingodisiac* are to manipulate a combination of various and conflicting musical styles, breaking down the possibilities of an overriding identity by using a group of musicians that are so

diverse in style and skill level as would not likely be found functioning together as a coherent unit. Through the above advert it is possible to see that, on a social level, the aim is to create a 'community of difference' in which an overall identity is resisted. The strategy is to mix practitioners of diverse genres of music and create, through the tension of conflicting styles, unexpected combinations of sounds and unorthodox forms of musical expression. This conflict, created by assembling disparate musicians from different traditions and expectation, is part of an attempt to destabilise structures of control, to de-territorialise the 'functionality' of the musician to produce a particular recognisable style of music. This functionality of the musician has been reflected above in *Vitamin-S* musician Paul Smith's view of the idiomatic musician as a "joiner" or crafts person, basically fulfilling the requirements needed to transform sound into music. The aim of *Bingodisiac,* however, is to transverse idiomatic and non-idiomatic forms of music: cutting across the social forms which, according to Smith, limit the sound within a particular genre of music.

Through combining musicians who would not usually play music together, due to conflicting styles and abilities, the aim of *Bingodisiac* is to create an assemblage which is non-totalising and produces unexpectedness and "unpredictability", as expressed by participating musician Carlos Pla[82]. As a way of increasing the unpredictability of sound, one of the strategies of *Bingodisiac* has been to introduce random elements into the cueing system, so that the human musicians are cued and combined together using a randomly generated algorithm. Another part of this strategy of the cueing system, as discussed below, has been to provide the musicians with seemingly random words to trigger responses. These strategies are identified by participating musician Erikka Griffiths-Keam as "aleatoric processes", randomised processes in which the human musician can extend their own limitations:

[82] Audio interview, September 26, 2011, 29 minutes

> Aleatoric processes always force you to think, try [to] reach for something to use as a response to a particular word, image or adjust to the pace of cues[83].

The use of random elements is seen as a way of 'escaping' from the prioritising of human agency, since the random allows an output without direct conscious human decision. The random is contained within the name of this case study: *Bingo-disiac,* relating to 'bingo' the popular game of chance which is based on the random generation of numbers. The aleatoric allocation of cues is part of the strategy of *Bingodisiac* to transverse the boundaries of the human and the nonhuman, enabling a "reciprocal determination" (Bryant, 2014, p. 50) between the material and the practitioner: between the human musician and the material agency of the cueing system. Over a ten year period of time the cueing system has developed as a strategy of allowing structure to emerge from both human and nonhuman actants. This is part of the background experience of the researcher, the tacit knowledge which predates the research period of this thesis and which influences the design of the Bingodisiac case study, as discussed in the methodology chapter.

The *Bingodisiac* cueing system is discussed below, so that the reader can grasp the intricacies of the strategies used to introduce nonhuman actants into the *Bingodisiac* assemblage.

[83] Interviewed by the researcher via email 26th October 2013

Figure 36: Bingodisiac performance. Showing cue number at the side of the screen (image by author, 2011).

In the 2011 *Bingodisiac* performance, the cueing system was a series of numbers placed at the side of the screen, as seen in Figure 36 on the left of the video screen, with the musicians occupying the space around, to the side, and behind the audience. The cue cards given to each musician were in the form of bingo cards, a card of random numbers as seen below:

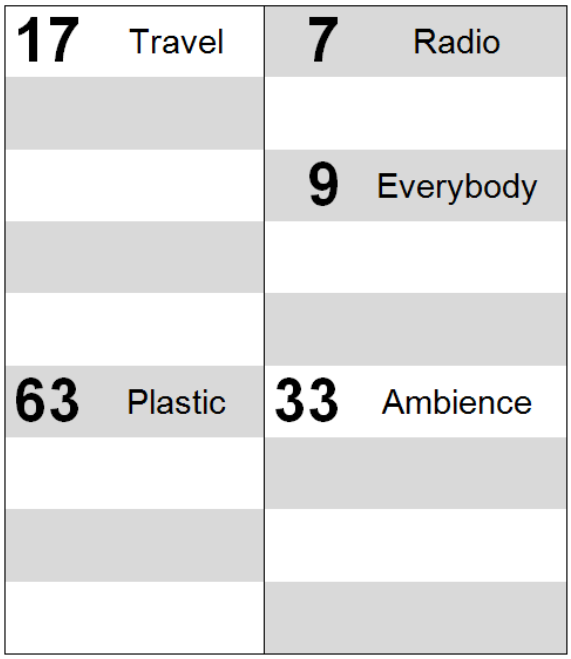

Figure 37: 'Bingo card' used in the cueing system (image by author, 2011).

The 'bingo' cards given to each musician contain two sets of cue information (Figure 37). The first is the number which corresponds to the on-screen number cue, telling the musician when to play and when to stop playing (when the number disappears). The second cue is the word, such as "plastic", "radio" or "ambience", which relates to a suggested theme for the music/sound to be produced. The word cues, in some cases, relate to various edits of the film in which these objects have appeared, for example when the number "63" appears on the screen it has at some time been accompanied by the image of "plastic", as can be seen in Figure 38:

Figure 38: "63" relating to "plastic" on the cue sheet (image by author, 2011).

Elements of the cueing system relate to objects on the screen, for example “29” has the trigger word “wind” and “63”, the word “plastic”, correlating to the masked figure wearing wind-blown plastic sheeting[84].

17	Travel	7	Radio
37	Electricity	28	Drums
8	Television	9	Everybody
13	Glass	16	Voice
23	Industrial	55	Authority / Flute
63	Plastic	33	Ambience
2	Water	47	Electronic
54	Fire	56	Guitars
29	Wind		

Figure 39: Complete list of cues for *Bingodisiac* (image by author, 2011).

[84] Musician Oscar Hidalgo filmed in Catalonia in 2008, later contacted through Skype to participate in the 2011 *Bingodisiac* performance.

The complete set of cue numbers and corresponding words, Figure 39, is the 'bingo master card', that is, the card from which the smaller selections are made for distribution to the musicians. The numbers are random but the words represent several things: a 'coding' of images seen during the film; a division of the more common or intrusive instruments, such as "guitars" and "drums", to limit their use; specialty instruments such as "voice", which are linked together to create multi-vocal sections; moods or suggested tones, such as "ambience", "authority"; the cue for "everybody" to play at once; and more abstract suggestions, such as "travel", "industrial", "electricity" and "electronic", used as open thematic cues relating to concepts on the screen for musicians to interpret as qualities of the sound produced.

Figure 40: Bingo card cueing system (image by author, 2011).

For many of the musicians the cueing system presented a challenge in terms of being able to concentrate on a complex bewilderment of visual tasks alongside the primary task of producing sound to accompany the video images on the screen (Figure 40). This complexity is observed in an entry in my research journal dated 18th June 2011 directly after the first Auckland performance:

> The musicians are commenting on the complexity of the cueing system, and that it prevents them from knowing what's

> happening, it's confusing etc, and creates a disruption of music and continuity. It means that the sound is broken up. I want to avoid the situation before [in 2003] where there was a continuous sound, the same sound all the way through. Confusion is good if it breaks up structure.

In this sense complexity is a way of inducing confusion and error, or erroneous perception of the cueing system, within the participating musicians. In this sense, "confusion" is used as a strategy that "breaks up structure", as a way of de-territorialising music and disrupting the "continuous sound" of the 'musical jam'. The presumption, based on the experience of the performance in 2003, is that the natural inclination of the musician is to create harmony, consensus and continuity. If this is the case, then the cueing system operates against the desires of the individual musician and distributes agency into the nonhuman, material realm.

As part of the strategy of de-territorialising human structures of music, the nonhuman actants of the *Bingodisiac* cueing system were seen by participating musician Erikka Griffiths-Keam as disrupting the "natural" tendencies of musicians once assembled to "all play at once":

> if you have got that many musicians together, the natural thing is for everyone to all play at once and I guess the main thing with the Bingodisiac, it's sort of saying don't play unless your number is called, or if you have some instruction to play. 'Don't play': that was the only kind of disruption as such.

Through limiting the "natural" tendencies of large groups of musicians, the cueing system, according to Griffiths-Keam, prevents the potential chaos of everyone playing at once.

According to Ruth Wynne[85], *Bingodisiac* imposed a form of order onto the musicians rather than disruption, so that: "It prevented musical mayhem by not allowing everyone to play at the same time". Perhaps the main 'function'

[85] Interviewed by the researcher via email 26th October 2013

imposed by the *Bingodisiac* cueing system is to allow a group of disparate musicians to play together without any rehearsals and in many cases having not met or spoken to each other before the night of the show. Therefore the random elements of the cueing system, rather than de-territorialise, actually functions as a structure which makes participation possible, as also observed by musician Geoff Doube[86]:

> It's one thing to get a bunch of people and say 'improvise to this visual', 'provide a soundtrack to this visual' and that would have just been a mess, if you'd done that, but the idea that you are actually going to be cued in and out, randomly, so you get this element of chance and this element of randomness … so that it's different each time.

The agency exerted by the random elements of the cueing system, whilst taking away some of the choices available to musicians, is something welcomed by Doube, as an actant which makes the soundtrack "different each time". For Doube, the cueing system prevents the "mess" which he expects would occur without limiting the musicians in some way. In this sense, the cueing system functions as an agent of cohesion, as a way in which the disparate musicians can work together without producing the kind of chaotic "mess" which would result from unrestrained human interactions. This means that the material agency of the cueing system functions to order and organise through the disruption of an exclusively human agency.

In practice, the material agency of the cueing system is mixed with the human interpretation of the musicians, as well as both intentional and unintentional human 'error' to completely follow the cues, as Geoff Doube describes:

> You had to be paying attention to see where you cue went, because occasionally I would miss my cue and go 'damn I missed a chance to play' so there was definitely a kind of tension there and when your cue came up you sort of jumped on it and made a

[86] Interviewed by the researcher via email 21st October 2013

> hell of a lot of noise in the first couple of seconds, until you actually learnt to listen what other people were doing and kind of blend in, work with what they were doing, respond to what they were doing, so in terms of natural flow, it was interrupted, but… we were just being cradled, we were not being forced or pushed or made to, nothing fundamentally different, just a different kind of framework for a natural flow.

Therefore, whilst the cueing system interrupts the "natural flow" of the human musicians, according to Doube, there was nothing "fundamentally different" produced by the nonhuman agents except a "different kind of framework for a natural flow" between musicians. In effect, the material agency of the cueing system is filtered through the human agency of the musicians, creating a hybrid of agency between human and nonhuman actants. The fact that it is difficult to actually separate the human from the material agents responsible for the organisation of sound, suggests that there is a process within the *Bingodisiac machine* which de-territorialises the borders between the human musician and the material actants.

According to some musicians the de-territorialisation by the cueing system was due to the failure of human musicians to interpret the cues, as an audio/visual 'overload' factor as expressed by Joshua Lynn[87]:

> It's quite an art to pull in these different factors, a visual thing, and then cues, as well as trying to do something that's interesting- it's a lot of things to consider... I think without people practicing they arn't [sic] going to be very adept at it. Everyone adapts to it in their own way... most musicians struggle to listen, so if they're struggling to listen then they are struggling to look, and to take cues.

What Lynn is saying is in contradiction to the idea that the cueing system functions to provide a structure for an assemblage of disparate musicians. Rather than create a structure in which numerous musicians can spontaneously play together without practice, the cueing system 'overloads' the musicians with "a

[87] Audio interview 19th November 2013. Auckland. One hour four minutes.

lot of things to consider": Lynn making the point that the musicians were "struggling to listen... struggling to look, and to take cues". Lynn's perspective is that the lack of rehearsal, the mix of skill levels and the difficulty of musicians to listen, look and also to take cues means that, under these conditions, the musicians "arn't [sic] going to be very adept" at creating a soundtrack to the film.

If the first night performance in Auckland was seen as a rehearsal for the second performance, it would be reasonable to assume that the returning musicians would be more familiar with what was expected of them and therefore the performance would be somehow 'better'. This presumption had an opportunity to be tested as many of the musicians returned again the next night with a sense of familiarity with the cueing system, and therefore a better chance of counteracting its disruptive, overloading or confusing influence. However, another human actant, namely myself as the researcher was to intervene, as recorded in my research journal dated 18th June 2011:

> Many of the musicians returned [12 out of the 22 musicians for the second night also played on the first night]. They should have been more familiar, but I swapped the cards around and they all had new numbers- All the same instruments occur together: loud or intrusive ones like voice, guitar or drums. Other instruments are given more solo spaces to play.

The above journal entry gives some insight into both disruptive and organising strategies used: the swapping of cards for returning musicians to avoid familiarity and the segregation of "loud or intrusive" sounds into smaller sections to allow "more solo spaces" for other instruments. This form of intervention by the researcher is typical of an action research methodology, where intervention becomes a way of generating data.

The functioning of the cueing system can be compared and contrasted to the previous case study, where the computer 'cueing system' of *The Trons* was fed through the material agency of imprecise Meccano mechanisms. In the case of *The Trons*, the human programmed aspect of the digital computer was also compared to the simple square wave generated by Larsen-Jensen's oscillator

circuits. Both Larsen-Jensen's square wave and the digital control signals of *The Trons*, represent human-biased actants, because they are the pre-programmed and of more 'fixed' function compared to the plasticity, or *malleability,* of function of other machine actants. The cueing system of *Bingodisiac* also contains elements of a 'fixed' function machine, the sequence of numbers being a pre-programmed aspect, whilst the allocation of bingo cards determined within a specific range of variables depending on what instrument the musician is playing. In the case of Larsen-Jensen and *The Trons*, these machines of more 'fixed' function are fed into an intra-action of materials acting as more malleable functioning machines, such as the 'indeterminate pot' and the flimsy components of Meccano, resulting in a more complex and indeterminate output. However, in *Bingodisiac*, the cueing system is fed into *human* actants, rather than *material* actants. This means that the human actants function as machines to add complexity to a pre-programmed machine of fixed functioning. At the same time, the material actants of the cueing system operate to re-function the musicians from 'music' generating machines, to 'sound' generating machines, through the action of randomising the intra-actions of diversely oriented human machines. By 'diversely oriented', I mean that each human machine is predisposed to a different style of 'musical' structure, both idiomatic and non-idiomatic, discussed previously as members of a 'community of difference'. Of particular interest is the way that human actants, rather than material actants, become machines of introducing complexity and indeterminacy into the pre-programmed functions of the cueing system, whilst, at the same time the more fixed functions of the cueing system also acts upon the functioning of human musicians to disrupt the formation of musical structures.

This idea, that human and material actants can operate as machines which adapt the function, or re-function, the operation of other machines[88], is discussed

[88] Originating from Levi R. Bryant's idea of the machine (2014).

below in terms of the various strategies used to de-territorialise the human/material divide and to increase the participatory potential of human/material machines.

6.2 An assemblage of human and non-human actants.

As we have seen in previous chapters, DiY culture is a particular engagement with materials and prototypes, rather than with the finished media and technological forms of the Black-box. The concern of DiY culture is to increase the participatory potential of materials, as the multiple actants which emerge once the subsuming function of the Black-box has been removed. In the case of *Bingodisiac* the Black-box which prevents participation with these material actants has so far been identified as the enclosure of sound within musical forms, as a musical style which acts to structure the material of sound into an organised and structured form. These musical forms have been identified as idiomatic music, that is, genres and styles of music which act as a Black-box to the sounds contained within, but also as 'human-biased' structures, such as observed in the experiences of previous *Bingodisiac* performances and in the formulation of non-idiomatic strategies of Vitamin-S.

When the human and material actants of *Bingodisiac* are viewed as machines of various functions, intra-acting within a complex assemblage of machines, the entire assemblage can be viewed as a *Bingodisiac machine.* This assemblage includes a multitude of intra-acting machines, including: the strategies of the researcher to de-territorialise musical flow to prevent 'coherence'; the interventions of the cueing system; the use of selecting diverse musicians to create a 'community of difference'; and various other machines, such as instruments, audio mix, audience, venue, and roaming performers within the space of the event. In the next section the space of the event is taken into consideration as an aspect of the functioning of the *Bingodisiac machine.*

6.2.1 The re-functioning of idiomatic music – Fairground effect.

The 'fairground effect' is the name I have used for one of the strategies used by *Bingodisiac* to de-territorialise idiomatic musical forms. The fairground effect is created by distributing multiple sound sources around and amongst the listening space of the *Bingodisiac* event. The fairground effect is named after a personal experience of sound within a fairground environment, where numerous different idiomatic music styles blend together to create a non-idiomatic soundscape[89]. In the fairground effect the combination of diverse styles all playing at once and from different directions, results in a non-idiomatic soundscape comprised of fragmented elements of idiomatic musical forms. This tacit experience of the fairground, de-territorialising music and allowing a re-functioning of sound, has been noticed independently by Paul Smith, in which the combined multiple sources of the music of the fairground become mutated into a non-idiomatic exploration of sound:

> I remember going into a fairground and thinking 'that sounds exactly like improvised music'… and that sparked off in my brain a notion I've had before, which is, no matter what we humans do, we are going to find it interesting, we are going to find the structure. It's like finding faces and patterns, we are going to find it. Whether it's idiomatic or non-idiomatic, whatever it might be.

Smith's comments are particularly interesting when he suggests the human-biased structure of both idiomatic or non-idiomatic music, that "no matter what we humans do... we are going to find the structure... [and] patterns". This

[89] Imagine that each of the many attractions at the fairground, dodgems, tombola, and coconut shy, are playing a different form of music to attract their customers. As the listener walks through the fairground space individual styles of music may be heard clearly for a brief moment before fading into the background cacophony of sound elements. This backdrop of multiple simultaneous musical styles, interacting, shifting and mutating as the listener strolls through the subjective sound space of the fairground, means that even idiomatic forms of music have the ability to produce non-idiomatic sound if so arranged that no one particular dominant style can subsume the other elements.

highlight one of the intentions of *Bingodisiac* to de-territorialise the inevitable human-biased patterns and structures which emerge from the materials of sound. In the fairground effect, with its multiple sound sources organised through the randomness of which particular song is being played within each overlapping audio space, increases the participatory potential of sound to become re-functioned into something else. In this sense, the fairground effect results from the overlapping of fragmented musical components: an assemblage of multiple sound machines which alter and adapt the functions of each other to change from idiomatic music to non-idiomatic sound. The chaotic 'noise' of the fairground resonates with the idea of non-idiomatic sound, where there is no particular structure to impose an order or containment over the whole assemblage. This means that the fairground effect increases the participatory potential by creating a non-totalising assemblage of sound, similar to Smith's idea of viewing any form of music as participatory sound: "structured music is just a noise, everything is just a noise, you know.... because it's about exploring sound". In consequence this summarises the fairground effect as a non-totalising assemblage made from the random convergence of fragmented multiple structures, so that idiomatic music can be re-functioned into sound: as the source of a DiY engagement with materials. The application of the fairground effect is discussed later in this section.

Another way of describing the fairground effect has been suggested by musician R. G. Shaw, who equates *Bingodisiac's* use of multiple converging musical styles as the tacit experience of listening to A.M. radio transmissions. The below quote is part of a recorded conversation with musician R. G. Shaw about a particular *Bingodisiac* musician's repetitive use of loud sampled idiomatic music, a keyboard player whose sound broke through and disrupted the more non-idiomatic improvisations of the other musicians:

> It was like the sample that locked it into some other space, it's like a radio which is not on the channel and another channel comes through, like the old A.M. radios... A lot of that was like

> the A.M. radio, when I was a kid, fading in, or all of a sudden there's a talk show, ships or something chatting.

Although in some sense the performance of the keyboard player was disruptive, and as I remember, personally annoying, the effect was to pierce the more coherent moments of non-idiomatic improvisation with a de-territorialisation which came from an idiomatic form. Personal annoyance aside, in essence, this piercing by fragmented interjections of loud sound acted as part of a complex machine assemblage which altered the function of idiomatic music samples into fragmented components of sound which non-totalised the sound assemblage. In the same way as the 'error' of A.M. radio, in which "another channel comes through" and de-territorialises the functioning of the radio, the loud samples produced by the keyboard player broke open the Black-box of music and brought an unexpected emphasis on the materials of sound.

In using the strategy of the fairground effect it becomes necessary to distribute musicians and sound sources around the space of the venue, utilising the 'liminal' performance areas rather than using a centralised sound source which would usually be expected to come from the direction of the 'stage'. The liminal areas of the performance space are illustrated below, in a diagram of a basic proscenium arch' layout of audience, stage, musicians and technical space. The main aim of the proscenium arch is to eliminate everything from the audience experience which does not contribute to the main focus or function of the theatre, as shown mapped onto the space of the Audio Foundation's venue for the *Bingodisiac* event (Figure 41):

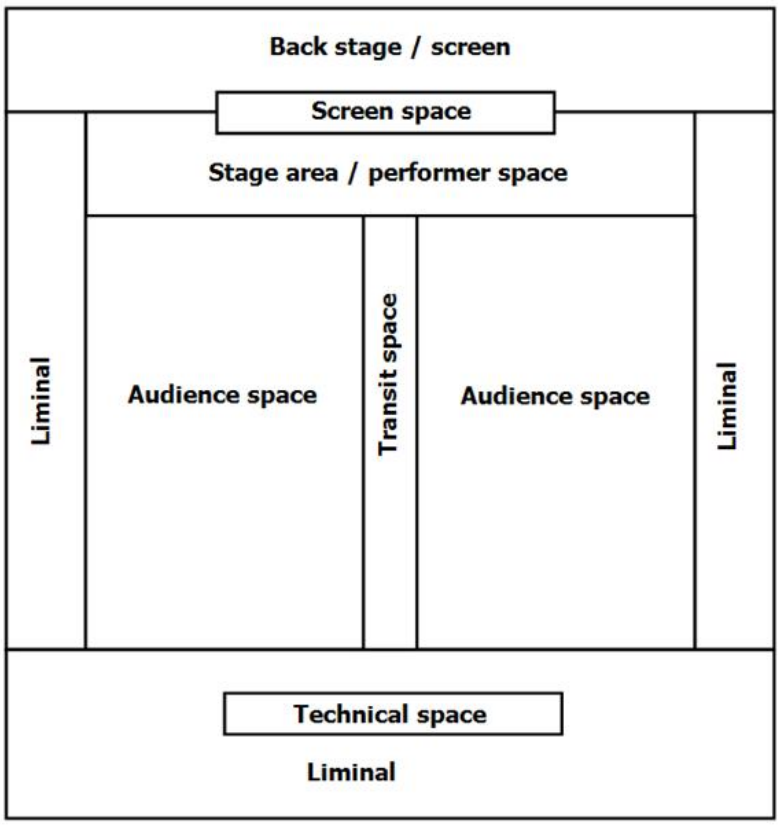

Figure 41: Designated spaces of the audience / performer engagement (image by author, 2012).

The side areas of the stage are traditionally called the 'liminal' space, meaning the marginal areas of the stage area. These liminal areas also include the sides of the audience space and the back of the audience, considered as 'technical' spaces, since it is where lighting, sound operators and equipment are located.

In contrast, the diagram below depicts the performance spaces of *Bingodisiac* employing the fairground effect, in which audience, performers and technical space are much less delineated:

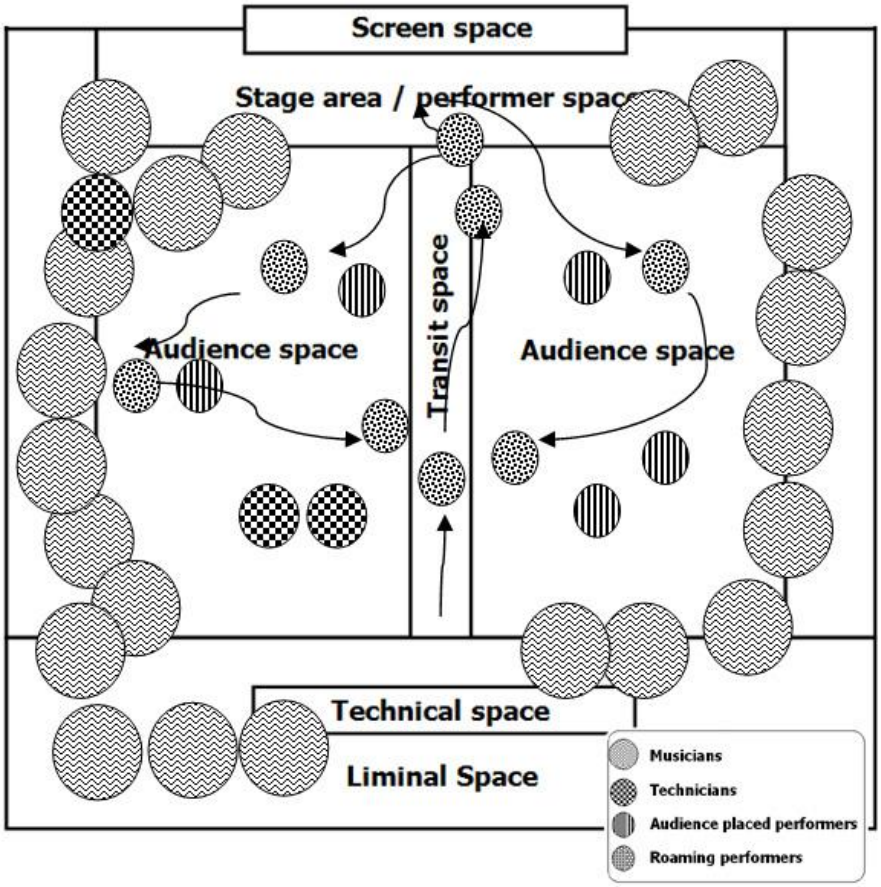

Figure 42: Diagram of *Bingodisiac* performance space (image by author, 2012).

As can be seen in Figure 42, the spaces of audience/performance/technical space have been de-territorialised by the strategy of the fairground effect, so that sound sources, marked by the circles, are multi-directional and are not contained within the directional structure of the proscenium arch.

The circles around the liminal edges of the conventional audience space are the placement of the musicians, each with their own acoustic instrument or amplifier as a source of sound. The placing of the musicians within the audience space means that the audio/visual source is multiple and dispersed, the experience of the audience is 'de-homogenised', meaning that the 'difference' between the perception of audience members is not minimised as it would be in a conventional theatre set-up. However, for the purpose of this thesis, the emphasis is not on the audience, but on the Machine-talk occurring between the various actants, both human and nonhuman within the complex machine

assemblage of *Bingodisiac.* The distribution of actants, in the fairground effect, evokes Jane Bennett's idea of the non-totalising assemblage as "*distributive agency"* (2010, p. 31), and the 'extended agency' which places the human as an actant situated within an intra-active material environment.

As well as viewing different sounds as actants, we can also view the various sounds produced within the fairground effect as function emerging from the intra-action of machines, such as occurs when sound is heard and responded to by a human musician. This means that the fairground effect is a complex assemblage of intra-acting machines, an extended agency of the space of the venue. As recorded in my research journal, dated June 19th 2011, there is no one person directing the absolute placement of the musicians and their positioning is due to various indeterminate reasons, including the timing of the arrival of musicians:

> They drifted in, [in] drips and drabs... kept instructions to a minimum... gave them their [bingo] card and told them to only play on those numbers. Too many musicians to tell them what to do[:] you go here you go there, do this do that… Didn't want to tell them too much… better if they decide... I had set up some power cords around the edges of the room, some microphones and amplifiers for vocals... It worked out OK that they just turned up and found their spot and set-up.

Within these set of informal verbal instructions, differing each time that a musician arrived to set-up before the show, there are a wide range of complex variants which determine the individual placement of each musician and the resultant sound mix: the availability and positioning of power points; the musician's individual sense of a space of 'comfort' and nervousness; the indeterminate order of arrival of the musicians at the venue, which meant that certain spaces were taken and others available; equipment needs, meaning that some had to share an amplifier. All of these factors determine the placement and characteristics of the sound sources. In this sense the fairground effect, in combination with the cueing system, is a strategy which de-territorialises the

space of the musician, the structures of music and increases the potential to re-function idiomatic music to the materials of non-idiomatic sound. By viewing all of the actants in *Bingodisiac* as machines, including strategies such as the fairground effect, the distinction between human and material, environment and space, becomes less emphasised. The intra-action of machines occurring with the complex assemblage of the *Bingodisiac machine*, is the focus of the next section of this chapter.

6.2.2 Transversing the human/material agency: the *Bingodisiac* machine.

> I had the sense that I was part of the machine, a component of it
> (Geoff Doube)

The *Bingodisiac* machine incorporates, as participating musician Doube states above, both human and nonhuman actants as components who are intra-connected parts of a larger machine. Whilst some of the strategies of *Bingodisiac* appear to aim towards removing the subsuming function of the Black-box, another way of looking at function is through Levi R. Bryant's concept of the machine, as discussed in Chapter Two, which emphasises function as a way in which material agency can be examined. According to Bryant both human and nonhuman entities can be viewed as machines: as a series of inputs and outputs which connect with other machines to create complex assemblages:

> There is no such thing as a simple machine. Rather, every machine is simultaneously a unit or individual entity in its own right and a complex assemblage of other machines. In short machines are composed of machines (Bryant, 2014, p. 75).

This is basically saying that beneath what appears to be a "simple machine" lies a "complex assemblage of other machines" and that "machines are composed of machines". By viewing both humans and nonhumans as machines within the complex assemblage of the *Bingodisiac* machine, the human and the nonhuman is transversed and agency, as the ability to make something happen, becomes

distributed amongst the various machines within the machine. It can be interesting to compare the *Bingodisiac machine* with Bryant's example of the frog, whose "body is a machine that engages in operations to deftly traverse river currents and eddies. Its body is a machine that engages in operations transforming inputs of air into strange songs" (2014, p. 39). In this sense, *Bingodisiac* can also be viewed literally as a "machine that engages in operations transforming inputs... into strange songs" (p. 39). Within Bryant's view the cueing system, the materials of DiY instruments, the human musical machines, the images from the screen, the audience, and the intra-actions between randomly selected musicians becomes a complex assemblage of intra-connected machines which functions to produce "strange songs" (p. 39). The human musicians become functional components, or machines of complex operations, which take in inputs of visual cues and the sounds from other musician machines and output their own sounds as a result.

The complex intra-action of machines as human and nonhuman actants is suggested by musician Erikka Griffiths-Keam, who identifies some of the elements at work:

> There's the Bingodisiac machine, which is multifaceted. There are several things to take cues from, watch for and absorb at any one time. Then there is a reasonably large group of performers responding simultaneously, who you can choose to work with and fit into their soundscape, complement one another , be harmonious, or as a performer you can choose to introduce a new or different idea, that can often seem conflicting or out of place. It can easily become a very busy piece both visually and aurally.

From the above comments, there is a sense that the musician is part of a vast assemblage of actants, in the form of "multifaceted" potentials for intra-action. Within the assemblage machines may adopt various functions, such as to "be harmonious" with existing machine outputs, or to "introduce a new or different idea, that can often seem conflicting or out of place". By viewing each musician as a machine it becomes apparent that there is a process of constant intra-action

and adaptation between the human and the material. This relates to Bryant's idea of "*reciprocal determination" "* (2014, p. 50) (discussed in Chapter Two), where multiple actants are seen as machines which endlessly modify the flows of inputs and outputs of other machines, so that*:*

> There is a sort of *reciprocal determination* between flows and inputs and machines exercising operations on these flows...There are many instances in which the machines that flow through a machine modify the machine that operates (Bryant, 2014, p. 50).

This means that Bryant's machines are not fixed in their functions, but instead, act reciprocally to modify the functions, outputs and operations of each machine. In this sense the musicians of the *Bingodisiac machine* are constantly adapting their functions (or interpretations in a human-biased view) of the visual and aural cues, adapting how the inputs are processes through the various strategies available to them and as a result creating outputs for other machines within the functions of the *Bingodisiac* environment.

Through viewing *Bingodisiac* as a machine to produce "strange songs" (Bryant, 2014, p. 39) the human musicians, the instruments and the sounds all become machines with varying degrees of plasticity of function. The capacity of each machine to modify the functions of other machines, to be modified by other machines, and the outputs produced in each of these modifications, indicates different aspects and qualities of the machine.

According to Bryant, there are three different ways that machines produce outputs as manifestations:

1. *Qualitative manifestation*, in which qualities of the machine are altered (2014, p. 42);

2. *Agentive manifestations*, where machines alter the behaviour of other machines (p. 44); and

3. *Material manifestations*, an output which leaves the machine to become a separate material output (p. 44).

If we view the musician as a machine to receive and output various types of manifestations, then it is possible to identify ways in which the above types of manifestation can be applied to the output. For example, a *Qualitative manifestation*, in which qualities of the machine are altered (Bryant, 2014, p. 42), can be applied to the qualities of a musician intra-acting with the cueing system to either produce sound or silence. An *agentive manifestation*, where machines alter the behaviour of other machines (p. 44), could be applied to the effect of sound on the musician, where the behaviour of the musician may change in response to certain sounds. The third type of Bryant's manifestations, as a material manifestation, could be seen as the making of a DVD of the *Bingodisiac* performance or, if sound is viewed as a 'material' actant as it has been earlier in this chapter, then the material output is manifested as sound. In discussing aspects of the *Bingodisiac Machine,* the environment also extends beyond the space of the venue via internet connection to the remote musicians participating during the night of the performances.

During the *Bingodisiac* performances visuals from the screen and audio from the venue were outputted to remote musicians for processing and participation. Sounds from the remote musicians, via an internet connection, were fed into the 'live' sounds occurring at the venue. These remote musicians, contained within the functionality of the event, can be viewed as machines which were fed visual cues, which were then operated upon, to produce a material manifestation of sound. The various aspects of the remote musicians can be taken into account as part of a complex assemblage of machines. These aspects include: the qualities of the internet connection including failures and errors in connection; software used (Skype) and the limitations imposed by this software; the inputs received or not received by the remote musicians; various environmental factors at the remote musicians end of the connection, such as the local time of day/night and technical abilities to perceive the visual cues or sound of the performance; and the reception of the sound outputted by the remote musicians and its integration into the 'live' sound for intra-action with other musician-machines.

The difference between the remote musician and the venue musician was that the volume of the Skype musicians was controlled at the venue, rather than controlled by the musician themselves. Another factor was the chaos of the Skype connection, which was channelling three different remote locations[90] onto the one sound channel of the conference call. This overloaded connection was a material actant determining which sounds were heard during the performance.

The machine-like aspects were sensed by remote performer David Rayner[91], who despite technical difficulties which limited his available inputs continued to process and provide outputs for intra-action:

> I was not able to usefully observe the cue system thru [sic] Skype. Eventually I moved into a trance like machine state but with a base knowing that my performance was possibly being mixed out of the final piece in place of silence. I was just an element that could be used.

For Rayner, being one of the remote musicians connected via the internet telephone program Skype, the machine state is more enhanced than the musicians present at the venue: expressed as the feeling by Rayner that he was "just an element that could be used". Rayner's intra-actions with the technical difficulties and errors of the internet connection was a machine which can be seen to have which altered the behaviour of Rayner, as a *agentive manifestation* (Bryant, 2014, p. 44), possibly responsible for the musician's feeling that his "performance was possibly being mixed out of the final piece in place of silence". As I remember, it was not the case that Rayner's performance was "mixed out", but rather that it was allowed to be broadcasted into the room of the venue as a

[90] Three remote locations: David Rayner in New Plymouth, NZ Skype name = "Ruth Cohen"; Oscar Hidalgo in Manresa, Catalonia Skype name = "oncoraton perez"; and Stuart Grimshaw in Leeds, UK.

[91] Email interview. 8th October 2014.

raw outputted sound to alter the behaviours and functions of other machines, as discussed below.

Erikka Griffiths-Keam, views the limited inputs for the remote musicians as a disruptive element which did not fit in with the "feel" of the sound made in the venue:

> The only thing that I thought was... [disruptive] was when one of the remote performances coming in via the Skype did not stop. There was no feel and connection with the others performing at Audio Foundation.

In many ways the unpredictability of the Skype musicians as a lack of "feel and connection" is the same as venue musicians adopting a strategy to "introduce a new or different idea, that can often seem conflicting or out of place" as previously quoted by Griffiths-Keam: part of the "unpredictability[92]" of the cueing system.

The errors from the Skype channel, resulting from re-functioning the system to operate in ways for which it was not designed, can be viewed as a machine which altered the behaviours of both remote and local musician-machines. This is a material agency which is brought to the forefront through re-functioning, a pushing of the system into areas where errors and break downs occur. This has been discussed in previous case studies as: Larsen-Jensen's use of error in faulty components to produce unexpected sounds, Chapter Four; and in Greg Locke's use of the pie plate to create indeterminate sounds, as well as his use of 'error' in using Meccano, discussed in Chapter Five. The use of errors becomes a way in which material agency can be introduced into a system to break down human-centred agency, as Locke says, as a way of "embracing the inefficiencies... I thought everything would have to be perfectly made… but it turns out that having things a bit wrong… is good" (see section 5.1.3). This expresses a

[92] A central aim of the *Bingodisiac* machine according to Carlos Pla.

deviation from the original function designed from a human intention through a process of re-functioning via errors which come from the materials used within the machine.

The errors of the Skype channel are a material actant which operates despite human efforts of moderation, as shown in the chat notes from the technical set-up the night before the performance (copied from the actual text without corrections):

> [17/06/2011 19:42:07] Ruth Cohen: yeah we have to take truns atr (sic) [turns at] making noise on a conference call or the loudest cuts everyone out...[17/06/2011 19:42:40] Ruth Cohen: i vaguely rember (sic) hearing about this from other people usin Skype [17/06/2011 19:44:58] Ruth Cohen: for conference calls [17/06/2011 19:49:34] oncoraton perez: will be a kind of skype moderator?

Part of the machines operating within the *remote Bingodisiac machine* is the function of 'chat' between the musicians, using the Skype programme, including the 'errors' of typos and rushed miss-spelt messages, and also the language barrier between musicians in New Plymouth, New Zealand (Ruth Cohen) and in Reus, Catalonia (oncoraton perez). All of these aspects are machines operating within the complex assemblage which is the *remote Bingodisiac machine.* This means that the remote machine is made from the complex intra-actions of both human and nonhuman machines and represents a complex distributed agency similar to other material engagements discussed in the previous case studies.

In effect, the technical limitations of the Skype connection became, for Rayner (Skype name Ruth Cohen), an alternative cueing system in which the failures of the connection became another way to dictate which musicians were heard:

> At some points of the evening the Skype connection would cut out - which seemed a bit like a cue... And then there was the Skype idiosyncrasy that Oscar and I found on the first night...only one of us could play at a time [and be heard].

In this way the technical 'error' becomes a machine which alters the functions of the remote musician-machine, where error "seemed a bit like a cue" for the musician to stop playing. Other machines within the complex assemblage of machines include "the Skype idiosyncrasy...only one of us could play at a time [and be heard]", a machine which alters the behaviour of the musician-machine via an *agentive manifestation* (Bryant, 2014, p. 44).

Despite the idea of a "Skype moderator", in which musicians took turns to send sounds through the connection, in practice the sound from the remote musicians was chaotic and un-moderated, determined by the unpredictability of the connection and also human 'error' to follow cues and to take turns. This was a combination of technical chance and human sound mixing:

> [17/06/2011 19:25:50] snakebeings: how to cue you ? [17/06/2011 19:25:54] snakebeings: on night [17/06/2011 19:30:19] oncoraton perez: we'll be playing or launching sounds all the time so you can mix us randomly as you want.

In the above Skype chat Oscar Hidalgo (Skype name oncoraton perez) comes to the same conclusion as Rayner, that the Skype musicians become elements of the sound which may or may not be heard depending on the complex operation of intra-actions of human and nonhuman actants. In this sense control and agency are dispersed across a wide number of actants or, in terms of a human-biased view of agency, presents a conspicuous lack of individual human control, as Geoff Doube observes:

> Control was almost completely absent, really from my point of view… as [in] *someone* having control over the final result. There was no kind of final control, I guess you could say there was *distributed control*, but the individual musicians didn't have their own, didn't have control over a lot of the elements that you'd normally have control over. It was almost control-less, that was my experience of it, control-less.

Doube's comments are not only based on the expectation of that which "individual musicians... normally have control over", but also on the assumption that control, and in other words agency, are human traits rather than machine

traits. Therefore, when seen from a human perspective, a project which lacks a human "*someone* having control over the final result" is "control-less". Also interesting is the observation Doube has of the "*distributed control",* of the *Bingodisiac machine,* suggesting that agency is distributed over the entire machine, rather than centred within a particular "*someone".*

David Rayner suggests a similar lack of human control, observing the confusing multitude of actants present in the *Bingodisiac* machine, of which the "will" of the individual human musician was a less important element:

> Control…it is always interesting to consider the control (or lack of) that we have... being 'controlled' by a gate device... signal[ed] without conscious effort, we had the free will... chance to obey... to provide sounds to contribute to the soundtrack... at the time it felt quite pleasant to just accede one's will [and say] welcome to the machine.

The signalling of the musicians "without conscious effort" again indicates the absence of human control over a final result: suggesting a way in which human agency is combined with the material agency of the cueing system, being "'controlled' by a [mechanical] gate device". As Rayner observes, agency was dispersed between the musician's "free will" and the randomised "chance to obey" of the cueing system, creating a reciprocal determinism which influenced the musician towards a tendency to "accede one's will... to the machine".

"Reciprocal determination" (Bryant, 2014, p. 50) between human and nonhuman participants is interpreted by Erikka Griffiths-Keam as a "shared control" between a multitude of actants:

> Shared control amongst the participants. Inspired direction which in a way was control from visual content, the film clips and the flashing lights... film content and light cues... the aleatoric nature of the cues... random cards with various numbers and words.

With control shared amongst the various human and nonhuman participants, the "visual content, the film clips... flashing lights... random cards and various numbers and words", agency in the *Bingodisiac machine* is extended, as Jane

Bennett's "*distributive agency*" (2010, p. 31), meaning that agency is not a 'enclosed' function but emerges from complex intra-actions between multiple actants. In terms of the *Bingodisiac machine* there are a multitude of actants which have agency to effect and alter the function of producing sound, therefore functionality can be seen as determined through complex intra-actions of machines, both human and nonhuman.

Reciprocal determinism, in which agency is dispersed amongst various actants, is expressed by Geoff Doube as a kind of shared "intelligence" which results from the combination of technology and musician:

> When I think about the machine, I'm thinking about the cue cards and everything that we got... a technological intelligence present in that scenario, it's an intelligence that incorporates the players …. together with the technology they constitute an intelligence.

The shared "intelligence" of the human musician-machines and the materials of technology, as suggested by Doube, forms a machine in which intention is shared amongst human and nonhuman actants. "Intelligence", "intention" "agency" and "control" are all functions of the machine which can be said to be distributed and shared amongst the various human or nonhuman actants of *Bingodisiac.* Doube's idea of the shared "control" between human and nonhuman actants has been discussed in Chapter Two as various forms of distributed agency: as Lambros Malafouris' "intention-in-action" (2008, p. 30); as Jane Bennett's "two-way street, an encounter between bodies human and non-human" (2010, p. 47); and as Levi R. Bryant's "*reciprocal determination* between flows and inputs" (2014, p. 50). As has been suggested, *Bingodisiac* represents an assemblage in which multiple forces express agency and in which no overall control is exerted. Viewed in another way, the *Bingodisiac machine* is a collection of functions and processes which are in a constant state of adaptation and complex intra-action within the machine assemblage.

6.3 Conclusions

At the beginning of this chapter the following research questions were asked: 'what strategies are used, in terms of creating structure[93] and de-territorialisation of structure?' and; 'what is the 'function' of the *Bingodisiac machine* in its capacity for increasing the participatory potential for materials and re-functioning?'. The conclusions drawn below answer these questions by referring to the various discussions occurring throughout this chapter.

6.3.1 The *Bingodisiac machine*: de-territorialisation, error and structure

By viewing actants as machines, accepting inputs and creating outputs for other machines to intra-act with, functions rather than the properties of machines have been emphasised. The *Bingodisiac machine*, comprising human and nonhuman machines, represents a complex intra-action in which no one actant or group of actants has control over the final outcome.

The integration of random and unpredictable elements means that machines are placed into an environment of vibrant and dynamic functions and that agency includes all kinds of diverse and complex actants, or machines within machines. Central to the unpredictability of the *Bingodisiac machine* has been the strategy of incorporating 'error' into the various systems, as seen in the re-functioning of machines such as Skype[94], and also attempts to fragment the natural flow of musicians to break down musical forms into the components of sound.

This strategy of de-territorialisation has been a recurring theme throughout the three case studies and is indicative of the DiY ethos and attitude towards

[93] The creation of structure, as it emerges from the intra-action of human and material, suggests a process of *re-territorialisation* – a re-configuration of actants from a human-biased structure to the extended agency of the non-totalising assemblage.

[94] Re-functioned from a voice-based internet phone system to a means of collaborating with remote musicians with 'errors' within this new function incorporated as part of the re-functioning of the machine.

structure and the organisation of materials. The DiY attitude towards structure is evident in *Bingodisiac* through the use of randomness, fragmentation, de-territorialisation, unpredictability and material error, which have all been used as strategies to "prevent music... to encourage sound"[95]: removing the dominance of human agency and the function of producing music to bring emphasis to the multiple components and material actants of sound as agents responsible for the resulting output. In this sense, to "prevent music" means to displace human oriented structures as the dominant form and to allow structures to emerge from the raw elements of sounds and materials.

One strategy of de-territorialisation has been discussed as the 'fairground effect', in which sound sources are dispersed and become part of the shifting localised environment of participation between machines. This dispersal of sound sources means that machines are altered by the material distance and proximity to each other, as well as volume and strength of sound, since there is no single controlling agent such as would happen if all of the sounds were placed through a mixing desk and amplified through a single pair of speakers placed at the front of the stage area. The ad-hoc positioning of sound sources, in which various elements have an influence, therefore, becomes a way to de-territorialise or fragment sound structures without having a centralised agent to control the various sound levels and placements. The fairground effect is one of a number of machines within the *Bingodisiac machine*, taking inputs of idiomatic music from the human musicians and outputting non-idiomatic sound through the operation of overlapping sound structures. In this way the de-territorialisation of musical structures occurs through combining disparate musical styles together, creating a shifting non-totalising assemblage of sounds which do not belong to any particular genre of music.

[95] Research journal entry dated 15th June 2011

6.3.2 Human/nonhuman actants and the non-totalising assemblage

One of the strategies of *Bingodisiac* has been to allow structure to emerge from both human and nonhuman actants. This means that non-idiomatic musical forms are not viewed as socially oriented, as would be expected when based within a community of practice, but instead structure emerges from a combination of the DiY ethos of Duncombe's 'community of difference' and the use of material actants enacting to de-territorialise human biased structures. This combination of human and nonhuman agency follows the DiY ethos of material engagement between the practitioner(s) and the material environment, the extended agency discussed in both of the previous case studies and in Chapter Two. In this way the various strategies of *Bingodisiac* can be summarised as ways in which the dominance of human-based structures is challenged so that material agency can emerge as a co-creator of the work: as ways in which the participatory potential of materials can be increased.

Error and randomness, incorporated into various aspects of *Bingodisiac,* are two strategies which have been shown as ways of challenging human intention and function. These strategies have been linked to Latour's process of reverse Black-boxing, as discussed in Chapter Two. When a particular system has been set up to perform an intended function by its human actants the Black-box contains and channels a multitude of both human and material actants into this specific function. This function of the Black-box subsumes the operations of the multiple actants as invisible elements. By introducing error these invisible actants emerge from the Black-box and the structure becomes an assemblage which is not contained within a single totalising function. In Chapter Two the connection was made between the reversed Black-box and Jane Bennett's idea of the 'non-totalising assemblage': as an "ad hoc grouping of diverse elements, of vibrant materials of all sorts" (Bennett, 2010, p. 23). *Bingodisiac* has attempted to use various strategies to fragment and break down *music* into a non-totalising

assemblage in which the "vibrant materials" of *sound* are the units of engagement, rather than enclosed musical styles. This means that sound is the material de-territorialised from musical form: equating musical form with the human-dominated structure of the Black-box; and sound as the material actants which are released when the Black-box is opened. This has been seen throughout this thesis as the DiY ethos of material engagement, an 'intention-in-action' in which the human is only part of the agency involved as multiple actants within the assemblage.

By moving away from the dominance of human agency *Bingodisiac* embodies many of the traits of DiY culture: as a material engagement which actively breaks down subsuming structures; and as a way of creating non-totalising assemblages which resist being incorporated into a larger category or classification. The non-totalising assemblage has also been seen in terms of the valuing of process over a finished product: the 'perpetual prototype', as discussed in Larsen-Jensen's case study (Chapter Four) and in *The Trons* case study (Chapter Five). The 'perpetual prototype' of the *Bingodisiac machine* is the work which remains 'open' to change and influence of multiple actants, just as the reversed Black-box is 'open' once the subsuming function has been removed.

By displacing the human as the controlling actant, the DiY ethos behind *Bingodisiac* emerges as a participation with multiple forces and agencies. In the previous case studies these collective forces were the various materials with which the individual DiY practitioner engaged with. In *Bingodisiac* these collective forces have additionally displaced the individual practitioner, as Geoff Doube observes: "Control was almost completely absent… as [in] *someone* having control over the final result. There was no kind of final control". With no form of "final control" both human and nonhuman actants reflect Levi R. Bryant's complex assemblage of machines with similarities to Jane Bennett's non-totalising assemblage. This situates agency as an emergent process rather than imposing control from a particular centre, brought about through the

various strategies which have been used to distribute agency amongst the human and nonhuman participants.

Against this argument, that *Bingodisiac* is a non-totalising assemblage of human and material actants, is the view that the cueing system is "the paradox of control used to destroy control – to prevent structure"[96]. This argument, that the cueing system is a totalising form of structure, is suggested by comments from participating musicians such as Ruth Wynne, Erikka Griffiths-Keam, Joshua Lynn and Geoff Doube, who point out "that if you have got that many musicians together, the natural thing is for everyone to play all at once"[97] and that the participation of so many unrehearsed musicians, operating without the cueing system: "would have just been a mess"[98]; "without people practicing they arn't going to be very adept at it"[99]. The suggestion is that the cueing system imposed a form of order onto the musicians, "[preventing] musical mayhem by not allowing everyone to play at the same time"[100] which would be the "natural thing"[101] to happen. In this sense the cueing system does appear to impose a framework through which a number of diverse musicians can participate without the need of rehearsals or familiarity with each other. However, my argument is that the aleatory nature of the structure provided by the cueing system, operating with the random allocation of numbers and cues, works as a strategy of de-territorialising the human-biased musical structures which would attempt to impose a totalising structure over the sound, rather than as a way of directing

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[96] Personal research journal dated 15th June 2011.

[97] Erikka Griffiths-Keam

[98] Geoff Doube

[99] Joshua Lynn

[100] Ruth Wynne

[101] Erikka Griffiths-Keam

the musicians to play in any particular coherent style. This aleatory nature of the cueing system means that the formation of structure is constantly changing and unpredictable, directed by machine rather than directly by human intention. This is pointed out by David Rayner who suggested that human intention was absent and the musicians were "signal[ed] without [human] conscious effort".

The incorporation of human-biased strategies to de-territorialise structure within the *Bingodisiac* case study expands the idea of material entanglement presented in the previous case studies. This is probably due to the more social emphasis of the *Bingodisiac* case study, reflected in the high number of participants involved. The strategies I would categorise as human-biased include: the diverse musical styles brought about through the selection of dissimilar musicians to create a 'community of difference'; the spatial placing of musicians in the fairground effect, which determined which musicians are more likely to intra-act due to proximity; and the 'overload' effect of the cueing system on the human musicians. This case study represents a closer integration of agency as a material entanglement, in the sense that the actants of *Bingodisiac* are *both* human and nonhuman. This means that the strategies involved can be seen as ways in which material entanglement extends agency across human/nonhuman boundaries. The use of the term *Bingodisiac machine* has been used to highlight this material entanglement, viewing machines as being functional devices which process inputs to create outputs, such as the "strange songs" of Bryant (2014, p. 39).

The cueing system provides an example of a functional machine which adapts the functions of the musicians, altering the expected traits of the musician to seek common musical ground. The function of the musician to produce music, discussed in terms of Paul Smith's view of the "trained musician" which functions to produce well-crafted music, is altered by the intra-actions of the *Bingodisiac machine* to instead function to intra-act with sound. By removing the function of the musician to produce music, there is less emphasis on musical structure and more focus on the qualities of sound, from which emerges the non-totalising configuration of the assemblage . As stated before, sound is the basic material

building blocks of music, and yet, if the function of sound to build music can be removed, then sound remains in the unfinished state of the 'perpetual prototype'. This has been one of the aims of *Bingodisiac*, to de-territorialise the formation of human-biased sound structure so that the participatory potential of the materials of sound can become increased. In *Bingodisiac* sound becomes the material of the 'perpetual prototype', since it remains 'unfinished' and non-totalised.

Material entanglement means that participation is not limited to the social, human biased structures, but instead agency is extended beyond the human to incorporate the material environment. In this sense, DiY culture can be viewed as a way of looking at the world which displaces language as the central structure of understanding. The de-territorialisation of structure, evident in *Bingodisiac* and the previous case studies, can also be viewed in this same light: as a de-territorialisation of systems of language as the dominant viewpoint of understanding the world. By extension this suggests that there is a strong current of this tendency to de-territorialise language in other forms of DiY culture, as discussed in Chapter Two, where a language view of the world represents a knowledge/power relationship which undermines an understanding of the world through material entanglement. In a wider sense, the extension of agency beyond the human means that the importance of the human is undervalued and the material environment is emphasised.

In the following chapter the findings and conclusions from the three case studies are revisited and implications are explored, with the direction of further studies suggested.

Chapter Seven: Conclusions, DiY theory and practice

This study has exemplified and, to some extent, embodied the points of connection between two disparate types of knowledge. DiY culture has been shown to embrace a form of knowledge which engages in the participatory potentials of materials, and therefore, to engage in the formation of a type of knowledge which is inextricably entangled with the material environment. Concepts emerging from the practices of the material-entangled DiY form of knowledge have been developed and interconnected within the language-biased structures of this academic study, offering a unique contribution to knowledge in both its 'situatedness' and emphasis on the extension of agency.

Despite the emphasis on material agency, human exceptionalism is never really completely removed in this thesis, particularly when we reach the case studies. For one reason, human-bias is an intrinsic part of the method of primary data collection in the case studies, which relies on the use of verbal interview with the human practitioner. On the other hand, human exceptionalism has been alleviated through the use of observation as a means of data collection, with this form of data collection balancing the more directly human-oriented.

Human exceptionalism's presence in language is a more difficult matter, where the use of the term 'practitioner', and other terms which define the relationship of human/nonhuman, such as 'between', 'engagement' and 'interaction', place a sense of separation between the human and the material environment which favours the human in terms of agency. These terms can be avoided, as they have in the majority of cases throughout this thesis, substituted by terms such as 'within', 'entanglement' and 'intra-action', however, the fact remains that language is a structure which situates the human at the centre of its dialogue. The argument here is, that DiY practices represent something beyond the system

and constraints of such human-oriented languages, not 'outside' of language as discussed in Chapter One, but as an extra-linguistic activity which also incorporates the 'language' of materials and extended agency implicit in DiY knowledge.

Part of the strength of this study has been the recognition of the interconnectedness between practice-oriented DiY knowledge, presented in the case studies, and the more conceptually driven theoretical perspectives on material agency, discussed in Chapter One and Two. Within the field work, DiY knowledge has been seen to emerge from the practices of material entanglement, as practitioners 'feel'[102] their way through their intra-actions with materials, as part of an entangled assemblage of actants. Part of the contribution to knowledge of this thesis has been the articulation and analysis of the less human-biased, less language-based knowledge of the tacit forms of DiY knowledge. This has been connected to conceptual tools of contemporary material agency to cut across the two disparate realms of theory and practice.

In this way, this study of DiY culture has traced a transversal pathway which cuts across realms which are usually kept separated and contained within their own systems of social understanding. In this sense, the research journey has exemplified a de-territorialisation of the boundaries between DiY practice and academic theory, as an integral means of accessing and analysing data: and as an intra-connection between the experiential knowledge of DiY culture and academic study.

Like-wise the transversal path traced from the more human-biased view of DiY culture to the extended agency view of DiY, has meant that the human and material have ceased to be conceptualised as separate entities, in terms of agency and the ability to affect each other. This suggests that, through this

[102] Referring to Polanyi's idea of tacit knowledge with DiY practitioners "feel(ing) [their way through]" (2005, p. 65), as a type of knowledge which contrasts with the more literary-biases of this thesis.

thesis, the boundaries of the human and the material have been de-territorialised: allowing the conception of agency to extend from containment within the human-biased view and to become distributed amongst all available actants. Participation now becomes a function which encompasses both material and human, altering the idea of participatory culture from a socially emphasised phenomenon to include the agency of the material environment.

The DiY practices examined in this thesis can be seen to embody aspects of the following interconnected concepts: organisation (or 'structure'), agency, function, intra-action, and participation. The five recurring themes form the basis of this conclusions chapter.

7.1 Overview of findings and contributions to knowledge.

Figure 43: 'The extended hand of agency'
(adapted with permission from Geoff Doube, 2015).

Figure 43 is an adaptation I have made of the poster taken from *The Trons* case study (Chapter Five) in which the human hand of the band *The Shrugs* and the nonhuman Meccano hand of *The Trons* have been combined into one image. If the hand in this figure suggests the ability to make something happen, the hand of agency, then agency is seen to emerge from its entangled human/material configuration. In this sense, Figure 43 embodies 'the extended hand of agency', as an assemblage from which emerges the organisation and structuring of actants.

The non-totalising assemblage has featured, throughout the case studies of this thesis, as a way in which 'structure' can be removed from the connotations of a human-biased concept of 'power' and to discuss an alternative way in which human and nonhuman actants are self-organising. In the non-totalising assemblage of the DiY practices examined, there is a less clearly defined perception of an organising agent, a totalising agent which is responsible for the forms created by the assemblage. Instead, the 'structures' are those which have emerged from the complex intra-actions of materials and practitioners. Agency within the assemblage is distributed amongst human and nonhuman actants, extended throughout the material environment in the complex intra-actions of machine-like actants. This means that the non-totalising assemblages of DiY practices, do not prioritise the human over the nonhuman, or vice versa, but that agency is seen as resulting from an entangled intra-action.

The DiY assemblage has been shown to allow functions to *emerge* as a result of complex operations and intra-actions from within the assemblage, rather than being imposed from human intention as the structures of Black-box technologies suggest. In Larsen-Jensen's practices the non-totalising aspects of the oscillator assemblages have been discussed in the way that material agency has participated in influencing the form and structures of the music produced (4.2.3) and also in the way that the 'perpetual prototype' means that assemblages are kept in a constantly non-totalised state, perpetually open to modifications (4.2.1; 4.3.1). The 'perpetual prototype', as a DiY practice, is part of the contribution to knowledge of this thesis, as a concept which has been developed from a combination of informed observations of the field of DiY practices and an engagement with prescribed knowledge.

The 're-functional potential' (4.2.2), also discussed in Larsen-Jensen's case study, is a strategy of material engagement which means that functions develop as a ongoing process of entangled material agency, rather than being imposed by human agency. Re-functioning of materials has been a defining feature of the type of DiY practices featured in this thesis. Re-functioning has been shown to be

a preferred practice by DiY practitioners, even when there are alternatives[103], since there appears to be certain beneficial results from allowing material agency to influence re-functioning rather than using the designed functions of technologies to do the job. The way in which re-functioning seems to work is by allowing material agency to participate in the process, providing complex outputs as a result of the material entanglement. This is a theme which also recurs again in section 4.2.3, in the discussion of the use of various non-standardised interfaces and sound elements which determine the structure of the music produced. The 're-functional potential' is presented as an original contribution to knowledge by this thesis, a concept developed from the interconnection of informed observations of actual DiY practices and conceptual viewpoints from Chapter Two.

Throughout Chapter Four, materials have been seen to exert agency over the structures and cultural forms produced: supporting the hypothesis that DiY culture seeks ways to increase the 'participatory potential' of materials and extended entanglements of human and nonhuman actants. In this sense, DiY culture is a non-totalising assemblage which allows a more 'open' participation between human practitioners and the material environment. The participatory potential of materials is identified by Larsen-Jensen when he suggests the material has "got its own life" and also that it "*creates its own* [types of] *structures*"[104].

In Chapter Five, Greg Locke's engagement with material 'error' is discussed in terms of an intra-action between materials, creating an output which is, according to Locke, more interesting and desirable than an exclusively human

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[103] For example: Greg Locke's preference of the 'crappy build' of Meccano over engineered components; and Larsen-Jensen's preferred use of the broken potentiometer which could easily be replaced with a working component.

[104] Interview of Larsen-Jensen in his home workshop on 22nd February 2013 (Chapter Four).

intention (section 5.1.3). Through "embracing the inefficiencies"[105] of the machine, Locke has increased the participatory potential of material actants within the assemblage. This characterises the assemblage as non-totalising by human intention, since 'errors' and 'inefficiencies' are unpredictable elements in terms of human intention. This use of unpredictable elements which are not exclusively under the influence of human intention has been one of the recurring strategies of DiY practices to displace the human as the central figure of agency.

If 'error' is defined as a diversion from an exclusively human intention, as it has been throughout this thesis, then to incorporate 'error' means to allow material agency to be part of the participatory influence of DiY culture. This is one of the underlying themes of this thesis, that DiY practices offer an additional view of participatory culture which allows material participation to occur as an entanglement of human and material environment. This has been seen in the DiY strategies which allow material agency to participate in the re-functioning of technological objects.

In section 5.2.1 the 'complex assemblage' of machines, which make up Locke's guitar strumming device, are viewed in terms of intra-acting with each other and altering the function of the machine assemblage. These discussions contribute towards the idea that human and material environment are part of the same machine assemblage: a multitude of machines which act together to reciprocally determine the function of the machine; a process which oscillates between human and nonhuman, contained within both, but is not located in either as a separate entity.

[105] Greg Locke recorded interview by author 07-12-12.

In section 5.2.2 and 5.3.2, the idea of *Machine-talk*[106] is developed and applied to provide an account of the intra-actions occurring within the machine assemblage. *Machine-talk* has been discussed as a more nuanced extension of the concept of re-functioning, as an agent to transform the functions of object, and as a descriptor of the processes in which the intra-actions of machines draw upon the functional capacities of materials. Example of re-functioned materials, where the intra-action of various human and/or nonhuman machines affect the functioning of the assemblage include: the aluminium pie-plate used as a snare drum (5.1; 5.1.2; 5.2.1; 5.2.2); the tape-deck as an amplifier (5.2.2); and the car solenoid as a robotic component (5.2.2); and can be seen as complex assemblages of machines.

Central to this idea of machines intra-acting with machines is the 'structure' of the non-totalising assemblage, which increases the participatory potential of materials and allows material agency to emerge. The assemblage of *The Trons* is such that, material actants have been allowed to participate in the formation of the robots, rather than the robots being structured and formed through an exclusively human intended design. Much of this participation occurs because of the use of re-functioned materials and through the use of 'error' to increase the 're-functional potential' of materials. The non-totalising assemblage is suited to this form of material participation, since the organisation of materials and actants is not from the top-down, but instead, is configured through the emergence of organisation, through the 'extended agency'[107], of the assemblage. Extended agency also means that the actants within the DiY assemblage are from

[106] Machine-Talk is developed from observations in the field of practice and Locke's original idea of machine talk as an audible 'chatter' between mechanical parts.

[107] Extended agency has been developed from the discussions of the work of Levi R. Bryant (2014) and Andy Clark and David Chalmers' idea of the "*extended mind"* (Clark & Chalmers, 1998, p. 7) in section 2.1.3 and interconnected throughout the case studies with observations of actual DiY practices.

a larger field than the engagement between practitioner and materials, to also include the 're-functional potential' of the wider material environment.

The extended agency of the material environment is discussed in Larsen-Jensen's case study (4.1.1; 4.2.3) as the workshop and the environment of Raglan's rubbish dump providing an extension to an exclusively human idea of agency. The extended agency of the non-totalising assemblage is further discussed, in 5.3.1, viewing Locke's engagement with materials as part of a process of reciprocally determined functions of the machine, in which agency is dispersed amongst the assemblage of *The Trons.* This has been a similar situation in the *Bingodisiac* case study where the intra-action of human and nonhuman actants has been discussed as a *Bingodisiac machine,* a non-totalising assemblage of actants which participate in creating the form of the event (6.1.2; 6.2.1; 6.2.2; and 6.3.2). The participation of multiple human musicians in *Bingodisiac* has helped to focus the idea that the machine is assembled from both human and nonhuman actants. The connection of the idea of the machine with the non-totalising assemblage is emphasised in the *Bingodisiac* case study where human participants are viewed as machines to process inputs from other machines and to produce outputs such as "strange songs" (Bryant, 2014, p. 39). The viewing of human musicians as functional machines to process inputs is more emphasised in *Bingodisiac* than the other case studies, due to the increased number of human practitioners involved in the project. This is where the idea of the machine begins to really reflect the intra-connectedness of human and nonhuman actants, in particular the de-territorialisation of the human and material which occurs when function is seen as being part of the machine assemblage. Viewed in this way the assemblage of machines signifies the way that agency is dispersed amongst the human and nonhuman actants, de-emphasising the separation between human and material environment.

This easing of separation between human and material implies that the 'social view' is no longer separated from the 'material view' of DiY culture, that there

are connections to be made across the social and material views, as discussed below.

7.1.1 DiY knowledge as an intra-connection of 'social' and 'material'.

Following on from the findings of the case studies, the DiY practitioner's attitude to technology is not to use technology to 'dominate' the material environment (for example, to enclose the material within the Black-box of functionality) but, instead, to claim a position for the human *within* the material environment. The function of DiY culture, therefore, appears to be an acknowledgement of extended agency to include the participation of the material environment. In this sense, the types of 'power' and 'structures' sought by DiY culture are ones in which the human and the material are not situated as separate entities or categories within a hierarchical structure but instead, types of power and types of structures which emerge from the intra-actions of entangled human and nonhuman actants. This emerging organisation of materials, made possible through the extension of agency, is the unique approach of DiY culture and can be said to be the root of DiY 'knowledge', a form of knowledge which includes the participatory potential and expressive capacities of materials. Therefore, in a wider sense, DiY culture functions to resist the human as the centre of agency, situating the human and the material as co-productive forces, which are not totalised or contained within linguistic categories and constraints, as an extra-linguistic force of agency. Within this thesis this extra-linguistic realm of DiY culture has necessitated the construction of a new aspects of language, in which terms are re-defined as being inclusive of material agency. In terms of power and knowledge, DiY culture is an approach to power and structure in which both power (as a social force) and structure (also of a social-bias) are resisted as totalising forces. By resisting the conventional ideas of both power and structure, as human-biased organisational tools, DiY practices allows other forces to

emerge as organising agents. Once 'power' is decentralised[108] and the human is displaced as the centre of agency, there are all kinds of implications which can occur as a result, for example, the incorporation of material agency suggested by this thesis, permits a re-thinking of the duality between human subject and material object. This means that DiY practices can be viewed from a perspective in which theory and practice are not viewed as separate activities, an underlying theme of DiY culture emerging throughout this thesis. This embeds 'knowledge', as well as agency, as an emerging function of the material environment in which the human practitioner is but one amongst a multitude actants. DiY knowledge, in this sense, emerges from the participatory capacities of the human and material, as a form of *Machine-talk* which involves extra-linguistic attributes. This means that language is extended from its exclusively human traits, influencing our way of relating to the material environment and creating consequences and considerations which extend from the localised DiY practices examined in this thesis. The suggestion is that the extended agency of DiY culture represents a timely re-evaluation of the relationship between the human and the material environment, challenging prevalent discourses which place the human at the centre of power and knowledge.

[108] Decentralised power is defined throughout this thesis as relating to Jane Bennett's idea of "distributive agency" (2010, p. 31).

7.1.2 Further studies

A further area of research suggested by this study is that of looking deeper into the types of knowledge produced by DiY culture. This has been discussed in the methodology chapter of this thesis, in terms of tacit knowledge and experiential knowledge, but a study which went into more depth could also incorporate concepts of power and the knowledge/power relationship responsible for the production of forms of knowledge which incorporate the entanglement of human and nonhuman actants. This thesis has suggested several pathways in which a study of this sort could be conducted, such as using Michel Foucault's concept of knowledge/power (1995) discussed in Chapter One of this thesis, where the concept of power is interlinked with the production and type of knowledge produced. The question asked could be: 'If power and knowledge are connected then what forms of knowledge are created within the DiY enactment of agency as incorporating both human and material?'. The direction of this study could include the idea of the extra-linguistic, as an area of knowledge which extends from the human. A secondary question could concern the potential format of expressing DiY knowledge and ways in which constraints and limitations brought about through the human-bias of language could be avoided.

Approaching DiY knowledge from a perspective of the 'life' of materials suggests a form of 'techno-animism'[109] which emerges from the vibrancy of the material environment, as an active component in the process of creating cultural artefacts. 'Techno-animism' is suggested as a future direction of this study, recognising the vibrancy of material agency by lessening the emphasis on the practitioner and using less human-biased forms of data collection and analysis. Of influence to this direction of research could be Ian Bogost's *Alien phenomenology, or what it's like to be a thing* (2012), where human

[109] A term used in the peer reviewed article *DiY participatory culture - Allowing space for inefficiency error and noise* (Snake-Beings, 2014).

exceptionalism is replaced by material perspectives. Another approach could be to make connections between the 'techno-animism' involved in DiY practices and other animist traditions which regard a form of consciousness located within objects of the material environment. This could involve a comparison between the more traditional animist beliefs concerning materials and contemporary thoughts on the relationship between the human and the material environment, comparing the differences in 'world view' of techno-animist approaches and industrial perspectives on materials and technologies.

A general direction for further studies, suggested by this thesis, is the relationship between the human and the environment: the questioning of the power granted to the human over the material environment and an exploration of practices which address this imbalance. Through bringing such practices under academic study there is the potential that we lessen the division between human and material, changing our attitudes towards human exceptionalism and opening the door to a much needed re-definition of our place within the material environment.

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Appendices

9.1 Ethics approval

Philosophy Programme
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THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Emit Snake-Beings
Associate Professor Geoff Lealand
Dr Bevin Yeatman
Dr Gareth Schott
Screen and Media Studies Programme
School of Humanities
Faculty of Arts and Social Sciences
The University of Waikato
Private Bag 3105
Hamilton 3240

14 May 2011

Dear Emit,

Re: **Participatory culture and performance through augmented space: an intermedia perspective.**

Thank you for the amended documents. This letter is to confirm that you have formal ethical approval for your research.

Kind regards,

Ruth Walker
Chair of the Faculty of Arts and Social Sciences Human Research Ethics Committee.

9.2 Ethics application

APPLICATION TO THE

HUMAN RESEARCH ETHICS COMMITTEE

APPLICATION FOR ETHICAL APPROVAL

May 2011

Emit Snake-Beings

Screen and Media

Supervisors:

A. Prof. Geoff Lealand

Dr Bevin Yeatman & Dr Gareth Schott

UNIVERSITY OF WAIKATO

FACULTY OF ARTS & SOCIAL SCIENCES

HUMAN RESEARCH ETHICS COMMITTEE

APPLICATION FOR ETHICAL APPROVAL

1. NAME OF RESEARCHER(S)

Emit Snake-Beings

2. DEPARTMENT OF RESEARCHER(S)

Screen and Media, Waikato.

3. RESEARCHER(S) FROM OFF CAMPUS

None

4. TITLE OF RESEARCH PROJECT

Participatory culture and performance: an augmented space perspective.

5. STATUS OF RESEARCH PROJECT

PhD Thesis

6. FUNDING SOURCE, if applicable

N/A

7. NAME OF SUPERVISOR(S), if applicable

A. Prof. Geoff Lealand

Dr Bevin Yeatman

Dr Gareth Schott

8. DESCRIPTION OF RESEARCH PROJECT

a) Justification in academic terms

Augmented space is the intersection and interaction between our environment and technology, particularly the ways in which we use technology to allow additional supplementary information to be integrated into our everyday environment. Most media provides information to be overlaid into the environment: television and radio all provide information and perspectives which influence our conception of space, for example, a news feed from a distant country influences our sense of space and position within the world. However, augmented space is more concerned with a two way interactive process which forms part of a new trend in participatory culture driven by new media technologies. This interactivity allows dynamic layers of information, a constantly updated data-space, through which users perform real-time navigation and negotiation between multiple media sources. In the performing arts the interaction between environment and technology has created a culture of cyborg performance, in which the human and technology function as a fully entangled hybrid: expressing our being through new forms and uses of technology, and creating fluid data-spaces in which performers participate.

The study will involve two case studies of existing creative performance practices which use layers of data and new technologies in a live public performance space. The first of these case studies will examine the cyborg performance of Hamilton's robot-rock group *The Trons*, the world's first fully automated robot-music group, in a live public performance situation involving augmented and multiple spaces. The second case study will examine the performance practices of the *Bingodisiac Orchestra*, another Hamilton-based group comprised of a musical orchestra which uses data-space technology to inform and cue its human musicians in a public audio/visual performance.

The Trons and the *Bingodisiac Orchestra* both use technology entangled with human qualities and responses to create a cyborg-human hybrid: an intermedia form in which performers interact with technologies and create augmented performance spaces.

The theories of space used in the study are influenced by Edward Soja's third space (1996) and Chris Salter's work on the entangled human-machine spaces created by our interactions with technology. The central theoretical framework will be an adaptation and extension of Lev Manovich's concept of augmented space (2005).

b) Objectives

The aim of this study is to compare two live performance spaces which use technology in different ways to create augmented spaces. This comparison between the human-machine (the anthropomorphic and human programmed *The Trons*) and the machine-human (the mechanised human performers in the *Bingodisiac Orchestra*), looks at the two-way flow of data which represents the performer's interaction with technology. The objective is to engage with contemporary spatial theory and document an intersection between this theory and the emerging uses of augmented spaces in creative arts.

c) **Method(s) of information collection and analysis**

The first case study involves the Hamilton based robot-music group *The Trons* and their established practice of creating cyborg music performance in front of a live audience. *The Trons* are a high profile, internationally recognised robot-rock group, comprising of four music-playing robots controlled by a central computer. Information will be collected from Interviews with Greg Locke, the composer, designer and inventor of the group, and a consenting sample of the group's audience within the context of a public performance of *The Trons*.

The Bingodisiac orchestra (AKA Kaosphere Orchestra) is an established practice, which has performed in several theatre festivals in Hamilton, Christchurch and Dunedin since 2002. Information collection will be through interviews with the group's musicians and conductor and the consenting sample of audience members at one of their performances.

The analysis of this data will be through an interpretive qualitative methodology using constant comparison or grounded theory to initially identify themes and underpinning conceptual trends. These themes will be analysed through the theoretical framework, established within the literature section of the thesis, to identify emerging practices of using augmented spaces in public performance.

Information will also be collected using the participating – observer method, whereby the researcher will also participate in the events as musician in the Bingodisiac Orchestra and as technical assistant in *The Trons*. The aim is to generate informed and engaged commentary on the performances observed through a practical appreciation of the processes involved. The information will take the form of field notes and research journal entries and go towards influencing the general flow of conversation during formal interviews.

The participating – observer is particularly useful in the early stages of research where design of the research project can be informed through a "nuanced understanding of context that can come only from personal experience" without which "we may not always ask the right questions" (Mack, Woodsong, Macqueen, Guest, & Namey, 2005, p14).

d) **Procedure for recruiting participants and obtaining informed consent**

Both of the groups involved (*The Trons* and the *Bingodisiac Orchestra*) have expressed an initial interest in participating in the proposed research and their collaboration is essential in recruiting participants for the interviews. There are four different categories of participant involved in the interviews:

- The audience of *The Trons*,
- The operator of *The Trons*
- The audience of the *Bingodisiac Orchestra*,
- The musicians of the *Bingodisiac Orchestra,*

The audience of *The Trons* will be recruited through an information sheet distributed at the entrance to the performance. This will be a day-time performance to ensure that safe transport is available after the show. This sheet will detail the necessary information on the research project, who the researcher is, the institution responsible, the purpose of the research and the procedures involved (see **appendix one)**. Audience members who are interested in participating can contact the researcher via email or telephone and an interview time arranged, or alternatively take part in the interview immediately after the performance. At the time of the interview the information sheet will be supplied to the participant and a consent form will be completed by the participant (see **appendix two)**. Interviews will take place in a neutral location, such as one of the rooms at the university or a room at the venue. The operator of *The Trons* will be recruited via direct email or telephone contact as this method of communication is already established between us and the information sheet (**appendix one)** and consent form (**appendix five)** will be used.

The audience of the *Bingodisiac Orchestra* will be recruited using the same procedure as *The Trons* audience above and the procedure of obtaining informed consent will also follow this pattern with the same information sheet (see **appendix one)** but a different consent form (see **appendix three)**. The musicians of the *Bingodisiac Orchestra* will be supplied with the information sheet (see **appendix one)** at a convenient time before the performance. Musicians who are interested can then contact the researcher to arrange to be interviewed at a later date. A completed consent form will be required before the interview takes place (see **appendix four)**.

The research instrument of participating – observer will be used during the performances and as part of informing the potential participants of the activities of the researcher this will be included in the information sheet (see below section: **f) Research instruments to be used**, as well as, **appendix one)**.

e) **Procedures in which participants will be involved:**

All participants will be informed about what the research involves and asked to grant consent at each step of the research. The audience interviews, for both case studies, will be around 15 minutes in duration and use audio recordings to speed the process. The questions will be of an open-ended nature to allow constant comparison or grounded theory to function, with prompts for further explanations included. The interviews with the musicians and with Mr Locke will be longer in duration, approximately forty five minutes, following an open-ended grounded-theory approach.

f) **Research instruments to be used.**

Interviews will be scheduled to occur as closely to the time of the performance as possible. Within interviews the researcher will set the topic of augmented space using a variation of several preconceived initial questions (see **appendix six**) after which the structure of the interviews are open-ended and will closely follow a grounded theory methodology to identify themes emerging from the interviewees. Once a theme is identified, the researcher will pursue a more detailed elaboration using open-ended prompts.

The research instrument of observing-participant (Bernard, 1995), or the more practice aligned participating – observer, will also be used during the *Bingodisiac* performance. This will take the form of the researcher collaborating in the performance as a means of gaining deeper understandings of the processes involved. There will be no structured observational schedule or particular types of behaviour to be observed since this will take the emphasis away from conscious and effective participation and the insights which may be gained in this way. Since the emphasis is on participating rather than observing it will not be possible or necessary to take field notes, photographs or video recordings at the actual time of the events. Field notes will be written up closely after the performance and together with pre-performance journal entries, used to express 'insider' insights and commentary which is engaged with the practice and experience of performance within augmented space. Although the audience or musicians are not the subject of the participating - observer they will be informed that a participating – observer is present in the performance on the information sheet displayed at the door of the performance.

9. PROCEDURES AND TIME FRAME FOR STORING PERSONAL INFORMATION AND OTHER DATA AND MAINTAINING CONFIDENTIALITY OF PERSONAL INFORMATION

Confidential information, based on the interviews and contact information will be stored in a secured digital format behind a password protected login account at the University of Waikato. This will be for a duration of five years. Any hard copies will be stored at a secure site in the supervisor's office at the University of Waikato for five years. No one, other than myself and my supervisors will have access to this material.

10. ETHICAL AND LEGAL ISSUES

a) Access to participants

Participants will be contacted through the agreed channels and only for the duration of the interviewing schedule. Contact details will not be shared amongst participants and the researcher will maintain confidentially of personal information as described in section nine of this application.

b) Informed consent

All participants will be informed of what the research will entail, the purpose of the research, their rights to refuse participation, the uses of data and systems to protect the security of data. The participant can refuse to continue to participate or withdraw their ongoing investment at anytime. All participants will remain anonymous, unless otherwise requested.

c) Potential risk to participants

To minimalise any potential risks to participants all audio-taped interviews will be for strictly research purposes only and confidentially will be maintained at all times. Any arising potential risks will be discussed with my supervisors at the earliest time possible.

d) Publication of findings

Data collected will be used for completion of my PhD Thesis and for any subsequent publications such as articles, book chapters, journals, electronic or otherwise. No personal information concerning the participants, including recorded audio material, will be published in any form.

e) Conflict of interest

There are no known conflicts of interest at present. I will endeavour to resolve future conflicts, if encountered, through communication and consultation with my supervisors.

f) Intellectual and other property rights

Ownership of copyright will remain with Emit Snake-Beings and University of Waikato.

g) Intention to pay participants

Participants will not be offered any cash incentives.

h) Any other ethical or legal issue

I do not believe there are any other ethical or legal issues involved

i) The Treaty of Waitangi

To the best of my ability, the Treaty of Waitangi will be respected in all relevant interactions. In the event that an issue arises I will contact my supervisor in the first instance so that I can resolve the issue with respect to the treaty.

11. ETHICAL STATEMENT

I will abide by the University of Waikato's handbook on Ethical Conduct in Human Research and Related Activities Regulations, paying particular attention to the sections dealing with ethical conduct in research.

If any unforeseen ethical issues arise the research will cease immediately until after consultation with my supervisors and a satisfactory outcome is reached. I will apply the above ethical principles and through my endeavours to inform the participants of all the implications and scope of the research prior to commencing the study.

These guidelines and regulations will be followed by the researcher in any written, spoken or other communicated interaction with research participants and general public for the duration of study and afterwards.

Emit Snake-Beings **(Applicant)**	**A.Prof Geoff Lealand** **(Chief supervisor)**
(Date)	**(Date)**

Contents:

Appendix one: Information Sheet for all case studies

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Information sheet

Participatory culture and performance: an augmented space perspective.

Description of project:

As part of my PhD research I am conducting research into Augmented space and the intersection between our environment and technology within the context of performance spaces. Augmented space includes any area which is extended by additional information, or data-spaces. Augmented space can be the simple addition of cell phone coverage or complex multi-zone performance spaces using video feeds, and connection to remote locations. Augmented space represents the technological extension of ourselves from a physical body to a virtual body which has presence in many different forms of technological spaces. The use of technology in performance makes visible the intersection of ourselves and other distinct spaces which are separate from the physical body but yet can operate under the command of our consciousness, extend our consciousness or transfer our sense of self from the physical body to the mechanisms we control. In other instances mechanisms may be used to limit our performance so that the sphere of the director's control is extended.

Procedures

The researcher is interested in interviewing several audience members, musicians and performers. The duration of the interview will be less than one hour. If you would like to participate please give your name and email address or telephone number to Emit Snake-Beings who will be located at the door.

During the performance the researcher will be an observing-participant as a means of gaining deeper understandings of the principles involved. Although the audience will not be the primary target of observation it is important to understand that the event as a whole will be observed by the researcher from the stage area during the performance.

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Participant information.

a) Non-identifying data will remain in a secure locked cupboard accessible only by Emit Snake-Beings or his supervisors for a period of five years after which it shall be destroyed or permanently deleted.

b) Your identity will remain confidential and anonymous unless you request otherwise.

c) You have the right to withdraw from the study at any point up to three weeks from the date of the interview.

d) You may refuse to answer any specific questions.

e) Information you supply will be used for the researcher's final PhD Thesis, journal articles and seminars which will be published electronically, on-line and in print.

Any concerns or questions may be directed to Emit Snake-Beings or his supervisors A.Prof Geoff Lealand lealand@waikato.ac.nz Phone: ext 6022, Dr Bevin Yeatman byeatman@waikato.ac.nz Phone: ext 8852, and Dr Gareth Schott g.schott@waikato.ac.nz Phone: ext 6803 at the Screen and Media Dept of Waikato University, New Zealand.

Any concerns or questions can also be directed to the Human Research Ethics Committee of the Faculty of Arts and Social Sciences. C/o the Secretary of the Committee, email fass-ethics@waikato.ac.nz, postal address, Faculty of Arts and Social Sciences, Te Kura Kete Aronui, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240. This research project has been approved by the Human Research Ethics Committee of the Faculty of Arts and Social Sciences.

Appendix two: Consent form for *The Trons* audience interview

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Consent Form

Participatory culture and performance: an augmented space perspective.

Interview: The Trons audience member.

Description of project:
As part of my PhD research I am conducting research into Augmented space and the intersection between our environment and technology within the context of performance spaces.

I (your name)_____ **agree to** take part in a short interview (less than one hour) as part of the PhD research of Emit Snake-Beings. I agree to audio recordings to be made of my responses as part of the research process. The audio recordings will be archived under the secure conditions detailed below.

Participant information.

a) Non-identifying data will remain in a secure locked cupboard accessible only by Emit Snake-Beings or his supervisors for a period of five years after which it shall be destroyed or permanently deleted.

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b) Your identity will remain confidential and anonymous unless you request otherwise.

c) You have the right to withdraw from the study at any point up to three weeks from the date of the interview.

d) You may refuse to answer any specific questions.

e) Information you supply will be used for the researcher's final PhD Thesis, journal articles and seminars which will be published electronically, on-line and in print.

Any concerns or questions may be directed to Emit Snake-Beings or his supervisors A.Prof Geoff Lealand lealand@waikato.ac.nz Phone: ext 6022, Dr Bevin Yeatman byeatman@waikato.ac.nz Phone: ext 8852, and Dr Gareth Schott g.schott@waikato.ac.nz Phone: ext 6803 at the Screen and Media Dept of Waikato University, New Zealand.

Any concerns or questions can also be directed to the Human Research Ethics Committee of the Faculty of Arts and Social Sciences. C/o the Secretary of the Committee, email fass-ethics@waikato.ac.nz, postal address, Faculty of Arts and Social Sciences, Te Kura Kete Aronui, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240. This research project has been approved by the Human Research Ethics Committee of the Faculty of Arts and Social Sciences.

Your Name_____

Address_____

Phone number_____

Email address_____

Signature (please sign your name)

Date (Date of signature)

Researcher: Emit Snake-Beings
Dated:

Please return this form to: Emit Snake-Beings, Screen and Media Dept. Waikato University, Hamilton Private Bag 3105 Hamilton 3240. New Zealand.

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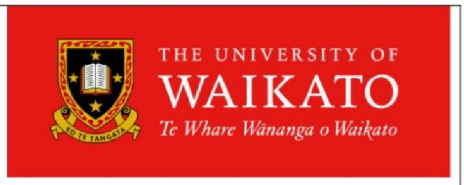
Appendix three: Consent form for *Bingodisiac* audience interview

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com



Consent Form

Participatory culture and performance: an augmented space perspective.

Interview: Consent form for Bingodisiac audience member.

Description of project:
As part of my PhD research I am conducting research into Augmented space and the intersection between our environment and technology within the context of performance spaces.

I (your name)_____ **agree to** take part in a short interview (less than one hour) as part of the PhD research of Emit Snake-Beings. I agree to audio recordings to be made of my responses as part of the research process. The audio recordings will be archived under the secure conditions detailed below.

Participant information.

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a) Non-identifying data will remain in a secure locked cupboard accessible only by Emit Snake-Beings or his supervisors for a period of five years after which it shall be destroyed or permanently deleted.

b) Your identity will remain confidential and anonymous unless you request otherwise.

c) You have the right to withdraw from the study at any point up to three weeks from the date of the interview.

d) You may refuse to answer any specific questions.

e) Information you supply will be used for the researcher's final PhD Thesis, journal articles and seminars which will be published electronically, on-line and in print.

Any concerns or questions may be directed to Emit Snake-Beings or his supervisors A.Prof Geoff Lealand lealand@waikato.ac.nz Phone: ext 6022, Dr Bevin Yeatman byeatman@waikato.ac.nz Phone: ext 8852, and Dr Gareth Schott g.schott@waikato.ac.nz Phone: ext 6803 at the Screen and Media Dept of Waikato University, New Zealand.

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Your Name_____

Address_____

Phone number_____

Email address_____

Signature (please sign your name)

Date (Date of signature)

Researcher: Emit Snake-Beings
Dated:

Please return this form to: Emit Snake-Beings, Screen and Media Dept. Waikato University, Hamilton Private Bag 3105 Hamilton 3240. New Zealand.

Appendix four: Consent form for *Bingodisiac* musician interview

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Consent Form

Participatory culture and performance: an augmented space perspective.

Interview: Consent form for Bingodisiac musician.

Description of project:
As part of my PhD research I am conducting research into Augmented space and the intersection between our environment and technology within the context of performance spaces.

I (your name)_____ **agree to** take part in a short interview as part of the PhD research of Emit Snake-Beings. I agree to audio recordings to be made of my responses as part of the research process. The audio recordings will be archived under the secure conditions detailed below.

I understand:

a) Non-identifying data will remain in a secure locked cupboard accessible only by Emit Snake-Beings or his supervisors for a period of five years after which it shall be destroyed or permanently deleted.

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b) Your identity will remain confidential and anonymous unless you request otherwise.

c) You have the right to withdraw from the study at any point up to three weeks from the date of the interview.

d) You may refuse to answer any specific questions.

e) Information you supply will be used for the researcher's final PhD Thesis, journal articles and seminars which will be published electronically, on-line and in print.

Any concerns or questions may be directed to Emit Snake-Beings or his supervisors A.Prof Geoff Lealand lealand@waikato.ac.nz Phone: ext 6022, Dr Bevin Yeatman byeatman@waikato.ac.nz Phone: ext 8852, and Dr Gareth Schott g.schott@waikato.ac.nz Phone: ext 6803 at the Screen and Media Dept of Waikato University, New Zealand.

Any concerns or questions can also be directed to the Human Research Ethics Committee of the Faculty of Arts and Social Sciences. C/o the Secretary of the Committee, email fass-ethics@waikato.ac.nz, postal address, Faculty of Arts and Social Sciences, Te Kura Kete Aronui, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240. This research project has been approved by the Human Research Ethics Committee of the Faculty of Arts and Social Sciences.

Your Name_____

Address_____

Phone number_____

Email address_____

Signature (please sign your name)

Date (Date of signature)

Researcher: Emit Snake-Beings
Dated:

Please return this form to: Emit Snake-Beings, Screen and Media Dept. Waikato University, Hamilton Private Bag 3105 Hamilton 3240. New Zealand.

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Appendix five: Consent form for *Greg Locke, The Trons* interview

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Consent Form

Participatory culture and performance: an augmented space perspective.

Interview: Consent form for *Greg Locke, The Trons.*

Description of project:
As part of my PhD research I am conducting research into Augmented space and the intersection between our environment and technology within the context of performance spaces.

I (your name)_____ **agree to** take part in a short interview (less than one hour) as part of the PhD research of Emit Snake-Beings. I agree to audio recordings to be made of my responses as part of the research process. The audio recordings will be archived under the secure conditions detailed below.

I understand:

21

a) Non-identifying data will remain in a secure locked cupboard accessible only by Emit Snake-Beings or his supervisors for a period of five years after which it shall be destroyed or permanently deleted.

b) Your identity will be named in the thesis and all subsequent relevant publications.

c) You have the right to withdraw from the study at any point up to three weeks from the date of the interview.

d) You may refuse to answer any specific questions.

e) Information you supply will be used for the researcher's final PhD Thesis, journal articles and seminars which will be published electronically, on-line and in print.

Your Name_____

Address_____

Phone number_____

Email address_____

Signature (please sign your name)

Date (Date of signature)

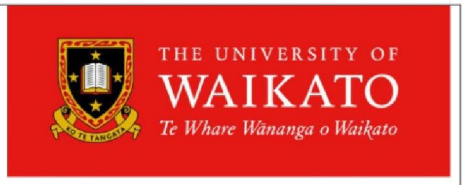
Researcher: Emit Snake-Beings
Dated:

Please return this form to: Emit Snake-Beings, Screen and Media Dept. Waikato University, Hamilton Private Bag 3105 Hamilton 3240. New Zealand.

Appendix six: Initial interview questions / themes

Researcher: Emit Snake-Beings
(+64)(07)838 4543 ex. 6717.

Email: snakebeings@gmail.com



Info. Required:

Name, Audience of which performance, Musician, role, etc

1) **What spaces were you aware of, during the performance?**
(Prompt for alternative names)

( ) Physical space
( ) Audience space
( ) Audio space
( ) Visual space
( ) Screen space
( ) Performance spaces outside of the room you were in
( ) Webspace
( ) Skype space
( ) Data-space

( ) Other (prompt for more)

2) **Can you explain more about the spaces you have mentioned above?**

(How did they affect you/your performance/your sense of personal space/sense of public space)

3) **Where was your main focus during the show?**
( ) Visual screen projections
( ) Cueing system
( ) Other musicians
( ) Audio space
( ) Audience space

( ) Other:

4) **Did this feel as if there were multiple spaces operating at the same time?**

5) **What senses did you use to perceive these spaces?**
(Prompt for any spacial awareness / multiple sense groupings / 'unexplainable' sense categories / senses other than the physical five senses.)

6) **What techniques did you use to interact with the visual space of the screen?**

7) **Where were "you" during the performance?**

(Prompt for multiple spaces, flows of data, consciousness located in different space etc)

References:

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