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# The Do-it-Yourself (DiY) craft aesthetic of The Trons – Robot garage band

## Keywords

craft and materials  
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   agency  
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   culture  
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 reuse  
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## Abstract

*The Trons are a Lo-Fi robot-garage-band constructed from discarded and redundant materials, including Meccano, aluminium foil salvaged from food wrappings and automotive solenoids. The central hub of their operation comes from a computer, made obsolete in the mid-1990s, which feeds signals to flimsy materials whose inefficiencies and 'errors' add another layer of processing to the sound. This article discusses the use of discarded materials as processing agents as a Do-it-Yourself (DiY) craft aesthetic that embraces inefficiency and error as active agents in the production of sound. The indeterminate performance of sound, enacted by the Lo-Fi robotics used in The Trons, is viewed in this paper as an example of a strategy that emerges from a deep engagement by the practitioner with the materials of construction. Through an observation of studio practices and interviews with the maker, material engagement is revealed as a way of generating embodied knowledge, a form of craft practice that situates the DiY practitioner as being entangled within the material environment, and with the work evolving as a shared, reciprocal, exchange between human and*

*material. In this article, function and dysfunctional 'error' are part of a spectrum of acceptable outcomes of the DiY craft aesthetic, a process in which practitioners and technological materials form an extended network of agency, displacing the human as the exclusive centre of process.*

## **Introducing The Trons**

The Trons are four computerized mechanical 'robots' that play 'live' music to an audience. They were created by an engineer, Greg Locke, working in a garage-workshop in the small farming town of Hamilton, New Zealand. Since 2008 The Trons have played over 80 'live' performances in New Zealand, Australia, Germany, Czech Republic, Singapore and Malaysia. 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 adapting redundant technologies to allow musical instruments to be played.

This article discusses the construction of The Trons, a robot garage band made from recycled materials, in terms of a DiY ethos of material engagement and meaning making in relation to everyday objects: discussed in this article as the DiY craft aesthetic that is specifically situated within the practices of The Trons. The notion of a DiY craft aesthetic is understood in this article as an attitude towards materials and technologies that allows material agency to become part of the making process, drawing on both contemporary theorists of material engagement (Bryant 2014; Malafouris 2008) as well as various commentators on DiY practices (Spencer 2008 and 2007; Plant 2002; Pacey 1999; Marcus 1989).

This article is less concerned with the type of sound produced by the robots than with the attitudes and approaches to materials and technologies that underpin the visual aesthetics, the choices of materials and the way in which the designer, Greg Locke, has engaged with materials to embrace 'error' into the functioning of the robots. In choosing to write about Locke, someone with whom I have collaborated and worked with in various making projects I am following an 'insider' methodology, utilizing shared tacit knowledge and a 'nuanced understanding of context that can come only from personal experience... [without which] we may not always ask the right questions' (Mack et al. 2005: 14). In this way, data were collected using an informal interview informed by observations of practices over a ten year period of collaboration.

## **The DiY craft aesthetics of The Trons**

### ***The politicized craft practices of Amy Spencer and the the refunctioning and reuse of discarded materials***

Locke who is working outside of the technical and financial support of an institution has researched and produced the self-playing 'Robot Garage band'. The technology and artistic design of The Trons



Figure 1: The DiY robot band The Trons, shown in their natural environment of their lounge room (reprinted with permission from Locke 2012).

represents a unique configuration drawn from a DiY ethos. According to Amy Spencer, the Garage rock genre is part of a DiY musical movement that originates from similar approaches to music as Skiffle and Punk music, ‘usually played on home-made or improvised instruments’ (2008: 187) and influenced by a similar Lo-Fi engagement with technology. Just as Skiffle and Punk movements before, The Trons follow in the DiY tradition of the ‘independent’, in that they are the sole product of their own Pie Plate Records company, retaining control over the rights of their songs, the methods of distribution and production of recordings, and where and when performances occur.

With The Trons there is a continuation of the DiY tradition, with the home-made Lo-Fi robotics utilizing recycled materials similar to improvised Skiffle-type instruments. The genre of Garage rock is particularly suited to the use of materials in The Trons, since it follows the same attitudes towards the use of Lo-Fi technology as Skiffle music, as stated by Locke in point four of his manifesto:

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.

(Locke 2011b)

In the context of The Trons, one of the defining aspects of Skiffle music was the ad hoc instrumentation crafted from everyday objects commonly found in the 1950s: the wash-board used as a drum with the player wearing thimbles on each finger tip: the tea-chest bass, made from a broom handle attached to an empty wooden tea box with a string stretched between the two (Spencer 2008: 187–94). In following this same attitude, the mechanical and electronic workings of The Trons are crafted from components that are relatively commonplace objects, re-purposed and placed within different functional contexts. For example: the outdated computer used in the workings of The Trons, the re-purposed solenoids from cars and the disposable tin pie-plate used for the sound of the snare are all objects of equivalent commonality and ubiquity as the wash-board used in 1950’s Skiffle music: situating the home-made Lo-Fi robotics of The Trons within the craft tradition of earlier forms of music that utilize the refashioning of commonly found objects.

In this article, the refashioning of discarded materials is a key aspect towards the development of a specific ‘craft aesthetic’ behind the manufacturing of The Trons. Refashioning is defined in this article as a specific process, situated in the DiY aesthetics of The Trons, which embraces ‘error’ as an active element in the emerging functionality of the crafted artefact. The craft aesthetic of The Trons borrows heavily from DiY culture and, as suggested above, the Lo-Fi ethos of Skiffle and Punk music.

Art and craft practices that utilize discarded materials and redundant technologies have recently been described as an engagement with ‘Zombie media’, signifying the ecological dangers of discarded

electronic e-waste as a significant threats for natural ecologies in the future. The use of ‘Zombie media’ brings to light the flow of toxins leached into the eco-system when e-waste is dismantled, suggesting that technology never really ‘dies’ but becomes ‘part of a wider pattern of circulation’ (Hertz and Parikka 2015). The reuse of apparently ‘dead’ media, in this sense, highlights dominant discourses of technology as a disposable commodity, with The Trons offering an alternative discourse based on a more sustainable attitude to technology. This alternative discourse of technology follows in the same tradition as Amy Spencer’s definition of craft practices in *The Crafter Culture Handbook* as: ‘a practical and political reaction against consumerism [...] concerned with the modes of production’ (2007: 9): presented in this article as the DiY/craft ethos that drives the practices and processes of The Trons.

Through refunctioning discarded technologies, DiY practitioners engage in the kinds of ‘tinkering methodologies’ (Hertz and Parikka 2015) that define DIY craft as an experimental, process-driven exploration of the engagement between the human and material environment. Through this engagement, DiY practitioners further explore the possibilities of refunctioning found objects so that new and often unexpected uses can emerge. These DiY practices of refunctioning are connected with the idea of upcycling, a craft-based practice of ‘reusing an object in a new way without degrading the material it is made from’ (Goldsmith 2009). In this sense, refunctioning is a craft practice, creating hand-made solutions from readily available and discarded objects and materials: creating a counterpoint to the use of new technology as a means of providing solutions.

The DiY ethos of refunctioning discarded objects is examined in Amy Spencer’s depiction of the DiY attitude of: ‘using whatever resources are available to you [...] and] not trying to seek out new technology’ (2008: 187). For Spencer, the reuse of redundant objects is a Lo-Fi practice, ‘subverting the term Hi-Fi’ (2008: 14), and questioning the participatory role of new technology by demonstrating what can be done with less complicated resources. This is part of a DiY ethos of disrupting the dominant discourse of new technology as a consumer product.

In the practices of The Trons the dominant discourse of technology is disrupted in two ways: the Lo-Fi ethos and also through the use of everyday objects that have been appropriated in the construction of The Trons. Lo-Fi is the aesthetic use of technologies that 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 reassessment 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: 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.

The Punk, DiY/Lo-Fi attitudes to craft aesthetic has been documented (Spencer 2008 and 2007; Plant 2002; Marcus 1989) as part of an extension of Dadaist and avant-garde art movements of the early twentieth century. This version of the craft aesthetic challenges the dominant discourses of

technology through the use of everyday objects, to invite an engagement with materials on a deeper level, as Walter Benjamin observes in his 1934 lecture:

The revolutionary strength of Dadaism consisted in testing art for its authenticity. Still-lives [*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: 86)

For Benjamin, the everyday discarded objects of ‘tickets, spools of thread, cigarette butts’, were a statement of ‘authenticity’ that ruptured the ‘validated knowledge’ of the art world. The use of the everyday object indicates a politicization of materials, suggesting an alternative way of social organization. In terms of DiY culture, this is similar to the strategies described by Spencer aimed at ‘subverting the term Hi-Fi’ (Spencer 2008: 14) through the re-configuration of everyday objects. In this way the Lo-fi aesthetics of *The Trons* challenges the continual progress of new technologies questioning the dominant discourse of technology and the values of Hi-tech.

### ***Material agency and material engagement***

Just as hand-made items go against the flow of mass-produced factory items, the DiY tinkering with technologies and materials also resist the seduction of new technology. This attitude of resisting the efficiency of new technology can be seen in the strategy of embracing the faults and errors of materials; processes involved in the construction of *The Trons* that allow a refunctioning of objects from their original purposes through the inclusion of material ‘errors’; an unpredictable element to the functions of materials that emerge from an entangled ‘agency’ that includes both human and non-human elements. This definition of agency is discussed below, as a DiY craft aesthetic that emerges from material engagement, an entangled agency in which the craftsperson works with the qualities, ‘faults’ and ‘errors’ of materials to negotiate a final form for the work. Lambros Malafouris uses the example of the potter’s wheel to explain agency as a dynamic negotiation between the human and the non-human, 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’.  
(2008: 30)

This means that agency is more than just exclusively human 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: 30). In this fashion, the potter works with the material of the clay as a collaborative exchange of intention and practice.

For Malafouris, agency is neither a human or non-human 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.

(2008: 22)

Material engagement is therefore more than the human engaging with the non-human material but instead a two-way process, where the human is entangled with the materials they work with and agency emerges from the configuration of human and material.

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: 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: 50)

Here Bryant is suggesting the same 'intention-in-action' (Malafouris 2008: 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. In this way material agency is a vital aspect of refunctioning and the DiY craft aesthetic of The Trons, as a material engagement from which a visual aesthetic emerges from the reuse of everyday objects as well as the use of objects that were not designed for the specific function within the assemblage of The Trons.

The refunctioning of everyday objects in producing meaning through altering their function is a theme explored by Arnold Pacey who looks at 'the way [that] some machines intended to serve more mundane functions take on a musical role' (1999: 17), to 'interpret the world and give it

meaning' (Pacey 1999: 17). Pacey identifies different ways in which technology can be adapted to influence the aesthetics of music produced, for example:

The clinkety-clack of power looms in cotton mills made Lancashire clog dancers want to tap-dance the pattern of their rhythms [...] The motion of ships has contributed to the lilt of sea shanties, and of trains to boogie-woogie.

(1999: 18)

In this way, the characteristics of the material environment exert a form of agency over the aesthetics of the work produced. The Trons robot garage band is part of a similar process whereby the aesthetic form of the artwork is influenced by re-configuring the functions of the technologies and materials used.

### ***Robot bands and automated orchestras: Situating The Trons in context***

To place The Trons into the context of music tradition it is important to recognize The Trons as a specific situated practice: a particular convergence of influences that are contextualized within this article through contemporary theories of material agency and material engagement. 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 over 200 years: documented in books such as David Bowers' *Encyclopedia of Automatic Musical Instruments* (1972), where the history of music boxes, clockwork musical toys, player pianos and orchestrions can be seen as the origins of the types of craft visible in the processes of The Trons. However, The Trons divert from this tradition of mechanical music machines through practices that are situated in a DiY ethos of *refunctioning discarded materials* and embracing the simple forms of Lo-Fi Garage rock to play original songs, rather than in the mechanical reproduction of well-known or traditional songs. The Trons also deviate from contemporary automated musical instruments in the robot genre through the use of basic materials and semi-redundant technologies: rather than state-of-the-art technologies that reflect the dominant discourses of technology as discussed above. Other robot bands at the time of writing include the German group Compressorhead (Compressorhead 2016) who play a mechanical form of very fast metal/rock and the Japanese group Z-Machines (Suzuki 2016). Both of these robot groups involve technologies that are vastly complex, compared to that of The Trons, enabling extra non-essential movements of the robots to mimic human musicians. The Trons differ to these other robot bands since their approach is from a Lo-Fi craft tradition that places value on the more simplified uses of technology, where the mode of production is made visible through revealing the simple processes of sound production



without resorting to overly complex technological solutions. Part of this Lo-Fi strategy of revealing the process is for The Trons to minimize movements to functional operations, rather than to mimic human musicians.

A similar approach, where the process is utilized as a visible element, are Jean Tinguely's automatic music machines that are mechanical sculptures made from everyday materials such as bicycle wheels, bath-tubs and industrial waste. Tinguely's 'self-destructing machines', seen in the 1960 performance *Homage to New York* and known as 'sabotage technology' (Museum Tinguely 2016) employ a similar process of using error and malfunction as The Trons: both makers utilizing the failure of mechanical processes as part of the visual aesthetic. Accident and 'hazard' in Tinguely's works can be seen in the 'drawing machines [which] produce abstract sketches whose parameters are partly determined by the machine [... in which] details are the product of hazard' (Museum Tinguely 2016). Locke visited the Jean Tinguely museum in Basil in 2008 but has been recognized for many years as an influence on the construction of The Trons. Locke's version of 'hazard' is the use of *error* as an active component of the robots, error defined here as a diversion from exclusively human intention.

In the following section I examine a creative process that engages with the material agency of objects and the way in which the aesthetic form of the artwork is influenced through these processes, a line of investigation similar to Arnold Pacey, when he says:

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

(Pacey 1999: 18)

By examining the craft practices and DiY attitudes behind The Trons, the suggestion is that the aesthetic and the practical are 'intertwined' through the DiY processes of refunctioning, revealing material agency as a significant factor in the craft process. This is of significance to craft research since it is based upon the observations of practices and attitudes of a craftsperson, building up a definition of the DiY craft aesthetic as a driving force behind practices entangled with strategies of material engagement in which the refunctioning of basic objects plays an important part.

### **The visual aesthetic emerging from practices of refunctioning**

An important aesthetic element of The Trons, is the reuse and refunctioning of discarded materials. Locke's use of 'garbage' can be seen in the refunctioning of the aluminium pie-dish in the 'records' released by The Trons, as seen in Figure 2 below.



Figure 2: Lathe-cut record of 'Sister Robot' using a discarded aluminium pie-dish (adapted with permission from private collection of Locke 2008).

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 refunctional potential of the material as discarded matter. Another aspect of the pie-plate record is that, as a recording medium, the physical object becomes an important aspect of the experience, which would not replicate in the same way as a link to a digitalized version of the song. This indicates the importance of the mechanical processes used in creating the sound of The Trons, as a focus on the material artefact as being part of the DiY craft aesthetic.

The above image, Figure 3, is taken from a music video of the song 'The Trons' Theme', showing some of the aesthetic style that emerges from the functionality of the mechanical processes used to generate music. In this sense, the musical qualities of The Trons is of less importance, in this examination of the DiY craft aesthetic, than the visual appeal of the robots as moving kinetic sculptures that visibly function to generate sound. 'The Trons' Theme' was the first music video made as a collaboration between the researcher and Locke in 2008. The video was to allow the viewers more detailed close-up shots of the mechanics of The Trons to provide concrete evidence that they were actually playing their instruments rather than miming to the song. Again, this indicates a focus on the visual material artefact as being an integral part of the DiY craft aesthetic, suggesting that performance is a shifting, precarious, almost 'living', enactment that results from the variable ability of the mechanisms to function. This differs from the tradition of musical boxes and automated music machines through the 'living' precariousness of performance that is inherent in the Lo-Fi DiY ethos.

Here, it is important to note, that function and dysfunctional 'error' are part of a spectrum of acceptable outcomes of the DiY craft aesthetic, with the important distinction that materials are a visual part of the process. From the above image it is evident that the appearance and form of The Trons is heavily influenced by an aesthetic of refunctioning, so that mechanical processes become visibly incorporated into the aesthetic. For the practitioner it is an important part of the aesthetic that every function of The Trons is visible:

The horn is an interesting visual piece but it actually does sing out of it... it's actually got a purpose... it's actually for real, that's where the sound is coming from, and it's being... open... transparent... it's being honest, presenting everything [that is actually] there.

(Locke 2012)

The strategy of revealing the mechanics behind the making of sound is central to Locke's design of the appearance of The Trons, indicating the importance of functionality over form 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



Figure 3: Still image from the video 'The Trons' Theme' (image by author, 2008).

coming from' (Locke 2012). In this sense, the process of material engagement determines the material form of The Trons: the functioning of materials is an active agent in determining the specific *configuration* of The Trons.

Figure 4 shows the Meccano 'fingers' of the keyboard player. In this image, one can see the mechanics of the car solenoids connected to the levers of the fingers that play the keyboard. The Meccano and the visibility of the connecting cables creates an impression of a transparency of mechanical operation: a prototype construction that reveals the refunctional potential through the contingent, unfinished appearance of the mechanical fingers. Rather than present a finished product, the malleable prototype qualities suggest an approach to technology that remains open to alteration.

The visible processes of the prototype is a central theme of Locke's, 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' (Locke 2012). This placing of functionality as a central agent is also stated in number eight of Locke's Trons manifesto: 'All movements of the band must be functional, directly making or modifying the sounds' (Locke 2011b), suggesting that the form of the material configuration (the aesthetic appearance of The Trons) emerges from some aspect of Locke's engagement with functionality and materials.

In terms of materials affecting the eventual appearance of the crafted artefact, there are reasons for the inevitable anthropomorphic shape driven by the form of the technologies used, as Locke states:

The robots weren't the aim [...] the anthropomorphation [*sic*] just comes automatically, 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].

(Locke 2012)

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 originally intended to be played by.

This may appear that Locke is advocating a modernist approach to making, in which the 'dictum *form follows function* has been seen... as the gist of the functionalist philosophy of design' (Michl 2006), however, the difference is that, for Locke, function, dysfunction and 'error' are all part of the same spectrum of acceptable outcomes that typifies a Lo-Fi approach to technology, as discussed earlier in this article. This relationship with function and 'error' is part of the DiY craft aesthetic that drives practice: an interrelated relationship between the practitioner and the



Figure 4: Still image from 'The Trons' Theme' music video (image by author, 2008).

materials, and between function and error. This interrelationship between function and error is discussed further below.

### The role of ‘error’ in the DiY craft aesthetic

A person who works with a machine quickly gets to know its characteristic sounds and takes unusual notes or rhythms as a warning of malfunction.

(Pacey 1999: 23)

Whilst Pacey speaks of a similar close connection between human and machine that seems to be a strong aspect of Locke’s practice in creating The Trons, rather than attempt to fix ‘unusual notes or rhythms’, part of Locke’s craft practice is situated in the relationship between the human practitioner and the refunctioning of ‘characteristic sounds [...] of malfunction’ into valuable aspects of the sound.

Figure 5 shows the bass kick-drum of The Trons. The sticks on the left side of the drum are made to move via the Meccano mechanism situated on the rim of the drum. One stick hits the bass drum whilst the other strikes the crumpled tin pie-plate that has been attached to the skin of the drum, seen in the image above as the large silver disc above the lettering. The sound of the pie-plate being struck produces a rattling treble sound similar to a snare drum. However, in practice, the fragility of the pie-plate causes the aluminium to distort and flex with each strike, exploiting the uncontrollable nature of the material being used so that, as Greg Locke says: ‘the randomness [comes] from the sticks not always hitting it correctly [...] it] means that every time they hit [the sound is] slightly different’ (Locke 2012). In this way, the material characteristics of the pie-plate, in the form of error, are given agency and incorporated as part of a process to generate variations in sound.

Integrating errors into the process suggests that materials are permitted an active role in the emerging sound of The Trons, indicating that agency is extended from the human practitioner to include the agency of the material environment. *Error* in this sense, means a diversion from an exclusively human source of agency, suggesting that the artefacts emerge from a material engagement acknowledging the dynamic processes that occurs between the craftsperson and the material environment.

In some sense, this means that Locke, too, is displaced as the primary controller of The Trons, allowing materiality, *error* and indeterminacy a space within the process, as Locke says of the role of *error* and indeterminacy:

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

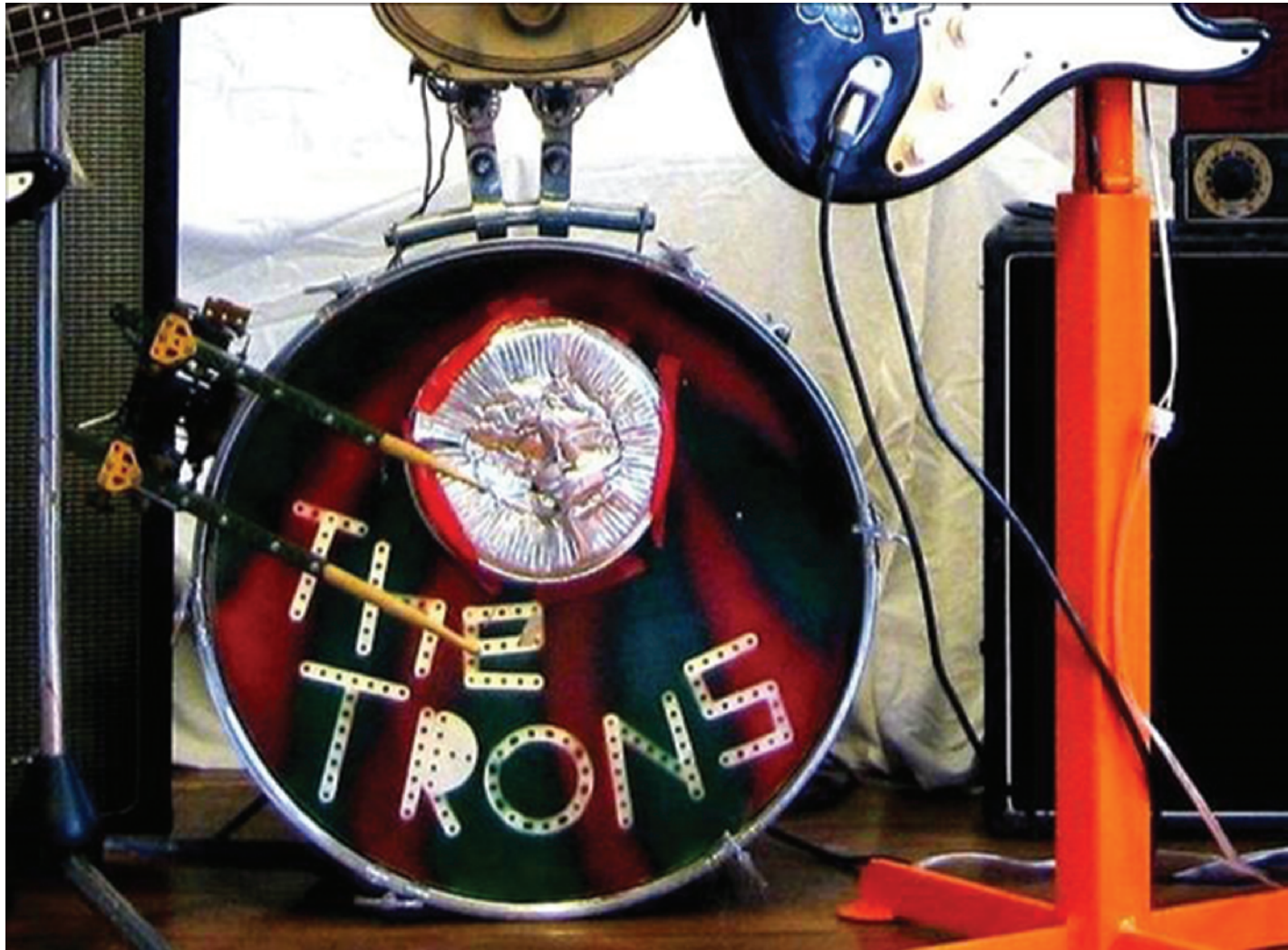


Figure 5: Pie-plate used as part of the drum sound (adapted with permission from Locke 2011).



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.

(Locke 2012)

For Locke, the 'mistakes' caused by material *error* become 'the good parts' of The Trons sound, outcomes that demonstrate the material engagement aspects of the process are something that was not originally intended: 'the mistakes sound better than what I was thinking of'. This implies that Locke's process involves material engagement as Malafouris' 'intention-in-action' (2008: 30), where agency results from the interactions between human practitioner and non-human materials. Furthering the argument that The Trons are a result of material engagement is Locke's point that the sound is a result of 'subtle' qualities that are beyond his control, suggesting that the complex functioning of the material is something that exerts its own agency in combination to his own contribution.

This represents an example of DiY engagement with materials, or an extended agency, which is something more than a purely 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 2011a: 9)

Through incorporating material agency, the complex operations of The Trons becomes something that is an emergent function resulting from the characteristics of the materials rather than something that is completely under the control of its human creator. Locke becomes another machine component within the complex assemblage, rather than a central figure controlling agency, as reflected by Locke when he describes the deviation from human intention that 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 2011a: 10)

Although Locke is expressing a human judgement, when he states that the sound was 'better' the 'worse' he built the machines, there is the suggestion here that agency, as the ability to create artefacts, is not an exclusively human trait – but an engagement with materials in which participation

between human and non-human actants becomes integral to the functioning of the group. Following this line of thought, The Trons becomes a musical group comprised of human and non-human agents, co-creating together, so that ‘the band was producing its own rhythms and colouring’ (Locke 2011a: 10), semi-independently from Locke’s agency.

With this in mind it is now possible to view The Trons as an artefact that emerges from material engagement – so that the aesthetic form of The Trons is an enactment, or embodiment, of material and human forces.

Locke’s choice of materials used in the construction of The Trons is influenced, in some part, by the characteristics and expression of material agency. This has initially been viewed in terms of the affect of refunctioning on the aesthetic form, whereby materials and their functioning change the appearance of The Trons. In this section the *error* of materials is viewed as an integral part of the process to produce sound.

This can be seen in Locke’s practical approach in employing material *error* as part of the ingrained process involving material agency:

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’ that Meccano produces is ‘crappy’ because of the high degree of ‘tolerance’, meaning that it is not a material that lends itself easily to accurate and precise mechanical operations. So, whilst Locke expected that The Trons would have to be rebuilt using higher engineering tolerances, it was a ‘happy accident’ (Locke 2011a) that allowed the ‘crappy [Lo-Fi] build’ to be the better option. This meant that the ‘crappy build’ was more effective than a precise engineering one based on purely human intention. There is a particular characteristic of the wider tolerances, or looseness of construction, which diverts human intention to create something that ‘was actually better’ in terms of the materials themselves providing an additional input that would be difficult to replicate through human intention and a machine built with precision. Through observing these statements the idea of the DiY craft aesthetic is being developed, within this article, as engaging with material characteristics: with *error* defined as a diversion from an exclusively human intention.

Rather than precision crafted by professional engineers, 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* [emphasis added] in the pivots and bearings,

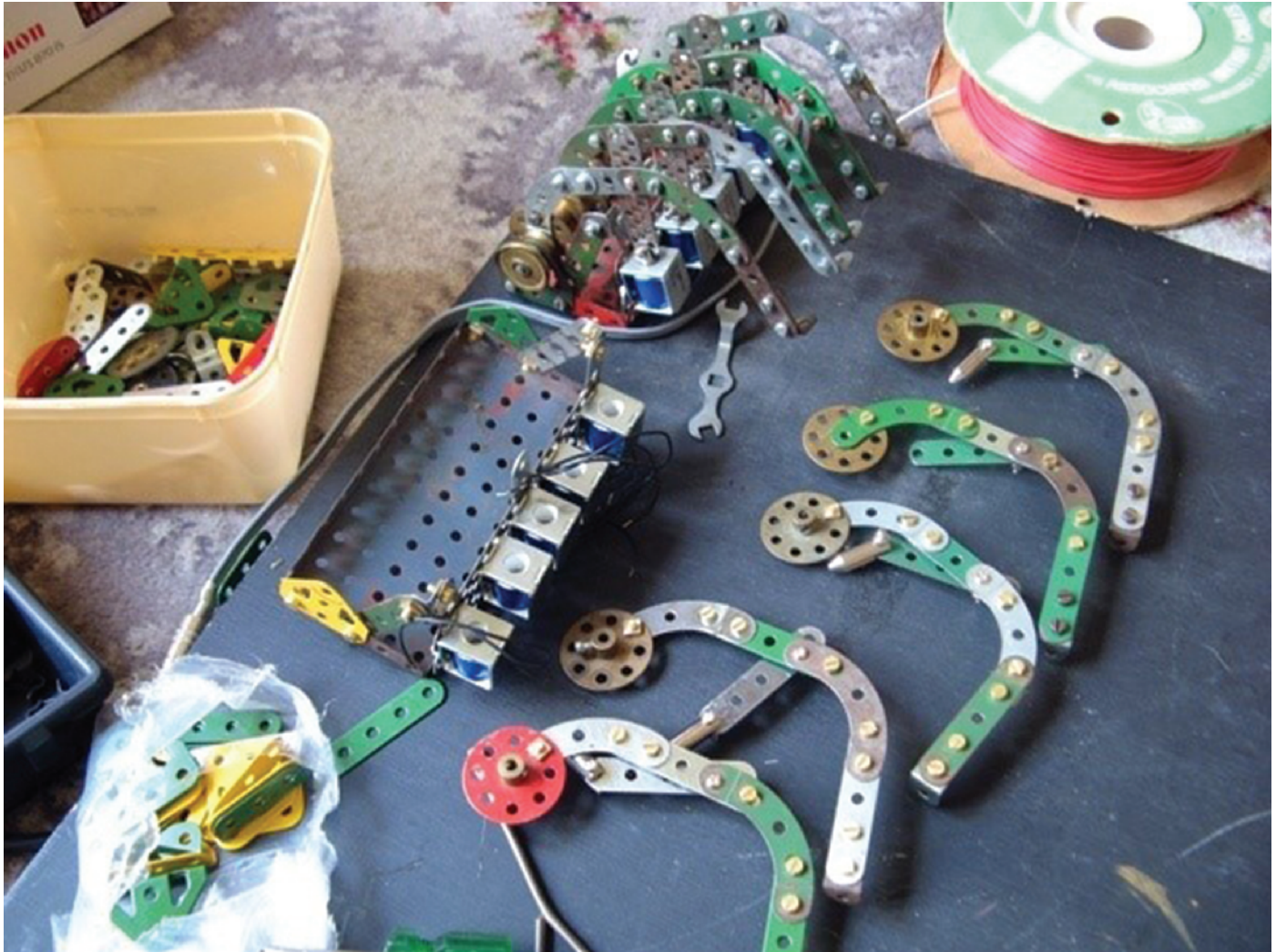


Figure 6: Construction of the Meccano fingers of Fifi, the keyboard player (reprinted with permission from private collection of Locke 2007).

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. In this sense, the indeterminate '*error* in the pivots' and the '*flexibility*' of materials reciprocate to alter the function of the material assemblage of the mechanisms playing the instrument. This form of material agency is the particular function of Meccano that would be impossible to replicate if the mechanisms were '*progressed*' from hand-made prototype to fully engineered product. This indeterminate function of the Meccano machine is a specific operation that forms an integral part of the processes involved in the functioning of *The Trons*, so much so, that the materials become an active participant in the process.

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, which occur through the hand-made approach, are of value to Locke who, as an accomplished musician, recognizes the expressive qualities of flexible timing to add a unique material agency to the sound.

The combining of material and digital technologies is used to Locke's advantage, in that, he is utilizing 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.

In developing the idea of the DiY craft aesthetic, the above comments suggest that 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 expresses a specific craft aesthetic that perhaps differs from the idea that '*the crafts have traditionally been preoccupied with function*' (Metcalf 2016), instead, promoting '*error*' as a happy accident resulting from the inability of materials to behaviour as they were intended to.

This embracing of material *error* and ‘inefficiencies’ is a process in which the precision of the digital computer is influenced by a material engagement to create an output that would be difficult to obtain through a purely digital means. This combination of analogue and digital technologies creates a complex assemblage that incorporate *error* and ‘indeterminacy’ into the production of sound, in much the same way that Skiffle bands of an earlier era incorporated everyday objects to influence the production of sounds that were not within the repertoire of conventional instruments.

## Conclusions

The processes of refunctioning in The Trons can be seen as a craft aesthetic entangled with the Lo-Fi DiY ethos: an attitude towards the malleability of function that transforms the functions of everyday objects. Each of these materials have been refunctioned from their original design intention to the new functionality that emerges through inclusion of the material into the assemblage of The Trons. Material agency, in this way, transforms the functions of the object through their engagement with other materials within the structure of The Trons. Material agency, in this sense, emerges from the complex engagement between human and materials through which the form of The Trons is expressed.

This type of 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 non-human controlling from a central position, and suggests that practices such as these represent a craft paradigm of generating knowledge from the engagement between human and material environment: a philosophical attitude that implies a re-situating of human and material values, challenging the dominant discourses of technology as a disposable commodity.

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