CREATIVITY AND ACCESS IN ELECTRONIC MUSIC:
CRACKED AND PIRATED SOFTWARE INSTRUMENTS

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Abstract

The purpose of this paper is to evaluate to what extent cracked and pirated electronic instruments are an important factor in the industrial dynamics of the electronic music industry. Current literature on technology transfer and technology assimilation is silent on this mode of technology transfer. This paper seeks to raise the use of cracked software in electronic music composition as a valid contributor to industrial dynamics. Additionally the paper seeks to comment on what impact the availability of these tools has on creativity within the field. A survey of 122 artists was conducted in December 2004. Results pertaining to the importance of technologies for achieving creative visions and frequency of use will be presented. Greater elucidation of the impact that cracked software instruments has within the industry stands to contribute towards rethinking models for the rewarding of technology makers.

1 Introduction

This paper considers how the evolution of tools for electronic music production and composition has impacted on accessibility to the field and creativity. This paper contends that as the industry moves from hardware based towards the software environment the field is being broadened and democratised, a process that is occurring partly as a consequence of greater access to creative tools. Additionally it examines the role that cracked and pirated electronic instrument software plays in terms of facilitating creativity and participation in the industry. This in part is reflected at the industrial level through the experiences of the Newly Industrialised Country (NICs) economic development trajectories in terms of leveraging technologies to participate in an industry.

The responses to the online survey and the analytical framework of technological learning raises a number of questions as to the most effective institutional structures to maximise creative engagement. This is particularly relevant for both developing nations as well as countries who are not radical innovators within the industry and the broader pool of relatively resource poor participants in the industry. The paper focuses on the impact on creativity of the move towards electronic instruments, in particular the impact of cracked software and its relationship to creativity. Results exploring this theme from a survey conducted in 2005-2006 will also be presented. Concepts of technological learning will also be discussed in terms of the institutional structures required to promote creative engagement.

The resource based view of economics suggests that it is through the securing of ownership and exploitability of resources that are scarce, non imitable and non transferable as a means to establish comparative advantage. Mathews in his treatment of latecomer firms in NICs has suggested the opposite is true, that the leverage of acquired technologies can be the more appropriate vehicle of growth. This paper seeks to extend this further by some first tentative analytical steps with respect to the electronic music industry through the following two hypotheses:

I chose to focus on licensed, open source and cracked electronic instrument software. As such, shareware and demo copies of software instruments are not discussed or included in the analysis.
Hypothesis 1: The availability of cracked software for electronic music composition represents a non-trivial contribution to the development dynamic within this sector of the music industry.

Hypothesis 2: This mode of technology adoption/assimilation provides greater accessibility to, and creativity within, the electronic music industry.

2 Data collection

A survey of electronic sound and music artists was conducted during December 2004 to Feb 2005. A component of this investigated the impact that access to software based composition tools has on creativity. The survey attracted over 100 respondents ranging from professionals to enthusiast/tinkerers. The income earning from artistic endeavors, based on the Pew Internet: ‘Artists, Musicians & the internet’ research is provided in the following table.

Table 1: Respondent incomes from sound and music based artistic endeavors

<table>
<thead>
<tr>
<th>Activity (Weekly)</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30 hours &gt;80% income</td>
<td>20</td>
<td>16.4</td>
</tr>
<tr>
<td>&gt;30 hours &lt;20% income</td>
<td>20</td>
<td>16.4</td>
</tr>
<tr>
<td>&lt;30 hours some income</td>
<td>28</td>
<td>23.0</td>
</tr>
<tr>
<td>&lt;30 hours no specific income</td>
<td>39</td>
<td>32.0</td>
</tr>
<tr>
<td>not applicable</td>
<td>4</td>
<td>3.3</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>7.4</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>98.4</td>
</tr>
</tbody>
</table>

Source online survey administered Dec 2005 by author

Table 2: Hours spent on electronic music / sound based artistic activity

<table>
<thead>
<tr>
<th>Activity (Weekly)</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 7 hours</td>
<td>19</td>
<td>16.0</td>
</tr>
<tr>
<td>8-20 hours</td>
<td>58</td>
<td>48.7</td>
</tr>
<tr>
<td>21 hours or more</td>
<td>41</td>
<td>34.5</td>
</tr>
<tr>
<td>other</td>
<td>1</td>
<td>.8</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source online survey administered Dec 2005 by author

3 The industry

The global music industry is undergoing considerable transformation through technological developments in a number of key areas. Briefly these are: the proliferation of music listening devices and formats, sharing and file swapping technologies, broadband connectivity, intellectual property (for example the expansion of the ‘some rights reserved’ creative commons and legal action over sharing and sampling), music production electronic instruments and the broad availability of home computing power that can produce near-studio quality music. These developments are changing the relationships between record labels, musicians and consumers (Jones 2002 220).

While the impact of the internet has widely been suggested to be leading to disintermediation (essentially removal of routinised business practices involving middlepersons) within the music industry Jones suggests that the high speed internet connectivity and data compression advances are leading to a redefinition of the nature of the product of music in so far as what had once been a physical product (a CD) is now a digitised one (Jones 2002 222). This paper advances that changes in compositional tools and the power and strength of software based approaches are also exerting transformative pressures on the mode of production in electronic music production.

There exists a rich body of literature that examines the music industry. This extends from pilot studies on artists earnings (Kretschmer 2005) to multi-country music industry analysis such as ‘Behind the music - Profiting from Sound: A Systems Approach to the Dynamics of Nordic Music Industry’ (Power 2003). Many studies examine the artist-recording company relationship while others comment on various parts of the erosion of traditional industry and the emergence of digital distribution (Fox 2002). Additionally others examine the impact of ownership structures on the industry and lead user innovation (Jeppesen and Frederiksen 2004). Recently there has been a number of studies that have taken a cluster approach to understanding the music industry (Power and Jansson 2004). While much of the attention in
innovation studies is typically aimed at the activities of manufacturing industries, studies that seek to deblack box creativity are emerging.

“Van de Ven and Garud (1989; 1993) emphasise that an ‘industry’ is more than just a group of firms arbitrarily assigned to a group of products. An industry represents a constellation of actors – the firms themselves, public sector research agencies, the trade associations, the regulatory authorities, perhaps the consumer associations and supplier groups. From this collection of actors the complex interactions and forms of collective behavior that occur make up a real industry with real dynamics.” (Mathews 1999 19)

When considering the electronic music industry a host of new institutions have emerged alongside the move towards software based production modes. These institutions are important because of their role in the diffusion of technology and include cracking studios and crackers, P2P software exchange networks, mailing lists and electronic instrument user groups (both official and unofficial). Additionally in a comparatively short period of time there has been a significant shift towards software based production for electronic music and sound composition. This has seen a shift in practice within the field from hardware based and own written programs to software based processing.

3.1 Mechanisms for the transfer of knowledge in the electronic music sector

Technology is acknowledged as being a combination of tools, techniques and know-how. While the effectiveness of any transfer of technology is not only dependent on the codified knowledge transferred through artifacts such as books and manuals, much attention has been brought to the concept of embedded knowledge transfer: knowledge that is embedded within people and developed through use and play. This transfer of knowledge applies not only within technology transfer between firms and countries. It also exists between technology manufacturers of complex products and the customers of these products. Within the sphere of electronic music instruments the need to transfer this embedded knowledge (if you like embedded in the technology, developers and sound designers) to the customers is facilitated in a number of ways.

There are elements of knowledge within music composition that are similar to the codified knowledge found within manufacturing industries. Codified knowledge exists within and around electronic instruments such as Propellerhead's Reason 3 and Ableton’s Live music composition programs (such as manuals, ‘how to’ pdfs and embedded tutorials). Additionally there exist a broad suite of forums, discussion groups, email lists and web sites dedicated to discussing these programs and the field of practice that is electronic music composition. Some are technically based, other structured around particular genres and yet others more theoretical and musicalological. These sites extend across the proprietary software environments, to open-source tools (Audacity, Pure Data), commercial hardware and instrument building initiatives (egg http://www.clatterbox.net.au/). Much of the discussion concerns techniques, problems, dilemmas, challenges and developing proficiency within these programs, identifying bugs and requesting modifications.

There are manuals and tutorials embedded in the installation files. There are user communities, often with lead users (as defined by von Hippel and Jeppesen and Frederiksen) (Jeppesen and Frederiksen 2004; von Hippel 2005) that not only provide forums for answering questions but also for distributing and sharing modifications, patches, sounds, samples and showcasing outputs, proposing modifications and chatting with other users. Competitions and call outs are announced, and run through them, pitting artists against artist. Work is showcased, feedback received if requested and the community built. This knowledge transfer additionally is not constrained to only ‘official’ sources – that is, released by the developing firm. There are many power users that also both establish user communities and forums. Many of these were involved in the development of the original technologies. Many examples of this exist with the Reason suite of electronic music instruments developed by Propellerheads Sweden. One in particular is a web site called Melodiefabriek.nl a site run by Marco Raaphorst in the Netherlands. Marco Raaphorst has programmed over 180 patches for Reason 3 and licensed samples and sample-loops for lifetime use in Reason (description from http://squidoo.com/reason/). Raaphorst was professionally involved in the development of the reason suit, having contributed significantly in terms of code and also refils for the Reason. ReasonBanks is another online resource established by the original sound designers of Reason that produce sampling libraries in refill format for the Reason suite of programs.

While generally the official user communities are closed to people using cracked and illegal software (by means of having to log in using an authentication code that relates to purchased copies of software) there are communities that do not police licensing. Indeed the Propellerheads forums are open to anyone (to read) and the only warning is this; “Here is the list of things to avoid at all costs (that can get you banned forever):

Requests for software cracks (duh!).
Requests for help with cracked software…”

(http://www.propellerheads.se/FAQ)

Some place warnings on the website and forums however generally the ability to join the communities, mailing lists and forums is not conditional upon demonstrating ownership of a valid copy of the software. After all, the principal purpose of these forums and user communities is to advance practice within the software tool environment, rather than necessarily police software licenses. The yahoo group prop.reason • Propellerhead Reason - established by Marco Raaphorst makes the following comment “This is a mail list for Propellerhead Reason users. For official users only, not for crackheads.” In some cases there will be a sticky forum item that states some kind of warning/disclaimer such as “Don't ask for/offfer illegal software We don't support the use of illegal software and we want to keep it out of our forums. Violation will result in the termination of your user account.”(Reasonfreaks 2005).

One respondent in particular highlighted that initially “I first came across the software I use (Ableton Live, Reason, Recycle) as well as others I no longer use (Logic, Cubase, FLStudio etc) via cracked software. After later purchasing a copy of Reason and Live I’m entitled to certain upgrades, tech support and (most importantly) access to the Reason community. If not for cracked software I would not have been able to make such decisions.” This raises an important issue which is the importance of becoming part of the official Reason community – something that is unavailable to crack users and that is identified as having considerable value.
This issue will be explored to greater extent during the case studies however the importance of participation in this community as a learning facilitator and location of technology assimilation echoes Granovetters weak ties hypothesis within a learning and technology assimilation perspective.

3.2 Cracking as technology enabler

‘The hacker seeks the liberation of the vector from the reign of the commodity, but not to set it indiscriminately free. Rather, to subject it to collective and democratic development. The hacker class can release the virtuality of the vector only in principle. It is up to an alliance of all the productive classes to turn that potential to actuality. Once the productive classes have actual control over the vector, then its virtual powers can be realized as a process of collective becoming’ (Wark 2004).

The transfer of knowledge is considered an essential ingredient in terms of growth and development. In this instance it does not occur through inter-firm transfer. Nor is it a government set of policies directing and establishing a collaborative environment. Rather external groups operate to crack software protections and disseminate the knowledge which is then spread via P2P networks, bit torrent, and other methods of person to person transfer. Current literature on technology transfer and technology assimilation is silent on this mode of technology transfer. While the term hacker has risen in terms of legitimacy, as both practice and ethic (as espoused by Wark and Himmanen) the term cracker seems somewhat unclear. What is referred to here as a cracker is one that cracks open security on software products and makes available to a broader population tools that enable these protections to be sidestepped and full user privileges of the software tool be enjoyed.

The hacker or in this case the software cracker is posited as a technology enabler. An intermediary between technology maker and end user, in a sense operating as a tool of technology assimilation. Mackenzie Wark suggests the hacker, like the indigenous farmer seeks to free information from property, and from the vectoral class (Wark 2004 087). This does not suggest that all commercial software code writers are part of the vectoral class however in the case of electronic music composition the hacker (and software security cracker) plays important roles in the freeing of information and also I argue the promotion of creativity.

At one level this function is not dissimilar to the function of reverse engineering technology (that is within the absorptive capacity of the technology assimilators). The practice of reverse engineering has always been a lawful way to acquire trade secrets in mass marketed products (Samuelson 2002 1). Within engineering the ability to reverse engineer is considered a major contributor to learning. It’s the way Wozniac learned to build the first Apple Mac and the path many engineers learn about hardware engineering. However this practice is treated in very different ways depending on where you are located. The Digital Millennium Copyright Act (DMCA) makes unauthorised access of intellectual property illegal and this includes some forms of reverse engineering. Thus when this occurs within South Korea, through the process of targeted technology assimilation, this is acknowledged as a valid methodology for achieving growth (however Linsau Kim is careful to point out that while significant gains were achieved through reverse engineering this was not through industrial espionage or intellectual property theft).

Mathews in his discussions of technology leverage argues that the vehicle of growth for some NIC latecomer firms was in the targeting of resources that were least rare, most transferable and most imitable (Mathews 2002 469). That is they acquire technologies and leverage these technologies to enhance their capabilities. Mathews further identifies four features of latecomer firms: 1) they are later entrants to an industry, 2) they are initially resource poor, 3) the latecomer firm is generally focused on catch up as a primary goal and 4) late comer firms have some form of cost advantage that they can use to leverage a position in an industry (Mathews 2002 472). Some parallels to electronic artists using cracked software exist. A high incidence of respondents to the survey indicated that they utilised cracked software instruments as a consequence of limited resources yet desiring not to be excluded from the industry. Also many indicated that the use of cracked versions provided for learning and skill development that would otherwise not be available and “…if I had not had access to this I would have been very stifled in my music, not achieved as much as I have and grown as a musician’.

As an indication of the extent to which software cracking is having on access to tools for electronic music composition it is helpful to consider some statistics provided by one popular bit torrent provider, Demonoid.com and two very powerful and popular electronic instruments. Ableton Live 5 and Propellerhead Reason 3. A brief description of each program is provided from their respective official websites. “Ableton Live is the only solution designed for each stage of the musical process, from creation to production to performance. In the creative stage, Live is transparent, intuitive and responsive, capturing inspiration and encouraging the flow of musical ideas. During production, Live provides all of the professional tools and studio compatibility required to complete and perfect projects. On stage, Live delivers the expressive control and stability that innumerable performing artists have come to rely on” (Ableton 2005).

“New Reason 3.0 gives you one-step loading of complex, customizable instruments and effect setups, a new instrument-packed soundbank, instant integration with MIDI keyboards and controllers, a new intuitive file browser, plus a suite of mastering tools” (PropellerheadSoftware 2005). Ableton Live as a program is approximately 50MB, while Reason 3, due to it have a vast suite of embedded sound libraries is around 2 GB (2000 mb). Within Demonoid.com Live 5 had been downloaded in excess of 26,600 times, while the previous version Live 4 had been downloaded over 12,500 times. Reason 3 being a far larger program had been downloaded over 11,300 times (Demonoid.com 2005). This represents only one torrent site of many and only one approach to sharing, of which there are many others.

However squirreling away of software programs and repository building cannot be underestimated when considering the access to tools through sharing programs. This may be a consequence of the costless basis of acquisition of content via these means. As one respondent claimed “I generally use licensed software as I can afford it. But I believe cracked software has enabled many more people to produce music at a more professional level. Contreating that though, is my observation that my musical friends who are the most rabid about hunting cracks etc are not generally very productive musically. They seem more
transfixed by the chase and hunt than the creative aspects of actually making and finishing music”. Nonetheless the sheer volumes that are suggested here infer that a vast amount of technology is being placed in the hands of would-be artists, tinkerers, technology fetishists and some part of this will be used for making, composing and creating sound based work. What is notable here is that this magnitude of technology diffusion and assimilation receives no attention within any branch of innovation or management literature. The reason for this omission may be related to the fact that the transmission is not facilitated by the innovating firms (in the case of Live 5 and Reason 3, Ableton, a German firm based in Berlin and Propellerhead Software, a Swedish firm based in Stockholm) but rather by third party intermediaries. Additionally the transfer is not to firms in particular but rather individuals (even though this is purely speculation as the characteristics of the receivers of the technology cannot be known with any degree of confidence). It may be helpful, however, to consider the receivers as firms in particular Mathews’ definition of Latecomer firms. In his discussion of latecomer firms such as those in Korea and Taiwan he suggests that in addition to their initial disadvantages they also have a number of advantages. While they do not have first mover advantage from any technological innovations they develop they are also not encumbered by any technology or approach – thus able to select from the range of technologies that are available the ones that are best suited for their particular strategy. Thus while earlier starters must defray prior technological choices (say of a more hardware intensive production approach) the latecomer is able to wait. Indeed this ability to wait and to evaluate technology is another important feature in the distribution and assimilation of cracked software instruments. Many of the respondents to the survey suggested that they utilised cracked versions of software instruments to provide a number of functions; to test for suitability, to try before you buy and to obtain unbiased reviews. In testing for suitability one respondents comment is particularly relevant. “Cracked software has been good for me regards to experimenting with different ones to find the software that was the most useful for me. And helped me decide which companies I wanted to invest my money in”. Another suggested that “I use cracked software only to experiment and learn, not to release and make profit from. I have used cracked software to find out which programs/plug-ins work best for me and have begun to purchase the ones I wish to use for future release”. While the two comments above have included that they have or intend on purchasing the software eventually what is in all probability closer to reality for the majority of cracked software users is suggested in the following statement “…I would not have persisted for nearly as long as I have had I not had access to illegal software and I’m sure that the vast majority of ‘hobbyists’ would be the same, the small percentage that begin to make money from their music would then I imagine start paying for their software”. One point that Mathews stresses is the importance of the absorptive capacity. That is the ability of a given population to absorb and use a particular technology or batch of technologies. Within the context of NICs the importance of the domestic infrastructure cannot be understated. Learning by doing and playing was highlighted by a number of respondents as a key reason for using cracked software instruments. However some suggested that a consequence of access to professional quality audio tools was that the overall music quality was suffering and more substandard music is being released, ‘…people now find it easier to make music as a hobby, i.e. just push a few buttons and not really dedicate themselves to it fully’. One suggested that ‘it has made people aware of the fundamentals of programming and synthesis, it has also made a lot of rubbish available to be released this is not just software, but also rubbish groovebox style preset music that has been churned out as original music.’ Thus while many inferred a positive impact from the availability of cracked software (both from an individual and broader community perspective some countered this by suggesting that the complexity of the tools, presets and the inherent structures provided by these instruments in effect compresses the breadth of creative expression – artists exploring the terrain provided by the tools rather than extending beyond these.

4 Creativity
Consider for a moment a person with a vision. Relatively resource poor and not earning anything from their creative pursuits: a classic enthusiast/tinkerer. Has a creative vision. Does not have access to a lot of hardware but, ethics aside, can get access to a broad range of software tools, instruments and patches. These include licensed electronic instrument software where the protection codes have been broken (cracked software), demo software of these licensed electronic instruments with limited functionality and electronic instruments developed within the open source environment. Downloads a cracked piece of software from a P2P network or bit torrent site and begins to learn with it all the while the vision they have coming closer to fruition. Small incremental steps. Whether working alone or with others. They interact within forums, email lists, online discussion groups and electronic instrument user groups and their knowledge, technique and ability moves further towards the realisation of their vision. They obtain patches, modules written by developers and users that provide additional functionality within the software based electronic instruments and this moves them ever closer to reaching their creative vision (whether this in reality is ever truly achieved is the subject for a completely different paper (lets assume here that it is). So a piece of software gets them to within 40% of achieving their vision. So they look and search for patches. A patch provided by a user gets them another 20% towards achieving their vision. Then they modify the patch and redistribute it. Participating in online user groups, forums and email lists and finally…finally (to the extent that any of us or a piece of work is complete) the piece is 100% - the vision realised. The patch shared. The piece of work complete.

This mode of creativity represents a marked difference to an individual grinding in isolation. It is also different to a group of band members playing different instruments attempting to find a cohesive rhythm. And specifically different to knowledge transfer/technology assimilation via inter or intra firm technology transfer. It is also somewhat different to the tacit knowledge transfer that occurs with the movement of individuals between firms and organisations.

How different is this mode of creativity, this approach to the realisation of artistic vision, to what occurred in the past. To a large degree it depends how far back you reach. Within electronic music composition it is not necessary to reach so far back until the
principal mode of creation was hardware based. At this time the availability (or scarcity) and cost of hardware was one of the key barriers to entry into the industry. Indeed for the most popular hardware synthesizers, while initial production runs in the thousands of units sold out almost overnight, often viable hardware business was plagued by uncertainty (Chadabe 1997 193). One respondent to the survey had this comment on how the mode of production has changed for him “…software has had a huge impact on electronic music production etc over the past 5 years. Now that everyone has quite powerful and cheap computers, and the ability to obtain cheap cracked software, its kind of anyone’s game these days. I do come from a hardware background, having started in 1991 amassing cheap analogue keyboards etc and using a cheap Atari computer for midi, so I appreciate hardware, its just that software has come a million miles since then, also sampling is at the basis of so much of what we do, the $3500 I spent on a hardware sampler is quite honestly a total waste of money now that my cheapish old apple laptop does a more efficient job of sampling…”

Within electronic music composition how much of this creativity is embedded within the tools that are used? To develop an understanding of what technologies were most important in terms of achieving their artistic visions respondents were asked to rate the technologies in table 3 on a four point Likert scale. The percentage scores reflect selections of important and very important.

Table 3: Technologies important to achieving an artist’s creative vision

<table>
<thead>
<tr>
<th>Technology type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Hardware</td>
<td>67</td>
</tr>
<tr>
<td>Licensed software</td>
<td>53</td>
</tr>
<tr>
<td>Cracked / illegal software</td>
<td>50</td>
</tr>
<tr>
<td>Open source patches</td>
<td>46</td>
</tr>
<tr>
<td>Open source software</td>
<td>40</td>
</tr>
<tr>
<td>Cracked patches</td>
<td>37</td>
</tr>
<tr>
<td>Licensed patches</td>
<td>35</td>
</tr>
<tr>
<td>Own written patches</td>
<td>24</td>
</tr>
<tr>
<td>Own made hardware</td>
<td>26</td>
</tr>
<tr>
<td>Own written software</td>
<td>18</td>
</tr>
<tr>
<td>Hardware made for you</td>
<td>10</td>
</tr>
</tbody>
</table>

Source online survey administered Dec 2005 by author.
4 point Likert scale used cumulative total of top two responses.

While it comes as no great surprise that Commercial hardware was identified by 67% of valid respondents as being important and very important the position of cracked and illegal software in terms of achieving a creative vision is significant (half the valid number of respondents - 50 of 100).

Additionally to the question of whether the availability of cracked/illegal software has made participation in the industry more accessible to artists, an overwhelming 94% of respondents said yes. This was further supported by many comments in the open ended questions that queried the extent to which respondents felt that cracked software contributed to their access to the field and industry. 76 (of 100) open ended responses were received to this question. The range of responses was quite broad, ranging from highlighting the existence of open-source and freeware products as viable alternatives to commercial and pirated software, to indicating that the existence of cracked software was democratising electronic music composition “…Evolution decided to free up electronic music for the masses and not repeat history’. By far the most common response was that cracked software enabled more informed choices to be made over what combinations of technologies to purchase. However a number indicated that in the absence of cracked software they would have been largely excluded from the industry and not achieved the levels of proficiency they have with access to the tools. “Cracks allow the work flow or artists to continue for new works to be created”. “…if I didn’t pirate, I honestly wouldn’t be as accomplished a composer as I am”.

The assimilation of cracked software for music composition recalls the technology assimilation approaches of NICs. Irrespective of the legality of the source the process provides a basis from which to understand the flow of tacit knowledge within electronic music instruments. Let’s take for example the experience of Korea in semi conductors. Korea in its drive to expand into DRAM technology established linkages with smaller troubled firms to acquire VLSI technologies. These were then assimilated and the technological learning absorbed. This was achieved through leveraging the tacit knowledge flow of people. Samsungs approach was to establish a R&D outpost in Silicon Valley and engage local expertise in cracking the VLSI technologies and another in Korea with significant training, joint research and consultation boosting the Korean teams capabilities in a very short time (Kim 1997 154). What is notable here is the extent to which the codified knowledge is geographically situated. Within electronic instruments from the innovating firms perspective there is a need to transfer much of the tacit knowledge of the designers and programmer to their customer base such that these customers are able to effectively engage with the suite of complex technologies within these composition tools. From the firms perspective this cannot be clustered within a geographic space but rather must be disseminated either through the initial technology (e.g. tutorials and learning programs in the box) or via user communities and other forms of interaction over distance. That is there is a real need to engage users to not only assist in improving the product but also to ensure customer satisfaction. Thus in contrast to the resource based view of economics the advantage for the innovating firm (e.g. Propellerheads/Ableton etc) is in making the technology as transparent and engageable as possible. When cracked /pirate distribution is then introduced, the originating firm is at a disadvantage in that not only is the codified knowledge embedded in the technology opened but the tacit knowledge, the knowledge of use, is also open.

However a common response to the use of cracked software was that the use was a conditional function. If the tools are persevered with or release stems from this use then the licensed versions will be obtained. This however is at the moment an unquantified effect.

Boden differentiates between psychological creativity (p-creativity) and historical creativity (h-creativity) suggesting that p-creativity involves coming up with an idea that is new to the person coming up with it. H-creativity suggests that no-one has had the idea before – that it is novel to the human race (Boden 2004 2). The difference between the two is perhaps best illustrated by the story of Turing (acknowledged as the father of computer science and wartime decoder of the German enigma machine). In
1931 applying to Kings College, Cambridge for a Fellowship in mathematics he submitted a dissertation outlining a refinement of a well known theorem in mathematical statistics. The referees that judged the dissertation pointed out that this very revision had been recently published by a distinguished Scandinavian mathematician, however there was no possibility that Turing could have known about this. Turing’s paper so impressed the referees that he was happily offered the Fellowship. Indeed the fact that a distinguished mathematician had developed the same revision independently was a point in Turing’s favor. When the decision of the referees is evaluated from a p-creative and h-creative standpoint it is evident that the referees did not decide against Turing because the work was not h-creative. Rather on the basis of the strength of his p-creative work he was supported. Suggesting that what was important for Kings College was Turing’s capacity for producing p-creative ideas, some of which may be h-creative.

When music composition via electronic instrument means is then considered this suggests that within a community of users what is a key driver is the facilitation of p-creative ideas (hopefully some of which will develop into h-creative ones). One facet of the development of p-creative ideas is the exploration of a conceptual space. The exploration of the sonic landscape provided via electronic instruments provides this capability. And this exploration of the technologies leads to further exploration and also feeding into the communities of practice. As Boden suggests ‘exploratory creativity is valuable because it enables someone to see possibilities they hadn’t glimpsed before’ (Boden 2004 4).

This importance of exploring the conceptual space was flagged by one respondent who suggested that ‘Softsynths like Reason have allowed me to load up my entire studio within seconds. This way I have been able to maintain that burst of inspiration and create music. In the past, using hardware would slow down this process and by the time I was ready to make music, that burst of inspiration was long gone’.

It is at the juncture of individual creativity and creativity of the group that the distribution and assimilation of software based electronic instruments impacts on creativity and expression. Csikszentmihalyi suggests that creativity can be observed only in the interrelations of a system made up of three main parts: the Domain, the Field and the Individual comprising a multicomponent model of creativity, a cyclical process (Csikszentmihalyi 1996 27-28). The Domain is represented by the electronic music industry and the Field the gatekeepers of this industry. Before a work can be deemed creative it must be examined by other members of the Field. If it is then deemed to have value it is incorporated into the Domain. These gatekeepers, using Csikszentmihalyi’s approach, would include the institutional actors surrounding the expression and performance of music. Within music composition, particularly electronic music composition this crossing of bounds from one style to another, one application to another through different compositional approaches carries a similar inference. Within this environment, where there exists indications of movement towards Attali 4th stage of music – composition the gatekeepers would also appear to be expanding (Attali 1985). Thus the definition of creativity seems to be expanding along with the expansion of creative activity, a very necessary but not always obvious outcome.

Csikszentmihalyi suggests Domains can hinder or help creativity in three principle dimensions; clarity of structure, centrality within the culture and accessibility (Csikszentmihalyi 1996 38). Within the electronic music domain the rules of composition are continually evolving through the tools and samples available. Yet the terms of music composition are also being simplified by these technologies. This pace of technological advancement in composition software suggests that the clarity of the structure is not as clear as domains such as mathematics. Yet, via technology and unprecedented access to musical tools, the research will support the suggestion that this feature represents a positive influence on creativity.

The access to the Field, in this case to not only the critics, dominant producers, independent record labels but ultimately the consumers, is according to Csikszentmihalyi usually restricted, with many gates to pass and bottlenecks to negotiate (Csikszentmihalyi 1996 55). The initial research presented suggests that a key feature to accessing this field is represented by the access to tools and electronic instruments. Access to which in the past was significantly restricted by scarcity of hardware.

5 Technology

Von Hippel discusses the role and importance of lead users in the innovation equation and Power discusses user innovation in relation to Propellerheads. In selecting what were the most important technologies used respondents selected as the 4th most important open source patches. These represent patches created by other users, not necessarily only by first mover or lead users. This suggests that it is not only lead users that are innovating in terms of contributing to the tools they use.

In relation to the concept of innovation the recent work by Von Hippel (von Hippel 2005) on the issue of user centred innovation is an important contributor. Within electronic music this is an important factor in a number of different spheres. It relates to how artists keep up to date and discover the capabilities of the software based tools they are using and to discover new approaches and techniques to achieve their creative vision.

Empirical work has shown that users innovate for their own use. Von Hippel showed for 8 industries where respondents indicated a high level of user innovation, ranging from 9.8% for outdoor consumer product to 37.8% of users for ‘extreme’ sporting equipment (Csikszentmihalyi 1996; von Hippel 2005 20). In order to evaluate to what extent electronic music and sound artists innovate they were asked questions about the technologies they used the most frequently and the importance of those technologies that contributed towards achieving their creative visions. In relation to the pool of respondents to the survey it was found that a high proportion were seen to write their own software, write patches and also make their own hardware (see table 4). One could categorise users who were writing their own patches as ones that are innovating using the packaged technology as a basis. The tables below indicate the frequency of use and the relative importance to achieving their creative vision. From this we can infer that like the industries highlighted by Von Hippel the electronic music industry is one characterised by relatively high levels of user innovation.
Table 4: Frequency of use of tools and instruments in achieving creative vision

<table>
<thead>
<tr>
<th>Technology use</th>
<th>Used often</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own written software</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Own written patches</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Own made hardware</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Source online survey administered Dec 2005 by author. 3 point Likert scale used highest response.

Table 5: Importance of tools / instruments to achieving creative vision

<table>
<thead>
<tr>
<th>Importance to creative vision</th>
<th>Important</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own written software</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Own written patches</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Own made hardware</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

Source online survey administered Dec 2005 by author. 4 point Likert scale used cumulative total of the top two responses.

Kim raises that "technological capability at the firm level is acquired and accumulated mainly through three mechanisms: interactions with the international community, interactions with the domestic community and in house efforts" (Kim 1997 94). Kim’s discussion of the international community level mainly refers to technology transfer between firms. What is observed within the environment of electronic music composition is that technological learning extends beyond these acknowledged players and a contribution to that learning is facilitated through the software cracking of electronic instruments.

6 Conclusion

Cracking studios and crackers have been defined in this paper as parties who subvert property protection measures on software and provide tools for the broader population to subvert these measures also. The above analysis seeks to situate the role of crackers as a legitimate contributor to the technology assimilation equation for the electronic music and sound industry. By opening this area to further detailed scrutiny opportunities may present themselves for the mutual enrichment of technology innovators and artists alike. This paper suggests that further detailed examination of the role of cracking studios – as the arbiters of creativity – be a worthwhile project. The responses to the survey confirm a positive contribution of cracked software instruments on the development dynamic within the electronic music sector. It has been used as a vehicle of testing and review and also dynamics operating within the electronic music industry.

Mathews suggests that “though industry creation through technology leverage is undoubtedly an East Asian innovation, its applicability is not confined to East Asia” (Mathews 2001 29). My hope is that I have contributed towards better understanding the dynamics operating within the electronic music industry.

References


Fox, M. (2002). "Technological and Social Drivers of Change in the Online Music Industry." First Monday 7(2).


