Floppy disks and FireWire drives

Towards an understanding of the shifting nature of musical sketch material

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Introduction

In the twenty-first century, digital technologies seem to disappear as 'they weave themselves into the fabric of everyday life until they are indistinguishable from it' (Weiser, 1991, p. 94). As these technologies are subsumed into our working lives, they are also brought into the creative realm. This digital shift has fundamentally changed the material nature of many musical sketches. Whereas pre-computer age composers working in the Western classical tradition primarily inscribed their thoughts on paper with pencil (another technology which has seemingly become invisible), they now direct cursors across screens, creating digital ephemera in place of hardcopy evidence. As hardware and software technologies develop, the ability to read these new e-materials is more transient than their hardcopy predecessors. This creates the possibility of rendering previous versions obsolete. The precariousness of the digital situation was recognised by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in the 2003 *Charter on the preservation of digital heritage* (32 C/ Res. 42). E-sketch study, a term coined by Ross Feller in 2004, like its analog predecessor, offers the researcher insight into specific aspects of a musical work that concerned the composer. It can also provide added depth, as a file's digital metadata[1] can capture information about the minutiae of compositional organisation and a composer's work practice that was not necessarily easy to retrace in paper-based sketch material. Nearly three decades after the widespread adoption of the personal computer, this article seeks to begin addressing some of the concerns and benefits for researchers working with e-sketch material.

In the last thirty years, both the theory and methodology of digital sketch study have lagged behind the physical reality of changing composer sketch materials. The issue of e-sketches is multifaceted and requires that a variety of perspectives be considered – from those of the software engineer and the archivist, to those of the technological philosopher and the musicologist. Questions abound: How are e-sketches and other

1 The term 'metadata' here will refer to administrative metadata such as technical metadata which includes things like file type, file size, as well as the date and time for the creation of the file. (Riley, 2017, p. 7)

born-digital documents (documents where only the digital object exists) of musical compositions treated within sketch study? What are the implications of changing the approach to sketch study? How can scholars and archivists work with the shifting nature of musical sketch material to come to a more complete understanding of how e-sketches can be utilised in musicological research? Beginning with a brief discussion of archives and born-digital documents, I argue that musicologists exploring e-sketches need to be better versed in the archival concerns surrounding born-digital records in order to work effectively within the technological quicksand of digital preservation. Following that, I examine how musical sketch study is beginning to adapt and incorporate e-sketch studies, identifying some issues particular to working with digital documents. Finally, I draw on the philosophical considerations of the technology of writing to theorise on the shifting nature of musical sketch material suggesting some perspectives on the above questions.[2]

Content and/or context: born-digital archives

Writing at the turn of the millennium, Brent Lee found that the digital revolution had effects in 'all stages of traditional musical creation, from the sketching and notation of compositions to recordings of performances' (2000, p. 194). Lee identified three main format categories of music's representation in the digital realm: 1) digital recordings, 2) notation files, and 3) control formats (file types used in music software to create notation or sound) (2000, pp. 195-198). Each of these categories has unique issues surrounding the preservation of their born-digital documents, further compounding the complexities of the researcher's job. Lee concludes his exploration by noting the worrying results of several case studies from the digital music realm:

> Individual musicians have learned that works created as little as five years ago have become impossible to reproduce due to the unavailability of functional hardware and software. Within public and private institutions, the expense of migrating archival digital recordings has necessitated a narrow selection of recordings for preservation and the loss, in hindsight, of valuable material. In most cases, digital documents are stored on diskettes, hard drives, or tapes, awaiting an uncertain future. More research needs to be done in order to formulate the best strategies for preserving these documents. (Lee, 2000, p. 203)

2 As detailed explorations of digital sketches in the musical realm are just beginning to emerge, the majority of the examples provided here are drawn from the literary tradition. Furthermore, I assume a compositional scenario that understands a replacement or integration of music notation software (MNS) for handwritten scores as being the norm. While MNS is certainly not the only method of music composition creating born-digital documents – one need only consider MAXmsp patches or Logic Pro files for that premise to be proved faulty – this article will not actively pursue the plethora of possible media types involved in compositional creativity focusing instead on more general concerns.

Taking Lee's conclusion as our starting point, we as musicologists need to possess a rudimentary understanding of how archives conceptualise the act of preservation and their individual mandates, as well as of some of the constraints archives face in preserving born-digital materials. Only then is it possible to work effectively with both the archive and the documents they store.

The preservation of physical objects is fundamentally different from the preservation of digital objects. As Kenneth Thibodeau notes, 'it is impossible to preserve a digital document as a physical object. One can only preserve the ability to reproduce the document' (2002, p. 13), in other words, the content. A comparable situation but separate problem is the shift in the media type of recorded music – in this scenario one can preserve the document, but without the ability to read it. In this situation the context of the document is preserved without access to the content. Further complicating the matter are the different types of archive, which have unique collection mandates that limit the form those digital documents arrive in. Some, known as 'collecting repositories', acquire their collections from outside donors, meaning that the archivists working with these collections 'have little control over the form in which they receive these records, or whether essential metadata accompanies them' (Davis, 2008, p. 169). Part of working effectively as a musicologist with born-digital documents is understanding what type of archive a given composer's e-sketches are housed in, and their approach to born-digital documents.

First, we must determine where on the content–context preservation spectrum the archive functions. If context is the archive's primary concern, then the archive may become a storehouse of archaic technology. Thibodeau illuminated the lack of feasibility and sustainability of this style of preservation, stating that the technology of creation might be useable for five to ten years before obsolescence, after which hardware and software are progressively more expensive and difficult to maintain (2002, p. 19). In an attempt to avoid such a scenario, Charles Levi, reporting on a legacy e-records pilot project for the Archives of Ontario as of 2011, articulated an archival approach that placed supremacy on the content of the documents:

> Although the use of computerized platforms to create this data implies the records are 'born digital', the aggregate experience of appraising these materials strongly implies that those who used the tools had no intention of leaving those items in digital format. (Levi, 2011, pp. 241-242)

According to Levi, since the computer in this archival context was used simply as a transitory tool to 'move information from mind to paper', retaining the electronic version of a hardcopy document is unnecessary. Within the e-records pilot project described by Levi, 'the only electronic documents kept are those that are "too big or too complex" to print' (2011, p. 242). Such a preservation tactic preserves the content of the file for future

users of the collection, much like a paper record, and the newly printed e-document requires no further development of preservation techniques on the archive's part. Jeff Rothenberg considers this a defensive action rather than a solution, as printing abolishes the document's 'unique functionality (such as dynamic interaction, nonlinearity, and integration) [...] [and] destroys its core digital attributes (perfect copying, access, distribution, and so forth)' (1999, p. 3). In order to mitigate such losses, some researchers advocate the use of extensive descriptive practices of the context and content webs which are integral to the description of e-documents (Hedstrom, 1993, p. 57; Lee, 2000, p. 201). Recognising that born-digital records have the potential for rich description, Margaret Hedstrom also indicates that an abundance of digital metadata could allow for the creation of 'a complete audit trail of all actions taken to create, update, and modify a record, and of all its uses' (1993, p. 59).

Another proposed archival 'solution' for e-document preservation includes migrating documents from one digital format to another, by either updating versions or switching software programmes entirely. However, Rothenberg, citing Peter Horsman, asserts that reading digital documents in software other than its native format at best 'sacrifices subtleties (such as format, font, footnotes, cross-references, citations, headings, numbering, shape, and color) [...] [while] at its worst, it leaves out entire segments (such as graphics, imagery, and sound) or produces meaningless garbage' (1999, p. 4). Version migration is also fraught with complications, as 'using more recent versions of software, even with the original formats, may present the preserved documents with characteristics they did not, and perhaps could not, have had' (Thibodeau, 2002, p. 23). With concerns such as Thibodeau's in mind, Rothenberg supports the development of emulators 'so that a digital document's original software can be run in the future despite being obsolete' (1999, p. 17). Yet 'emulators (computer programs designed to run software written for another type of computer)' are themselves inherently problematic, as Matthew G. Kirschenbaum and Doug Reside note; emulators 'are themselves digital artifacts that must be updated and maintained if they are to remain useful' (Kirschenbaum and Reside, 2013, p. 269). Furthermore, running emulators to maintain and preserve the context of the born-digital documents alongside the content and present it to researchers in a digital format is an undertaking that requires extensive financial backing and specially trained personnel, which are not available to all archives.

Salman Rushdie's papers at Emory University are an example of an undertaking that combines migration chains and emulators. The team responsible for the Rushdie papers noted that historically, scholars delved into elements such as 'incunabula, early publishing practices, bindings, paper, manuscript hands, marginalia, and front and back matter', and that it was likely that the practice would continue with scholars interested in literature

'and creative production in the late twentieth century and on' (Carroll et al., 2011, p. 79). From this understanding of research priorities, the archival team approached the processing and presentation of the author's documents using 'both migration of data and emulation of systems' (Carroll et al., 2011, p. 80). This dual approach was not without issues, as even though the documents accommodated in the emulator were text based (word processing files, fax files, and Eudora e-mail messages), the process of creating stable access versions of these files from the original digital documents was laborious and time-consuming. Applying these archival lessons to music e-documents highlights a potentially significant issue for musicological research: if these fairly universal text-based file types were found to be problematic, how much more so are MNS files, which are typically saved in proprietary formats? Such file formats, as identified by Lee, have suspect long-term stability, necessitating the consideration of 'the migration of information from a proprietary format to a standard format' as an aspect of preservation (2000, p. 197).[3]

Even if the archive is collecting and preserving born-digital documents, not all institutions' policies currently provide researchers access to them in any format. In a 2008 survey of 125 American primary source repositories (including public universities, private universities, historical societies, and public libraries), Susan E. Davis found that 47% of the respondents reported that they currently accepted born-digital documents, and an additional 22% intended to do so in the future (2008, p. 177). Yet, of the 125 repositories Davis surveyed, only 40 had access policies for born-digital documents, and of those 40 repositories, 18% provided only paper copies for researchers (2008, p. 180). With only 32% of the surveyed repositories offering access to born-digital material, it is hardly surprising that scholars have been slow to incorporate techniques for utilising such rich documentation. Furthermore, it is likely that the availability of musical materials is even lower than indicated by Davis, given that MNS files and composer e-files are not as commonly collected as other file types. The difficulty of reading files due to the proprietary nature of most MNS software, compounded by a historical lack of standard access protocols, is likely a further reason for the current dearth of musicological e-sketch study.

Surveying the concerns surrounding born-digital documents in an archival framework indicates the pressing nature of the problem. Lisa Hooper and Donald C. Force remind archivists that 'digital records cannot be left unattended for several years as the collection slowly moves its way to the front of the blacklog queue. [...] There is no silver-bullet solution to ensure that your digital records will survive as long as the paper records cur-

3 MusicXML, a format designed 'for sharing sheet music files between applications, and for archiving sheet music files for use in the future' only became available in 2004, so the first two decades of MNS e-sketches could not have been saved in this format originally. Yet, it is important to mention this format and note that its adoption could mitigate some potential issues surrounding software migration in the future (MakeMusic, 2015).

rently in your holdings' (2014, p. 69). Knowing the strategies employed by archives in their quest for authentic preservation allows musicologists interested in working with e-sketches and other born-digital documents to consider what type of investigation they can undertake fruitfully, while also clarifying the challenges archivists face with this ephemeral material.

(E-)sketches and technological quicksand

The preservation concerns and issues articulated in the previous section, compounded by limited archival access, might suggest that studying works with e-traces is too difficult or unrewarding to bother attempting. If, however, we take to heart that an 'underlying assumption of modern archival theory and practice' is that a creator 'can be best understood and appreciated through a full spectrum of possible records which encompass all of a creator's activities, rather than on selected aspects or records of those activities' (Sallis and Landwehr, 2016, p. 161), then it is necessary to explore a composer's computer files in addition to other materials.

As previously noted, utilising computer software in musical composition has become increasingly commonplace amongst composers since the advent of the personal computer in the mid-1980s. Yet little has been done to incorporate these digital materials into traditional sketch study. Previous research – Bakker (2015) and Feller (2004) – has begun the interrogation of such source material, but falls short of interacting completely with the digital nature of the material. Earlier research approaches tended towards simply applying more traditional methods of paper-based sketch study to the computer screen. Some composers, such as Chris Watson (2006), have also begun the process of tracking their computer-based compositional practice and self-assessing their digital working methods, but more remains to be done. This section identifies potential problems that may be encountered when working with born-digital archival materials, including incomplete sets of e-files and a lack of documentation concerning obsolete software applications, and suggests a method for understanding a composer's individual human-computer interaction (HCI) with digital technologies.

A potential problem for e-sketch study arises from a possible lack of value assigned to such sketches by composers. Part of the core nature of digital files, as Rothenberg (1999, p. 3) points out, is the possession of attributes such as perfect copying. It is possible that these attributes could result in users understanding them as commonplace. Devin Becker and Collier Nogues identified such an issue in emerging writers, noting that this lack of value can manifest in 'the accumulation of poorly managed, highly distributed, and unsystematically labelled files, representing works of writing in myriad versions and in various states of completion' (2012, p. 483). Paralleling the experience of their writer

colleagues, Lee has observed that the personal file archives of composers who utilise computers for composition is 'nearly invariably chaotic' (2000, p. 199). This is not to say that the sketches of past composers were to any extent 'organised', but rather that the unsystematic array of sketch materials continues in the digital realm. Becker and Nogues offer possible ontological reasons for writers' lack of regard towards their digital files, including that:

- the ephemeral nature of digital files does not promote a sensual relationship between creator and product;
- the infinitely replicable nature of a file lessens feelings of authenticity or novelty;
- most writers do not have a 'master' file as there would be a 'master' recording of a performance, and therefore there is no one file that has primacy of place in relation to the other files. (Becker and Nogues, 2012, p. 504)

In order to combat this unsatisfactory state of affairs, Becker and Nogues reiterate the findings of other studies as well as their own, suggesting that guidance be provided to possible donors 'about sound personal digital archiving practices, while at the same time keeping enough distance to allow these archives to retain their personal and personally evidentiary characters' (2012, p. 492).

Although the advice given by Becker and Nogues for organising documents concerning artistic creation is both practical and potentially useful for creators who profess no system of file organisation, what is most interesting about their findings are the reasons why these writers may not value their born-digital documents. Each person utilises technology in a unique manner. Therefore, attempting to determine how a composer interacts with a software application is an integral aspect of understanding born-digital documents. In the case of the Rushdie papers at Emory, archival staff conducted specific interviews to uncover details about the author's digital life, finding that his approach to the computer shifted over the course of his career from 'a sophisticated typewriter' to its incorporation in 'all aspects of his life' (Carroll et al., 2011, p. 65). Similar interviews with composers may uncover whether they worked with the aid of the software manual, provide information on file organisation, or even reveal the sequence of events involved in composing a work. For the authors surveyed by Becker and Nogues, the translation of ideas between hardcopy and digital formats was a foundational aspect in the creative process, and writers considered the moments of transfer as important editorial moments in the life of the work (2012, p. 497). Likewise, in an investigation of HCI, music composition and its associated creative flow, Chris Nash and Alan F. Blackwell note that 'even when using digital tools, users often support more complex interaction with pen and paper, to make notes, reminders, calculations, or sketches of representations not easily

or quickly executed in the UI [user interface]' (2014, p. 396). It is therefore imperative to understand the composer's approach to their digital life. As Nash and Blackwell, and Becker and Nogues suggest, not all users rely solely on digital compositional tools. In fact, unravelling the entwined traces of multiple media may benefit from interviews focused on the composer's workflow and approach to digital technology. Questions for such an interview should consider at least four categories: digital technology personal history, hardware and software details, working practice, and personal archival practices. Sample queries, adapted and expanded from Watson (2006, pp. 215-223) and Becker and Nogues's (2012, pp. 511-513) questionnaires, could include:

Digital technology personal history

- When did you begin working with digital technology?
- How did you learn to use digital technology (classroom-based, peer-directed, self-directed, reliant on manual, etc.)?
- Has your view of the purpose of digital technology changed over time?
- Have you always used the same hardware and/or software application? If no, what prompted the switch?
- How do you primarily regard MNS (score setting tool, creative tool, other, etc.)?

Hardware and software details

- What kinds of device do you have access to and use for composing?
- On what operating system do the devices run?
- What software applications (including version) do you employ?
- How do you use the applications (multiple applications simultaneously, independently transferring files between applications and file formats, etc.)?

Working practice

- Does your working method require you to manage files and drafts between devices? If so, how do you manage them?
- Do you use non-digital technologies in your compositional practice? If so, at what stage in composition do you go digital (or alternatively go from a digital to a non-digital format)?
- What do you consider a draft of a composition?
- Do you print out paper copies of your digital work for revision or some other reason?
- Do you use audio playback or other built-in MNS features while composing?

Personal archival practices

- Do you save your pre-compositional notes? If so, how?
- In what file format do you save your final e-files? Is it different from the format you created them in? Why or why not?
- Do you organise your composition files? If so how (work, year, idea, etc.)?
- Do you use a particular naming convention?
- Do you overwrite drafts of your work? Or save new draft versions?
- Do you save paper copies of any interim compositional drafts?
- How often and how do you back up your digital work?
- Have you ever 'lost' files? If so, did this affect your approach to archiving work?

Although this is by no means a comprehensive listing of possible questions, it emphasises that born-digital documents such as MNS e-sketch files are, as Ciaran B. Trace argues, 'forged in the alliance of the user, the computer hardware, the operating system software, and the application software' (2011, p. 24). Observing this web of influences aids the researcher in understanding the composer's digital life, and how that life engages with their non-digital one.

Depending on a scholar's ability to access computer files, e-sketches can offer insight into the structuring of the musical work or into the composer's organisational method. In their chapter on the challenges brought about by the digital turn in textual scholarship, Kirschenbaum and Reside relate Reside's foray into Jonathan Larson's born-digital documents for the musical *RENT*. Through Reside's scholarship on Larson's digital 'papers' – amounting to one hundred and fifty 3 1/2-inch diskettes – the authors demonstrate a practical application of born-digital e-sketch material in relation to discussing creative practice. In this study, the information stored in e-sketches included precise sketch ordering using the metadata of creation and last modified found as part of the e-file (Kirschenbaum and Reside, 2013, pp. 265-267). This style of e-sketch ordering has similarly been demonstrated for the American composer Steve Reich's *Electric counterpoint* in Bakker (2015). The applicability of this style of draft ordering is dependent not only on the researcher's ability to access the digital metadata of the files, but also on how the composer saves their work – 'save-as' versus 'save-over'.

Reside suggests that contextual information other than metadata, timestamps, or folder directory structures is not easily represented on paper. By asking questions about how variables within the computer display (such as scrolling capabilities and text wrap) might affect Larson's creative process, Reside addresses a query that it is only possible to fully comprehend in the digital realm (Kirschenbaum and Reside, 2013, pp. 267-268). The archival practice of simply printing out hardcopy documents, advocated by Levi (noted in the first section of this article), would not allow for Reside's prodding into Larson's compositional process.

Thibodeau proposes that 'under a strategy of preserving technology, doing research in such [archival] series would entail using all the different software products used to produce the records' (2002, p. 21). Such research would include uncovering a software application's manual and versions, noting discrepancies in the capabilities thereof. In fact, Kirschenbaum and Reside believe that when working with content created after 1980, textual scholars should posses a certain level of digital sleuthing ability. What is the difference, they ask, between not expecting 'an archivist to translate an ancient Chinese manuscript for a visiting scholar or explain to a library patron that one has to read a Hebrew scroll from right to left' and dealing with 'an arcane array of antiquarian file formats in order to perform even the most basic research activity' (2013, pp. 271-272)? It is also important to note, as Thibodeau reminds us, that work with propriety formats (such as those found in MNS) through tools such as emulation can lead to complex intellectual property rights issues asserted by companies over proprietary formats, regardless of content ownership (2002, p. 21).

In 1982 Joseph Kerman suggested that sketch study focuses a researcher's understanding of a musical work 'by alerting us to certain specific points about it, certain points about it that worried the composer' (1982, p. 179). Kirschenbaum and Reside take the situation a step further, borrowing a scenario from Stephen King's novel *Lisey's story* (2006) to illustrate the possibilities of an author's 'born digital detritus'. They ask not only what types of tool would be required for a textual scholar in this new era, but also probe the ethical concerns 'involved in plumbing the depths of a storage medium that routinely commits all manner of data, often without the user's awareness, to magnetic memory' (Kirschenbaum and Reside, 2013, pp. 261-262). According to Kerman, sketch study can only aid a musicologist's understanding of the composer as long as it is remembered that the remnants subjected to sketch study are unintentionally provided and that the points highlighted in the sketch material are not necessarily the only ones of interest to the composer. This holds true whether the sketches are paper-based or of the e-sketch variety, and should be kept in mind by researchers working with these materials.

Digital technology: a new era of sketch study

Traditional sketch study, although not quite adequate for the task, is a good place to start when investigating the depths of information housed in e-sketches. As Kirschenbaum and Reside have pointed out, scholars of such material should be required to gain some level of fluency in the software and hardware configurations they will work with. Further adding to that fluency, however, is the need to situate and consider one's research in the philosophical framework of digital technology.

To do so, we must first grasp that inscribing thought in something other than a human's memory has shifted our understanding of history, including the length of remembered history and what history is remembered. If we consider writing, as stated by Mark Weiser (the founder of ubiquitous computing), to be the first information technology because it characterises 'the ability to represent spoken language symbolically for long-term storage' and frees 'information from the limits of individual memory' (1991, p. 94), then we are also addressing the concept of orality. Walter J. Ong has discussed a difference between types of orality, noting that primary orality exists in cultures where no knowledge of writing is possessed, whereas secondary orality develops within high-literacy cultures, 'depending for its invention and operation on the widespread cultivation of writing and reading' (1985, pp. 23-4). Within this secondary orality, Ong proposes that the type of technology utilised for writing can restructure thought processes. This idea is of particular interest to the scholar of born-digital documents, considering as Ong notes, that:

> between the knower and the known print interposes elaborate mechanical contrivances and operations of a different order of complexity than writing. The computer achieves the ultimate (thus far) in separation of the knower and the known (the subject of discourse): between the two it interposes limitlessly complex structures of mechanically articulated 'bits' of information, each consisting of the ultimate in divisive patterning, the dichotomy or binary division, which translates into 'yes–no' or 'is–isn't'. Putting the simplest statement of, say, a dozen words on to a page in a word processor involves operations inside the machine, totally remote from the human lifeworld, which are thousands, perhaps millions, of times more complex than writing or even letterpress printing, though unimaginably less complex than the activities of the human cerebrum. (Ong, 1985, p. 45)

If we agree with Ong's assessment of how the written word changes under the influence of the word processor – a digital entity versus a mechanical technology such as a letterpress or fountain pen – how much more change (or corresponding lack of change) might be expected in the realm of MNS? This question is central to a scholar of born-digital musical e-sketch study, and so is the following: does the (digital) technology used change how something is created?

Just asking such a question raises the hackles of those engaged in the on-going debate of symptomatic technology versus technological determinism. It brings to the fore the need to interrogate, for each digital technology user, whether the technology proceeds from the needs of the user (symptomatic technology) or whether the needs of the user are shaped by the technology (technological determinism) (Williams, 1990, pp. 13-14). Of course, neither extreme has to be the exclusive manner in which an individual utilises technology – or even how one works within a given software application. It is,

however, important to consider the implications of technology use shaping the user's use of technology.

Software applications have their own functionality; they cannot merely be considered another 'digital language'. Matthew B. Crawford's (2009) work raises questions of the appearance or absence of psychic friction described by Ong, noting that well-written computer software adds a level of abstraction in the creation process. Michael Heim contributes to the discussion, saying that with the advent of the computer, linearity is no longer inherent in the creative process of writing; rather, a fragmentary or dynamic approach is fostered with the use of a word processor. The act of revision gains an overwhelming sense of mutability, and writing paired with 'automated editing functions – for example, search-and-replace, move-text, delete, typeover – generate quite a different sense of the risk involved in committing oneself to writing' (Heim, 1987, p. 153). For Heim, a computer running a word processing program removes 'the sense of words being carved in stone' (1987, p. 154), thus freeing the creative process of writing from the impending teleology expected if one were to through-compose a work by hand. Would a similar study of MNS demonstrate a correspondence?

The very nature of the material has shifted from hardcopy to a digital shadow, which can be ephemeral to access, presenting a situation that is simultaneously daunting and exciting for its myriad of possibilities. In the new era of e-sketch study, questions such as those raised in Crawford, Heim, Ong and other studies must be addressed, in addition to Kerman's concerns. Studying a particular composer's working method requires that the scholar attempt to address the composer's approach to and familiarity with digital technology as part of their background research.

Possibilities and complexities: moving forward with e-sketch study

This article began by asking: how are e-sketches and digital drafts of musical compositions treated within sketch study? If we ask *how could* instead of *how are*, the world of possibilities for sketch study becomes unfathomable – the implication being that there are endless ways for humans to use digital technologies in the creative process, and that this variety is borne out, in part, in the e-traces and metadata of those digital files. This potentially allows the researcher insight into how the technology was used, and not simply what the composer created with that technology – akin to asking how a composer held a quill or what type of ink they preferred. This level of detail provides extra-musical information that aids our understanding of the economic, political, or other circumstances within which the composer created.

When Reich, a composer active since the 1960s, was asked about technology and his career, he noted that his personal archive 'goes from paper, to floppy disks, to Syquest

drives, to Jaz drives, to various small FireWire drives' (Reich quoted in Catapano, 2007). In order to keep pace with compositional materials, like Reich's, that were created in the late twentieth century and which continue to be generated in the twenty-first, we need to begin accessing the information on those disks and drives. But simply accessing the information or acknowledging the use of a particular technology creates a skewed view of the process of composition. In his literary history of the word processor, perhaps the closest equivalent to MNS, Kirschenbaum hastens to warn that:

> Any analysis that imagines a single technological artifact in a position of authority over something as complex and multifaceted as the production of a literary text is suspect in my view, and reflects an impoverished understanding of the writer's craft. (Kirschenbaum, 2016, p. 7)

Music scholars, like our literary counterparts, need to understand the digital shift in the output of the individuals whose works we study. And this understanding has to be based on an integrated approach that accounts for the complexity of compositional creation.

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Abstract

The physical reality of composers' sketch materials has changed in the last thirty years, but how scholars are to understand and work with these new materials has only begun to be theorised. This article seeks to offer some perspectives on the questions: How are e-sketches and digital drafts of musical compositions treated within sketch study? What are the implications of changing the approach of sketch study? How can scholars and archivists approach the shifting nature of musical sketch material in order to come to a more complete understanding of how e-sketches can be utilised in musicological research? The issue of e-sketches is multifaceted and requires a variety of perspectives – from archivist, to technological philosopher, to software engineer, to musicologist – in order to be more fully understood. Beginning with a brief discussion of archives and born-digital documents, the author argues that musicologists employing e-sketches need to be better versed in the archival concerns surrounding born-digital records in

order to work effectively within the technological quicksand of digital preservation. Following that, the author examines how sketch study is beginning to adapt and incorporate e-sketches. Finally, the author draws on the philosophical considerations of the technology of writing to theorise on the shifting nature of musical sketch material in order to suggest some answers to the above questions.[4]

Keywords
E-sketch study; sketch study; born-digital document; archive; digital technology; digital draft; digital shift.

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