

The Effects of Music Notation Software on Compositional Practices and Outcomes

By

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Abstract

This thesis investigates the effects of music notation software (MNS) on compositional practices and outcomes. Research methods consisted of the administering and analysis of a mail-out questionnaire, comparative study of literature concerned with MNS-paralleling technologies and with general technologies and study of digital video footage of the author composing *in situ*.

A mail-out questionnaire was completed by 106 New Zealand composers. The questionnaire posed a range of questions to gauge composer use of and attitudes towards MNS. The main findings were that eighty-two percent of respondents reported using MNS in their work, that the “professional” look of MNS scores, ease of part production and playback function were the factors that most attracted composers to MNS and that composers felt that MNS playback had some influence on their compositional decision making. While respondents expressed concern over MNS use by inexperienced composers, they felt that the overall impact of the software on their own compositions had been positive.

The questionnaire findings laid the basis for literature-based enquiry into questions of resistance to new technologies and MNS specifically and historical shifts in modes of knowledge transfer. It was concluded that, while new tools for expression of thought typically encounter initial resistance, they are eventually accepted *en masse* and lead to powerful new artistic possibilities. The physical and cognitive aspects of MNS were explored and shown to constitute significant departures from traditional compositional practices and from the Romantic ideal that popularly defines composers and composition.

MNS, as a compositional experience, was found to occupy a range of perceptual states along a continuum from real to virtual. The virtual condition was shown to have the tendency to encourage unwitting composers to write “for the software” rather than for the end-goal of live performance of works. MNS was also shown to impinge upon human time perception, something already altered by listening to music. This, it was argued, could lead to miscalculation of tempi and other

temporal indications. MNS was also found to both reinforce and erode the historical importance of the music score and to both homogenise the outputs of composers and diversify composer communities.

The author captured digital video footage of his own interactions with MNS during the composition of a work. Selected clips from this were analysed with particular attention to the frequency and nature of playback auditioning and how this stimulated the creation of material. It was found that the author related to MNS on a quasi-collaborative level and was deeply, but not negatively, reliant on playback as a means of musical comprehension and stimulation. Many other aspects of the findings of the preceding chapters were also brought to bear on this Human-Computer Interaction case study.

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Questionnaire participants – the high response rate is a good example of New Zealand's composition community pulling together to help out one of its number.

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List of Abbreviations

3D	Three Dimensional
ASCII	American Standard Code for Information Interchange
CAD	Computer Aided Design
CD	Compact Disc
CPU	Central Processing Unit
LP	Long Playing (record)
MIDI	Musical Instrument Digital Interface
MNS	Music Notation Software
RAM	Random Access Memory
VoIP	Voice over Internet Protocol
WAV	Windows Wave (audio format/file extension)
WYSIWYG	What You See Is What You Get

Chapter One

Introduction

1.1 The phenomenon

Music notation software (MNS) is this study's term for software applications used by many composers to realise notated music scores in a digital environment. It offers contested advantages over the pen and manuscript paradigm it seeks to replace by, amongst other things, rendering engraver-standard notation, providing simulated audio playback of scores and allowing for the automated production of parts. MNS does not include applications that primarily render non score-based music.¹

Industry-leading examples of MNS are Finale and Sibelius. The former was first available for purchase in 1988, the latter in 1993. Both packages release regular software updates and have sizeable followings in many countries, including New Zealand.

1.2 Rationale for and aims of this thesis

This thesis comes at a time when, although a majority of composers include MNS in their "toolkits," little or nothing of substance has been written on the nature of the composer migration to MNS, its effects on composers and their compositions and its impact on such things as composer-performer relations, publishing and the traditions of concert performance.

Discourse about the nature and effects of MNS has until now been informally observed to centre around such subjects as the realism, or otherwise, of MNS playback, comparisons between the different software packages and the blaming of MNS for the notationally and idiomatically flawed output of some composers.

¹ Examples are such MIDI sequencing and audio editing packages as Logic and Pro Tools.

Such matters are of limited use in identifying the historic, psychological, sociological and technological questions that would clear the way for the necessary critical analysis of the phenomenon.

There is a tendency in many quarters to go with the technological flow, assuming that because technologies such as MNS offer new efficiencies, all aspects of their being must be beneficial. In other quarters, MNS is demonised because inexperienced composers are witnessed using MNS to write digitally illegible and practically impossible music. Both outlooks prevent composers from understanding the full implications of their and other composers' relationships with MNS. It would be more useful, for example, to identify the new ways in which MNS allows composers to organise and manipulate musical materials and to question how these might alter the compositional-cognitive demands that are placed on composers than to assume either that the compositional-cognitive demands of MNS are no different from composing with pen and manuscript or that their very nature leads to poor and ill-considered composing.

The immediate aim of this study is thus to establish a wider and better informed context for discussion about and analysis of the phenomenon in the hope that composers will be compelled to think more critically about the role of their tools in their working lives. It is thought that this is the first study of the effects of MNS. As such, the scope of the research undertaken is broad and hopes to introduce key concepts that will later be used for more focussed investigations. Indeed, Michael Heim concludes that broad, introductory studies such as this are valuable because they define the basic terms by which phenomena may be understood and because they "originate the questions against which [phenomena] can appear more sharply."² It is my intention to conceive such questions in relation to MNS use.

² Heim, Michael, *Electric Language: A Philosophical Study of Word Processing*, 1987, p.14

1.2.1 Timeliness of study

This study is timely. While the majority of currently active composers began their careers using pen and manuscript, most have now engaged with MNS to some extent. There is already an emerging tendency for young composers to *begin* their careers working solely with MNS, in all likelihood meaning they may never know the nature of the pen and manuscript paradigm.³ At this cross-over stage, when composers draw on a wide physical range of compositional methods, and when most still remember what it was like to work with pen and manuscript, it is possible to examine the effects of change. Said word processor theorist Michael Heim, writing in 1987:

It would be easier to judge or evaluate the phenomenon of word processing after some historical distance from it has been established, once detached, historical accounts of the computer revolution became available. Even a five-year distance in time would afford a clearer picture of the computer hardware which is developing so rapidly now and which promises ever greater changes in the technology of written communication. To investigate the transformation of writing now might seem premature or hasty.⁴

2006 would seem an excellent, if possibly even slightly late, stage at which to embark on this research. The sense of what composing was like in the pre-computer age has not yet been lost, while the thrill of the revolutionary feeling of first using MNS remains fresh in the minds of most composers.

³ Similarly, it has now been many years since fledgling electroacoustic composers have had to grapple with tape splicing techniques.

⁴ Heim, p.6

1.3 Research in the creative arts: linking practice-based and academic approaches

The very notion of PhD research based on creative practice is problematic. While many artists might believe that a collection of finely crafted works can constitute a doctorate, the author agrees that “A Ph.D. is not an opportunity for an artist to pass the beads of their success through the rosary of academia.”⁵ Much is to be learned by artists themselves and by a wider audience when the regular course of creation is supplemented with critical appraisal of the methods used. Art is not diminished when allied with research, nor should it be considered that the validity of research is sullied by study of the practices of the self.

Volumes One and Two of this thesis (respectively, the practice-based and academic approaches) are linked by Chapter Six, in which the creation of a single Volume One work is studied as an exemplar of the author/composer’s approach to MNS. It is conceded that the practices revealed by looking at this one work cannot be applied to those undertaken in other works, or in works by other composers. However, the broad range of MNS-related topics unearthed most especially in chapters three, four and five, greatly contribute to a global understanding of composer actions, motivations and technological influences.

1.4 Approaches to studying MNS

MNS is as highly dynamic, unstable and fluid as the composers who use it. As Lévy states:

There are...no genuine relationships between ‘a’ technology (part of the cause) and ‘a’ culture (which would undergo its effects), but among a

⁵ James, D. Davis, *A Working Model For Postgraduate Practice Based Research Across The Creative Arts*, http://www.idemployee.id.tue.nl/g.w.m.rauterberg/conferences/CD_doNotOpen/DED/d_final_paper/d_02.pdf, p.3, viewed 19/10/06

multitude of human agents who variously invent, produce, use, and interpret *technologies*.⁶

Lévy speaks to the uniqueness of each composer's adoption of and reaction to using MNS and the multitude of factors impinging on how composer use of MNS might be studied. Approaches to studying MNS are complicated by the exact nature of the software (make, version number, etc), the composer's working environment (a secluded studio, a bustling flat, a family home, etc), computer hardware (the computer's ability to run MNS well, the size of the display used, ergonomic considerations, etc), the composer's place in his or her society (socio-economics, musical background, recent and long-inured experiences of music, etc) and a number of other elements. Change to any of these factors necessitates modification of understanding of the impact of technology:

Whenever computer memory and bandwidth increase, whenever we invent new interfaces to the human body and its cognitive system (such as virtual reality), whenever we translate the content of old media into their cyberspace equivalents (telephone, television, newspapers, books), whenever digital technology enables formerly separate physical, biological, psychic, economic, and industrial processes to communicate with one another, their social and cultural implications must be reevaluated.⁷

Technological, cultural and societal change will necessitate continual updating of the questions posed and the answers produced in this study. Such an approach is suggestive of Foucault's historical-genetic method, which requires that technologies such as MNS must be studied

in process, both in process of use of development, and in transition. It would entail examining not only the transformative power of tools on the consciousness, but also how the tools themselves get made, and how

⁶ Lévy, Pierre, *Cyberculture* (Translated by Robert Bononno), 2001, p.5

⁷ *ibid*, pp.6-7

they get transformed. It would entail reconfiguring what at first may seem brand new technologies as extensions and modifications – albeit sometimes radical ones – of previous technologies, and it would entail studying the phenomenon of technology as a history of that phenomenon.⁸

While an extended historical-genetic study of MNS is beyond the scope of this present thesis, many of the key issues that have emerged from the rise of MNS, particularly with respect to its extension and transformation of the existing paradigm of Western notation, will be identified.

A dedicated literature review is considered unnecessary, given the dearth of specific studies addressing MNS. Instead, literature dealing primarily with the effects of the word processor on writing, as well as texts taking a broader approach to technology, form the backbone of enquiry in the central chapters of the thesis. Chapter Three contains a summary of the manner in which these chief sources were used. As with dedicated literature reviews, assessment of the validity of applying the notions of non-MNS-specific literature to MNS studies is integrated into the general discussion.

While music of the electroacoustic sphere is occasionally referenced for contrast and/or comparison, this thesis is concerned only with music notation software insofar as this is a technology used to generate Western notation. The thesis is not concerned with the software and computer platforms used in the creation of music in which a notated score is not a central aim. And, while the musical-social issues of reproduction, distribution and consumption are touched upon at various points, the aesthetic and creative implications of MNS are the primary focus of this body of work.

⁸ Haas, Christina, *Writing Technology: Studies on the Materiality of Literacy*, 1996, p.18

1.5 Organisation of this thesis

This thesis approaches the MNS phenomenon from three linked directions. Firstly, a questionnaire investigates the modes of MNS use and attitudes towards the software amongst a large group of composers. Secondly, literature-based investigation uncovers the histories of literacy technologies, the physical and cognitive nature of MNS and their wider implications. Thirdly, the author studies his own compositional practices with MNS, putting these into the context of earlier discoveries.

Chapter One briefly introduces the topic, explaining what MNS is, why it is thought to be worthy of research and outlining the methods and processes by which it is examined in this volume.

Chapter Two presents the findings of a mail-out questionnaire to New Zealand composers, which questions uses of and attitudes toward MNS. Its aim was to take a snapshot of MNS use in a defined population of composers, with special attention to rates of adoption, the extent of use of MNS playback and composer understanding of the nature of the composer-machine relationship.

In Chapter Three, areas of interest are analysed in relation to literature concerned with the effects of the word processor on writing and the broader implications of technology adoption. The first matter dealt with is resistance to and acceptance of new technologies and this is cast against an historical backdrop: the arrival of MNS is contextualised alongside the ancient transition from oral to literate culture and the more recent tendency towards “secondary orality.” Cultural, compositional-historical and composer misuse factors are identified and weighed in terms of their effects on attitudes towards MNS-use.

Chapter Four describes the physical nature of MNS, looks at the dissonance between it and the Romantic ideal of composers and composition, and identifies the surface differences between it and the pen and manuscript paradigm. It discusses the ways in which MNS makes new cognitive demands on the

composerly mind and examines the altered employment of the composer's short-term memory, leading to the condition whereby MNS might be thought of as a quasi-collaborative partner in the creative process. The negative assumption that MNS is more technological and artificial than methodologies of the past is challenged, and the loss of "signature of myself" and of tactility is analysed in relation to Poster's theory of "normalisation." An examination of the extent to which the MNS work environment can be thought of as real, virtual reality, simulation or prosthesis, closes off the chapter.

Chapter Five elaborates on some of the issues identified in Chapter Four, applying them more directly to the MNS phenomenon, in order that approaches to explaining several key questions surrounding MNS use and compositional outcomes might be forged. There is an examination of the virtuality of MNS that builds on the foundation laid in Chapter Four, with special emphasis on Baudrillard's "orders of simulacra" as a possible explanation for misuse of the software. This is then widened into a look at the effects of *screen consciousness*, a condition fostered by many of the computing devices used in the modern world. The chapter then lays a foundation for enquiry, in future studies that may build upon this one, into the notion that MNS, in imposing scientific time on human and musical time, alters composers' temporal perception. The ways in which MNS both reinforces and dematerialises the score and how these things cause changes in musical values are revealed. Related to this, there is a discussion about MNS's agency as a proponent of both compositional homogeneity and diversity.

In Chapter Six, the phenomenon is personalised, with digital video footage of the author/composer's own music making serving to illustrate the nature of his own compositional practices, with reflection on the concepts unearthed in the questionnaire findings and in the literature-based research of Chapters Three, Four and Five. It begins with a description of the compositional project used for evaluation and the methods used to capture video footage of its unfolding. A tabulation of the results of this footage is presented, followed by an extensive

discussion about the findings. In this, the methodological issues of reflexivity, generalisability of findings and the advantages and limitations of the method of research undertaken is covered. The nature of the author's compositional working practices with MNS and the issue of working at a detailed level compared with working on the larger musical architecture vis-à-vis the maintenance of structural control are discussed. The effects of repeated listening are, with specific reference to Baudrillard and Smalley, investigated, as are the ways in which MNS influences the process of compositional planning. The shift from comprehension of the work as a computer simulation to its life on the concert stage is explained and the chapter concludes with suggestions for further research and a brief summary of the role of MNS in the creation of the remaining works in Volume One.

The thesis is concluded in Chapter Seven, with a summary of research findings and a description of the ways in which the study contributes to the sum of knowledge in this area.

The five appendices consist of Chapter Two's questionnaire (and associated information for research participants), the complete and condensed qualitative findings of the questionnaire, a data DVD containing the digital video footage analysed in Chapter Six, the results of this footage and the transcript of an interview conducted by the author with Michael Avery of Sibelius Software.

Chapter Two

Music Notation Software and Composition Practices: a questionnaire

2.1 Aim

The aim of this study is to form a picture of New Zealand composers' use of and attitudes towards music notation software (MNS) and to discover the extent and nature of MNS's influence on their work. These aims will be tested with particular attention to gender, age, IT literacy and compositional experience.

2.2 Methodology

2.2.1 The population and sample

Participants were selected from a database made available for this study by the Centre for New Zealand Music, which maintains the most comprehensive listing of New Zealand composers available. This "purposive sampling"¹ excluded composers, understood by a representative of the Centre, not to be actively composing.

Subjective qualities of the composers in the group (ability, experience, achievement etc) were not factored into the selection of participants, as the opinions of all active composers were considered important. As such,

¹ "Purposive sampling" seeks out research participants with specific traits. (In this case, the participants are all composers). The specific purposive sampling employed here is a hybrid of "expert" sampling (using participants with expertise in a particular area, ie, composition) and "heterogeneity" sampling (sampling all opinions or views on a given topic). From Trochim, William M.K., *Nonprobability Sampling*, 2006 at <http://www.socialresearchmethods.net/kb/samprnon.htm>, viewed 25/06/06

composers in the sample ranged from third year tertiary composition students to internationally recognised composers.

Survey participation was restricted to New Zealand citizens, including composers based overseas, as a means of restricting the sum of data to an amount manageable given the scope of the study.

2.2.2 Distribution of questionnaire

158 questionnaires were sent, 22 to composers living abroad. Most questionnaires were mailed, along with paid return envelopes, to composers on 16 June 2004. Some questionnaires were hand-delivered while a small number of potential respondents were informed of the questionnaire via e-mail and invited to complete it online. (All potential respondents were given the option of completing the questionnaire on-line at the author's personal website.)

Recipients were given until 17 September 2004 to return the questionnaire. Friendly reminders were posted and e-mailed on 26 October 2004. The Human Ethics Committee granted a two month extension and remaining non-returnees were informed of this extension. With ethical approval expired, no further questionnaires were accepted after 25 December 2004.

2.2.3 Ethics and confidentiality

The Human Ethics Committee at Victoria University of Wellington granted ethical approval for the study. Potential respondents were assured of the anonymity of their responses (with the exception that the contents of questionnaires might be shared with the researcher's two supervisors) and could withdraw from the study at any time. Questionnaires would be destroyed two years after the conclusion of the study. Respondents were required to sign a consent form, signalling their

understanding of the terms of the study and giving them the option to receive a summary of the study's results at its conclusion. The information letter and consent form appear in Appendix A.

2.2.4 The questionnaire

The questionnaire appears in Appendix A. It is divided into three sections. Section A collects demographic data and background data relating to MNS use. Section B asks deeper questions about MNS use, with particular focus on the use of playback, compositional planning and collaboration. Section C seeks information about interaction with performers, global effects of MNS use and feelings on use of MNS by fledgling composers.

2.3 Data analysis

A table was constructed in Microsoft Excel, into which quantitative responses were entered. Simple univariate statistical operations (sum, mean, etc) were performed to generate statistics of interest. More complex bi and multivariate operations revealed links of interest between different datasets.

The responses to each open-ended question were logged and bundled into groups of similar answers to reveal the breadth of responses to each issue. (These appear in Appendix B).

2.4 Results

The following tables and graphs display quantitative results. Qualitative results are given in full in Appendix B and, with quantitative results, are the subject of discussion later in this chapter.

2.4.1 Participants

Table One shows survey return numbers and demographic characteristics of respondents.

TABLE ONE: *Participant demographics*

<u>Return rate</u>	67.1%
<u>Return number</u>	106 (of 158)
<u>Age</u>	
Mean for all returned	41.8*
Males	45.6
Females	35.7
Mean for MNS users	40.4†
Males	45.1
Females	32.3
Mean for non-MNS users	47.6†
Males	47.9
Females	47.2
Age range	19 – 76
Male	19 – 76
Female	20 – 63
<u>Gender</u>	
Total questionnaires sent	62% male (98), 38% female (60)
Total returned	60% male (64), 40% female (42)
MNS users:	62% male (53), 38% female (32)
Non-MNS users:	52% male (11), 48% female (10)
Non-respondents:	65% male (34), 35% female (18)
<u>Composing experience (in years)</u>	
Mean compositional experience of sample	23.7
Male	27.5
Female	17.9
Mean for MNS users	22.1
Male	26.7
Female	14.4

Mean for non-MNS users	30.1
Male	31.4
Female	28.8

Non-MNS users

Total	21
% of sample	18%
Gender	11 males, 10 females

* two missing values

† one missing value

Table Two illustrates the self-rated IT literacy of respondents. Respondents were asked to indicate their IT literacy on a 5 stage scale:

- 1 I have minimal or no experience with computers
- 2 I have some experience but need guidance to use most applications
- 3 I am able to learn new applications with persistence but am held back by inexperience or undeveloped skills
- 4 I have a good practical knowledge and get by with a minimum of assistance
- 5 I am able to quickly and independently master most windows-based, “what-you-see-is-what-you-get” applications

TABLE TWO: *IT literacy*

Sample mean	4.04 [†]
Male	4.10
Female	3.95
Mean for MNS users	4.34
Male	4.37
Female	4.29
Mean for non-MNS users	2.86 [†]
Male	2.82
Female	2.90

Where respondents circled more than one response, the response was averaged out. For example, where a respondent circled 3 *and* 4, their score was interpreted as 3.5

† one missing value

2.4.2 MNS usage

Table Three shows MNS adoption rates.

TABLE THREE: *MNS usage*

MNS users

Total	82.1%*
Male	84.4%
Female	78.6%

Adoption of MNS

Mean year of adoption	1996†
Male	1995
Female	1997

Software used

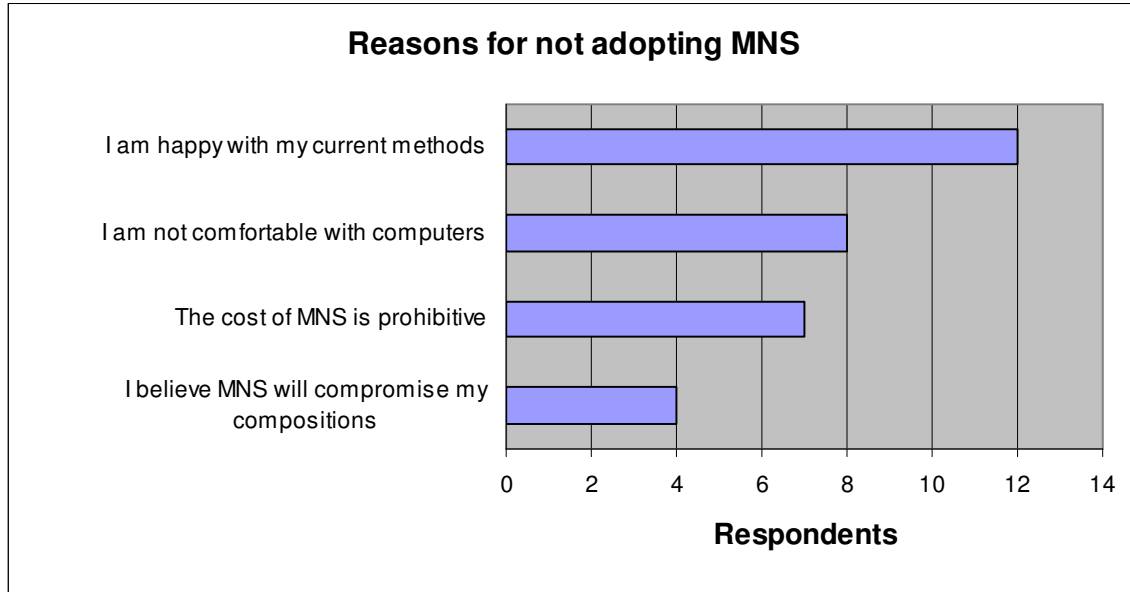
Sibelius	45.9%
Finale	14.1%
Encore	7.1%
A mix of these	31.8%
Other	1.2%

* Four respondents considered that, in the main, they were not MNS users but, for the purposes of this piece of data, their limited exposure to or unconventional usage of MNS will class them as MNS users

† four missing values

Figure One displays the reasons why some respondents chose not to use MNS.

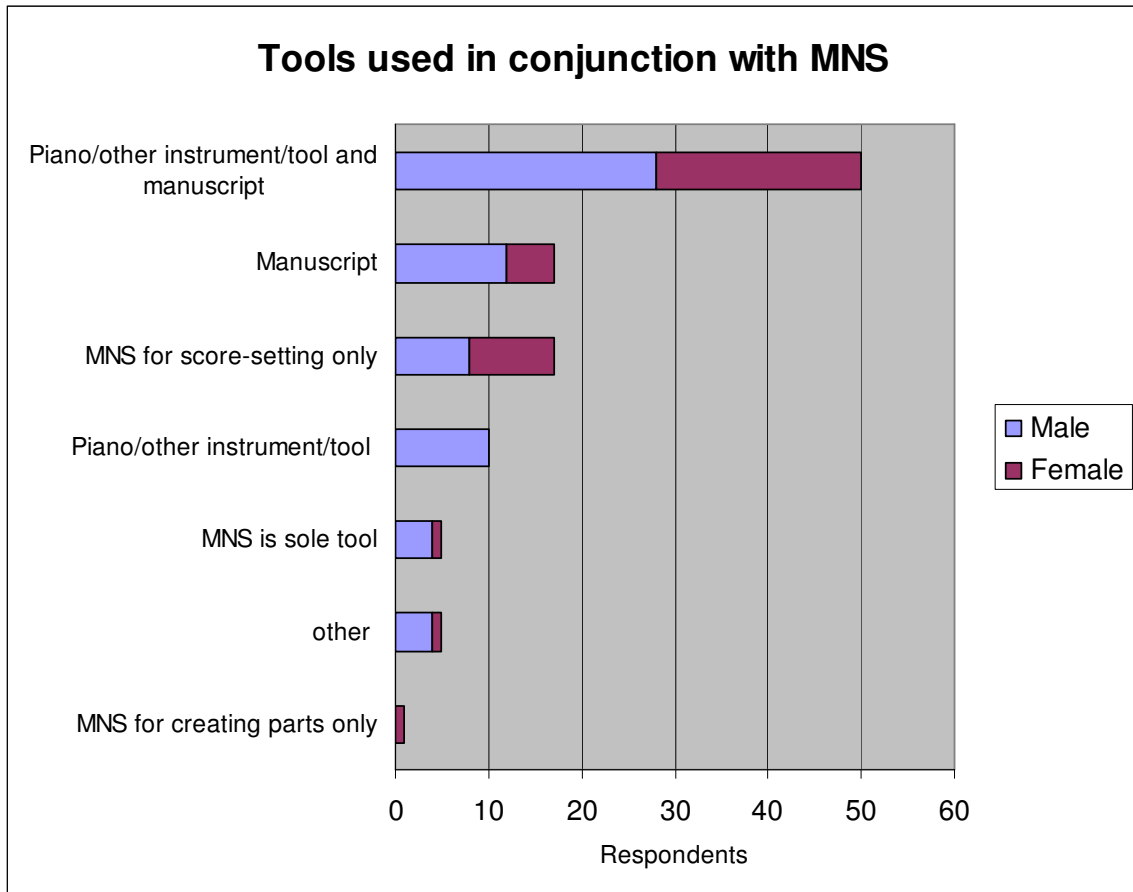
FIGURE ONE



(A total of 21 non-MNS users. Three missing values).

Figure Two displays the modes of usage of MNS in combination with other compositional tools. In some cases, MNS is used only for score-setting, for creating parts, or is not used in combination with any other tools. (Respondents could tick more than one response and sixteen did so). The five responses given under “other” were that tools used varied from composition to composition, that music was constructed using a pure sequencer and then notated using MNS and that sequencer use took place concurrently with MNS use.

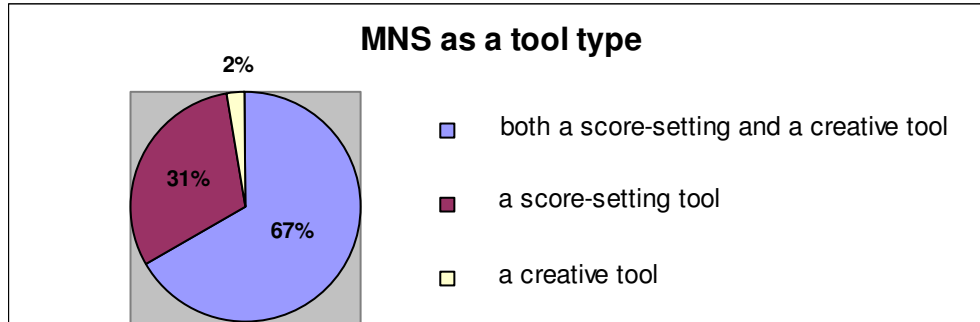
FIGURE TWO



(Two missing values).

Figure Three illustrates what kind of tool respondents regarded MNS as.

FIGURE THREE

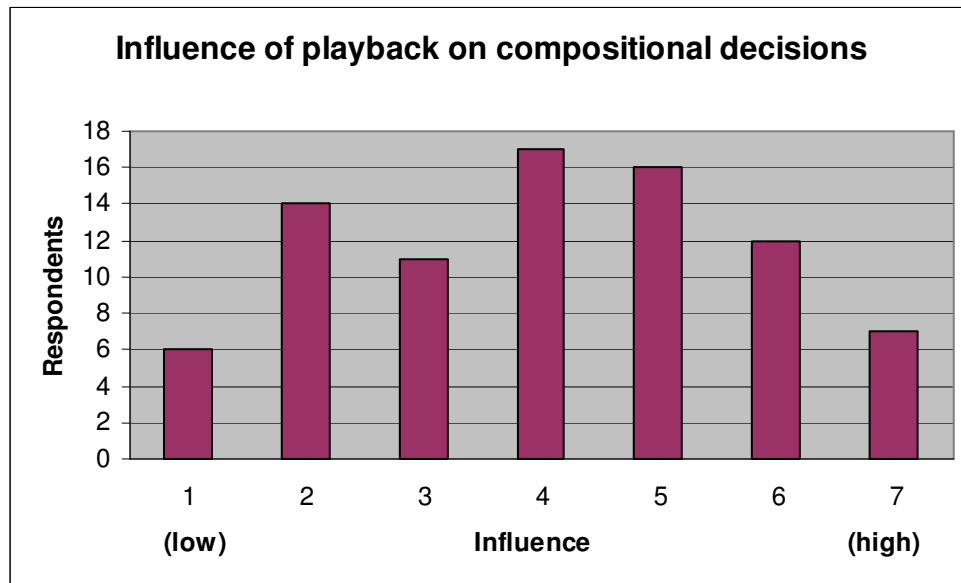


(Two missing values).

2.4.3 Playback

Ninety-three percent of MNS users indicated that they listened to MNS playback of their compositions to some extent.

On a scale ranging from 1 (“no influence”) to 7 (“a great influence”), the mean composer thought that listening to MNS playback had an influence of 4.04 on subsequent compositional decisions made (males 3.91: females: 4.24). Figure Four shows the distribution of responses.

FIGURE FOUR

(Two missing values).

Fifty-four percent of respondents (60% males) had, in the past, made tapes or CDs of computer playback for the benefit of their performers. (Two missing values).

Of respondents who had prepared tapes or CDs, 73.33% found the practice useful, 11.11% did not find it useful and 15.56% had mixed feelings.

2.4.4 Plug-ins

Table Four shows the extent to which respondents used their MNS packages' plug-ins. On a scale from 1 ("never") to 7 ("frequently"), respondents were asked to indicate how often they used the plug-ins bundled with the industry-leading MNS packages.

TABLE FOUR: *Use of plug-ins*

Sibelius users (mean results)

Plug-ins for note generation

Invert	1.64
Retrograde	1.58
Pitch mapping	1.18
Add drum pattern	1.11

Plug-ins for playback tweaking

Cresc./dim. playback	3.37
Quarter-tone playback	2.02
Change glissando properties	1.79
Change trill speed	1.53

Finale users (mean results)

Plug-ins for note generation

TGTools (for playback tweaking also)	2.54
Canonic utilities	1.79
Piano reduction	1.57
Drum groove	1.07
Band-in-a-Box auto harmonising (never)	1.00
MiBAC jazz rhythm section generator (never)	1.00

There was too much missing data to produce meaningful results from responses pertaining to other software packages.

2.5 Discussion

2.5.1 Methodological issues

2.5.1.1 Reflexivity 1: subjectivity vs objectivity and question-motivation of the researcher

Reflexivity is a concept that addresses the impact of the author's preformed attitudes on the formulation of research questions and on data analysis. It acknowledges that complete objectivity is impossible, as researchers almost always tackle subjects about which they already possess considerable knowledge and about which they have, however unconsciously or unintentionally, already formed opinions.

The author's attitudes towards and use of MNS will be explored in detail in Chapter Six. In the meantime, it will suffice to describe his use of MNS and his broader approach to composition in these brief terms: The author does not pre-plan works, preferring to work "at the coalface."² He composes entirely using MNS.

He listens to MNS playback extensively and this drives further creation of material. The author regards himself as highly "what-you-see-is-what-you-get" IT-literate and is interested in digital technologies outside of music. He runs quite powerful hardware and fairly up-to-date MNS software, including a "software" sound canvas. He first used MNS in 1997 and views his relationship with the software as quasi-collaborative. The quality of MNS playback is a concern for the author and as such he works on enhancing the realism of playback and is inclined towards investing in better hardware and software, as finances permit.

² The term "coalface" refers throughout this thesis to that area of the in-progress score currently being worked on by the composer. It is that portion of music that "runs-out," of which there may be more than one instance.

The author freely acknowledges that he finds it unlikely that he would have flourished as a composer without access to MNS. While largely positive in his views on MNS use, he does see real problems with its use, especially by young and inexperienced composers.

Reflexivity requires that the author be conscious of his personal outlook and on-guard against undue dismissiveness or prejudice towards approaches and opinions to the contrary. It also holds that the formulation of questions in the questionnaire was influenced by the author's feelings on MNS. This is most evident in the weighting of questions about playback: he regards his own use of playback as bordering on obsessive and, in wanting to see if other composers were similarly inclined, he included questions to gauge this. A composer/researcher in a similar position who was far less reliant on MNS playback would likely not have asked so many questions about this aspect.

The tabulation of quantitative responses, below, lends a certain amount of weight to analysis by gender. The author declares an interest in the differences between works composed by males and females. He has unscientifically observed that, *very broadly speaking and with many exceptions*, women composers are motivated by the concrete and programmatic, whilst men seem to operate in the abstract realm. The current findings may or may not cast light on this perceived phenomenon and would require analysis by specialists in the areas of psychology and sociology. Nonetheless, the author's interest in this area explains the proliferation of breakings-down of data by gender.

2.5.1.2 Reflexivity 2: subjectivity vs objectivity for questionnaire respondents

While it would have been undesirable for respondents to reflect too deeply on the impact of their held views on the answers they recorded, analysis of their responses must factor in such views (insofar as they can be identified). That

many respondents indeed did weigh up their attitudes against a more detached objectivity was apparent in responses that presented opposing points of view as equally plausible.

Many pre-existing notions surrounding MNS use which, prior to the commencement of research, were understood only anecdotally to exist, were confirmed by questionnaire findings. It is impossible to know if such opinions were adopted from widely-held beliefs in the New Zealand composition community or if they were independently formulated. Regardless, such notions will now be identified.

The most high-profile of these was the belief that listening to MNS playback would result in the composition of unplayable works: given that the computer can play back “anything,” the unwary composer might be seduced into writing completely unidiomatic music, not realising the practical difficulties for human performers. It is possible that this led to under-reporting of MNS playback usage by composers wanting to distance themselves from this notion.

Another belief held by some is that “real” composers work solely with pen and manuscript. This Romantic notion might have led to an underplaying of the involvement of MNS in composers’ working lives. It is hoped that assurances of the protection of anonymity discouraged misreporting in this area.

2.5.1.3 Data changeability

As illustrated in the answers to Question A10, the working methods of composers with regard to physical tools used are highly subject to change: there has been a massive shift to MNS use in the last decade but, for most composers, MNS use is still combined with a concurrent use of other older tools. With many composers frequently changing the contents of their “toolboxes,” a snapshot of practices captured today may be at odds with one captured tomorrow. Improvements to software (recently most especially in the area of playback

realism), also mean the currency of the data gathered will diminish quickly. Availability, affordability, computer processing strength and many other factors doubtless affect access to and use of the technology and impact on the data gathered.

For example, composers currently working with outdated versions of MNS packages with crude playback, may find that when they upgrade their software they become more receptive to the idea of composing by trialling materials by listening to them. Such a shift would likely alter such composers' overall acceptance of MNS as a creative tool (it no longer feeling like just a score-setting tool) and change their responses to questions about the usefulness of playback, the use of MNS by fledgling composers and the nature of their working relationship with MNS. Such hypothetical composers' questionnaire responses would be different now from those they would give some time in the future.

2.5.1.4 Practical concerns

The facility whereby composers could respond to questionnaires on-line caused some problems. Differing settings in e-mail handling software resulted in some questionnaires being returned blank (fresh answers using correct settings were sought and gratefully received). It became necessary to construct long-winded explanations about how respondents should go about e-mailing their responses to the author and it is possible that consequent frustration caused hasty responses or questionnaires that were never attempted. While still considered a methodology likely to encourage returns (and indeed one in keeping with the technology-focussed nature of this study), the online questionnaires required fine-tuning and testing beyond the expertise of the researcher.

2.5.1.5 Generalisability

The generalisability of this study – the degree to which it could accurately describe the MNS use of composers in other countries or groups of countries – would depend on issues such as computer and software availability, gender split, age spread and so on in the composition communities in question, as well as unforeseen impacting social and cultural differences.

2.5.2 Non-respondents

Data may be skewed if a significant number of non-respondents have similar demographic or attitudinal characteristics. It would be of concern if high proportions of the composers in this group scored similarly in one or more areas such as age, compositional experience, socio-economic background and IT literacy.

52 composers did not return questionnaires. Their gender divide was 65.38% male, 34.62% female. No other characteristics of this group of composers is known.

It is fortunate however that the purposive sampling employed means that the author has a passing knowledge of most questionnaire non-respondents. In his opinion, no concern-causing common characteristics were evident upon examination of the list of non-respondents, who covered a wide range of ages, compositional experience and achievement in composition. This review suggests that non-respondents would be likely to return scores similar to respondents on matters such as IT literacy, MNS adoption and the influence of playback.

It is thus concluded that, as far as can be ascertained, there were no obvious demographic similarities in the non-respondents in this study that might, through their absence, have contributed to a skewing of results. The sample is thus deemed to be a fair representation of the population.

The following is an analysis of the preceding quantitative data and summarises, highlights and draws out the qualitative data listed in Appendix B. The weight of discussion falls on those answers given by multiple respondents, while more unique and revealing responses are identified for closer examination. The chronological order of the questionnaire is followed throughout. Where applicable, the reader is referred to specific locations in Chapters Three to Six, in which issues are discussed in greater detail.

2.5.3 Return rate

106 of 158 questionnaires were returned, 22 from composers living abroad - a response rate of 67.09%. While a higher return would have been desirable, it has been stated that “very well administered surveys may get response rates as high as 60-75%.”³

2.5.4 Gender, age and composing experience of MNS and non-MNS users (Questions A3 and A4)

Composition is a field in which male practitioners have historically, at least in terms of public visibility, overwhelmingly outnumbered women. That the New Zealand composition community has a 62/38 male/female gender split might be seen as something of a statement for redress of this traditional gender inequality. That the average female respondent was ten years younger than the average male indicates that such redress has been a recent phenomenon and is likely trending towards balance.⁴ The New Zealand situation is punctuated by a quick

³ Davidson, Carl and Tolich, Martin, *Social Science Research in New Zealand: Many Paths to Understanding* (Second Edition), 2003, p.198

⁴ An interesting and unexplainable statistic emerged from analysis of gender and age: female composers were close to the same age as the New Zealand female average, but male composers were over a decade

comparison with Australia, where the gender split is estimated to be, at worst, around 77/23 in favour of males.⁵ Composer gender divides in further composition communities would need to be calculated to determine the typicality of the New Zealand composer population, with possible implications for the generalisability of this study (such research is beyond the scope of the present study).

Non-MNS users, while a small group (just 21 respondents), were at odds with the group profile of MNS users: their gender split was almost 50/50 (closer to the New Zealand population gender difference) and they were, on average, seven years older than their computer-using counterparts. Female non-MNS users were, on average, 15 years older than female MNS users. These last two findings reflected wider research on rates of computer use by age and gender.⁶

2.5.5 Composing experience (Question A4)

Males reported, on average, nearly ten years more composing experience than females, a reflection of the of-late balancing-up of the gender divide of the New Zealand composing community. Just as non-MNS users were older than MNS

older than their New Zealand average. (The average New Zealander is 34.80 years of age (males: 34.00, females: 35.60 - *Table 3 – Age group by sex, for the census usually resident population count, 1991, 1996 and 2001* from 2001 Census: National Summary (2001) - reference report, Statistics New Zealand website: <http://www.stats.govt.nz/census/2001-census-statistics/2001-national-summary/default>. (Data taken from 2001 Census)).

⁵ Taken from a listing of composers represented by the Australian Music Centre at <http://www.amcoz.com.au/composers/>, viewed 13/06/06. Problems with using this list to form a trans-Tasman comparison with the present population include the presence on it of New Zealand composers (and possibly composers of yet other nationalities), deceased composers and non-active composers. However, with such anomalies removed, it remains likely that the gender split of Australian composers would favour males significantly more than in New Zealand.

⁶ For example, Table 13 of *Use of ICT and the Internet by households and individuals 2005*, shows that in twenty-one European nations, males almost invariably use the Internet more than females, with usage rates declining sharply in older age groups. At <http://www.hagstofa.is/lisalib/getfile.aspx?ItemID=1325>, viewed 07/11/06

users, they claimed eight years more composing experience, female non-MNS users registering over 14 years more experience than computer using females. As with age, greater composing experience decreased the likelihood of MNS adoption.

2.5.6 Self-rated IT literacy (Question A5)

The average composer placed him or herself at around 4 on the scale from 1 to 5. This high rating is perhaps a reflection of the bottom-heavy weighting of ages in the sample (younger people, generally, being heavier IT users – see 2.5.4 for further discussion) and of musicians being – anecdotally – adept at the use of new electronic technologies, from CD players to synthesisers.

Non-MNS users reported a self-rating of 2.9 – much lower than the 4.3 of MNS users. Though non-MNS users rarely cited low IT literacy as their reason for not having adopted MNS, their low score in this area cannot be overlooked as a factor in this group's avoidance of MNS.

2.5.7 Do you use music notation software? (Question A6 – in 3 parts)

Eighty-two percent of composers signaled that they used MNS in some way in their composing lives (males: 84.4%, females: 78.6%). Given that MNS provides composers with markedly new methods for realising music and that the merits of these methods are untested to any depth, this high adoption rate is quite extraordinary. Furthermore, this uptake has occurred remarkably rapidly: Sibelius Software, the MNS package used by 45.88% of surveyed MNS users, first became available in New Zealand in 1993. At this time it was only available for use on the somewhat obscure Acorn computer, limiting access for many composers. It was not until 1998, when Sibelius was released for the personal

computer (and a year later for Apple computers), that mainstream adoption of MNS became possible in New Zealand.

MNS might be classified, at least in the current high-adoption context of findings pertaining to the New Zealand population, as a “disruptive technology,”⁷ an innovation that achieves such prominence in a given field or for a given task that it essentially displaces existing technologies. Just as the telephone disrupted the telegraph, the semiconductor disrupted vacuum tubes and steamships disrupted sailing ships,⁸ MNS disrupts the pen and manuscript paradigm. While all of these *disrupted* technologies lingered for some time after the introduction of their *disruptive* usurpers, any continuing use of them is purely in the capacity of personal interest or leisure. The true test of calling MNS disruptive will lie in whether its eighty-two percent adoption rate continues to rise in coming years, something that would seem likely.

At this point it is worth noting, as a reference for further discussion (see 2.5.7.1), the generally understood characteristics of technology adoption. Everett M. Rogers’ *Diffusion of Innovations* (1971) is considered the key text in this area. It contends that adopters of new technologies can be separated into five groups, ranging from the very first to adopt new technologies to the very last, respectively: innovators, early adopters, the early majority, the late majority and laggards. Over this list, a standard bell curve can be drawn, demonstrating that sixty-eight percent of adopters fall into the two majority groupings, with innovators, early adopters and laggards completing the remaining thirty-two percent at the graph’s edges.⁹

⁷ A term first coined by Clayton Christensen, in *The Innovator’s Dilemma* (1997)

⁸ Examples taken from Scooco, Daniel, *Disruptive Innovation*, 2006, at <http://innovationzen.com/blog/2006/10/04/disruptive-innovation/>, viewed 07/11/06

⁹ Rogers, Everett M., *Diffusion of Innovations* (Third Ed.), 1983, pp.247-251. Rogers’ thesis is held in high regard to this day, although some aspects of it have clearly dated. For instance, he asserts that early and late majority adopters are not likely to be any younger than laggards, something that this questionnaire and other studies do not support – see footnote 6.

2.5.7.1 Please explain why you haven't adopted the use of music notation software

This question was answered by respondents who indicated that they did not use MNS in any way. As these composers formed a minority of respondents (18%) and uphold a mode of composition that served composers well for close to a millennia, their opinions were of particular interest. In terms of both the strength of their curriculum vitae and a subjective evaluation of their music, this group contained many fine and accomplished composers, some with quite outspoken views on the use of new technologies in composition.

To summarise their characteristics, non-MNS users were older, their gender split was almost 50/50, they were compositionally more experienced and rated themselves generally less adept at using computers than their MNS-using counterparts. On Rogers' bell curve of adopter categorisation (introduced above, 2.5.7), non-MNS users would fill the space that he somewhat unfairly assigns the label "laggards." Rogers describes such people as basing their decisions on what was done in previous generations while interacting mainly with people who share these values. Says Rogers:

When laggards finally adopt an innovation, it may already have been superseded by another more recent idea that is already being used by innovators. Laggards tend to be frankly suspicious of innovations and change agents...The laggard's precarious economic position forces these individuals to be extremely cautious in adopting innovations.¹⁰

While certain elements of Rogers' laggard as an ideal type may be in evidence, a subjective survey of the non-MNS users reveals these assertions to be entirely inapplicable in any kind of blanket manner. The reasons given by the composers themselves for not adopting MNS were headed by the argument that the

¹⁰ *ibid*, p.250

computer degrades the individuality and personality of scores, leaving them, to quote one respondent, “sterile”. This notion was extended by a belief that important musical information is projected through the composer’s hand in a way that would be impossible to project using MNS (see 4.6). Associated with this was a preference for working with manual tools and a love of the tactile nature of these tools. One composer talked about the “ritual” nature of composing with pencil and paper while another enjoyed the “graphic, aesthetic and musical process of writing scores in ink.”

A slightly less frequently raised point was a fear that using MNS might result in a loss of aural imagination. Composers worried about the negative implications of MNS providing the temptation to use cut-and-paste procedures, said that writing with pencil and manuscript allowed for greater freedom than MNS provides and were concerned that computer usage would delay or interrupt their creative flow.

Other reasons given for not having adopted MNS centred around monetary cost, possible health hazards of working with computers (eye strain, back discomfort, etc), the employment of professional engravers offsetting a need for MNS, not having time to learn new methods, the inflexibility of computer use (with only a desktop computer, mobility is difficult), being interested in MNS but not having looked into it yet, believing that hand writing is faster, technophobia, etc. *At this point the reader is referred to Appendix B, for detailed listings of responses and groupings of responses to all questions, by frequency.*

There was little reportage that composers did not use MNS due to having limited IT literacy, which is interesting, as this group reported that they were less IT-literate than MNS users, with mean scores of 2.86 and 4.04 respectively.

2.5.7.2 Please describe your compositional tools with reference to the physical objects used (eg pen, manuscript, the piano, etc)

While many composers provided a simple and brief list of tools used (eg, “Pencil, pen, rubber, manuscript, piano (sometimes)”), others demonstrated the importance of their tools through the specificity of their descriptions, as in these two examples:

Propelling 2B pencil with rubber on end, black fibretip pen and calligraphic felt tip for beams, MS – mainly A3 landscape format 18-stave (Panopus) or portrait format 24 stave for larger orchestral works. Piano.

Manuscript paper, plain paper, pencils (2B), pens of various colours, mechanical eraser, knife (to sharpen pencils), piano, metronome.

A few composers added to their tool-lists “my brain” and “brain plus imagination”, apparently suggesting that MNS use deprives the composer of thought and imagination.

While this group eschewed MNS, two stated that they used synthesisers and software sample libraries and sixteen of the twenty-one reported using the piano or some other instrument while composing. Notwithstanding the argument that the basic tools of music literacy (pen and manuscript) *are* technologies (see 3.3.1), this group utilised non-MNS technologies to a high degree in their compositional work.

2.5.8 Year of adoption of MNS (Question A7)

The mean year of adoption of MNS use was 1995. This is problematic: many young composers have always used MNS in their work and thus adopted it in whichever year they began composing. A more telling statistic might be that, of

composers with 24 or more years of composing experience (24 years is the mean experience rate), the mean year of MNS adoption was 1994 compared with 1997 for those with 23 and less years of composing experience.

The comparatively recent availability and affordability of the leading MNS packages, designed for compatibility with PCs and Apple computers (see 1.1) as discussed above, plays an important role in when composers adopted MNS.

2.5.9 Software package(s) used (Question A8)

That Sibelius was easily the most-used MNS package was unsurprising: it is the MNS package of choice in a large proportion of New Zealand secondary schools and is de rigueur at *all* New Zealand university music departments.¹¹ That packages outside of the Sibelius-Finale-Encore troika were used by only one respondent indicates the strength of favour of these programmes.

Of interest was the finding that nearly thirty-two percent of MNS users had tried a mixture of different packages. While information on the sequence of adoption of different packages was not requested in the questionnaire, it is likely that multiple-package composers tended to move from Finale and Encore to Sibelius, given the latter's popularity and reputation for a balance of user-friendliness and sophistication.

2.5.10 Nature of your compositional use of music notation software (Question A9 – in 2 parts)

¹¹ Personal e-mail from John Orams, New Zealand distributor of Sibelius Software, 10/05/03

Frequency results of this question have been listed previously (see Figure Two) and showed that respondents had a sizeable preference for working with MNS in conjunction with the piano (or other instrument) and writing by hand. This multi-tooled approach, with 51 adherents, played out against just five composers who, at the other end of the MNS adoption spectrum, reported they used MNS as their *sole* compositional tool.

It should be noted that MNS allows composers to continue using musical instruments to compose in the digital domain, by way of – primarily – the MIDI keyboard. This method is but a modified replication of the existing “interface” of composer, piano and manuscript (with the obvious timbral differences of electric and acoustic instruments). While this method retains much of the physical “feel” of the existing way of composing, its converse, “writing” directly into MNS, is fundamentally different from working with pen and manuscript.

Many composers will, with time and in reaction to the conditions of different projects, alter their mix of tool use. Questions might be asked about the extent to which MNS is intended by its makers to “cover all bases” because, despite high usage rates, other older tools remain in heavy use.

One might expect that, with the march of technology, were this question to be asked of composers in a number of years’ time, more composers might report sole MNS usage as their *modus operandi*.

2.5.10.1 Please describe any variation on the above (the above being six tick-box options showing tools used for composing)

Only nine respondents answered this question, with two points of interest emerging. The first was that with each new work, the tools used and the stages at which they were introduced into the composition process, varied. For example, there was a tendency to introduce MNS earlier when working with

larger ensembles, because this enabled tighter control of more unwieldy forces. The second point was that dedicated sequencing software was an important tool for some composers.

2.5.11 In reference to the previous question, how, if at all, has your use of music notation software changed in the time you have used it? – please describe in detail (Question A10)

This question was interpreted both in its native intended format and as “how has your *composition* changed in the time you have used MNS.” Though this confusion was undesired, both interpretations yielded interesting and useful answers.

The interest in this question lay with determining how composers adapted to the introduction of MNS into their work. How were their approaches to composition altered by the new technology and what allowances did they have to make for shortcomings in the software?

Responses to this question may have been mediated by what Mark Poster, in writing about the word processor, dubs the “normalization effect”: when first confronted with the computer, the user is struck by the shortening of the distance from thought to realisation. However, says Poster, “new forms of subjectivity induced by computer writing quickly become commonplace, taken for granted and denegated.”¹² The composer becomes accustomed to composing with MNS and no longer perceives the differences between this method and older ones; the computer appears now to be fulfilling the exact same functions as pen and manuscript and might be viewed as the same means to an existing end (see 3.5.1). It would follow from this effect that many composers will have forgotten

¹² Poster, Mark, *The Mode of Information: Poststructuralism and Social Context*, 1990, p.113

the many distillations of technologies used over time because their current use of technology seems so “normal.”

The most reported response pertained to composers becoming more expert at using MNS, not only in terms of knowing more about what the software did and how it performed operations, but also in learning to work around deficits and defaults in the software. Version-by-version improvements to the various MNS packages and improvements to personal computers in general also contributed to the speed and satisfaction of using MNS.

A number of composers reported that their use of MNS had not changed at all in the time they had used it (see Poster, above), while some said that their use changed according to the nature of the project they were working on.

One composer wrote of how his methods had changed since adopting MNS: “I now write in medium-sized chunks and then listen, whereas before I would write a few bars at a time then check with the piano or write huge sections relying on my imagination.” This is a specific example of MNS actively altering a composer’s approach to his work. Comparison of this composer’s pre-MNS scores with his current output might reveal whether the music reflected this change in working methods: did the relief from the mental effort of imagining a sonic image degrade his compositional powers, or did he re-focus his mental efforts into other more important creative areas? (See 4.3.2),

The appended list of actual changes made to working methods with regard to tools used is testament to the changeability of tool use by composers in the MNS age. Composers moved in both directions: from pen and manuscript to MNS, from MNS to pen and manuscript and some composers moved backwards and forwards according to the demands of new projects and their level of comfort with different technologies. While the largest grouping of composers reported moving from piano and manuscript use to piano and MNS (or just MNS) use, the large variety of individual responses means it is not possible to generalise mobility as gravitating towards the newer technology.

2.5.12 Do you regard music notation software as a score setting tool, a creative tool, or both a score setting tool and a creative tool? – please discuss (Question A11)

This question was posed in order to test what composers thought the core function of MNS was: a useful but essentially “dumb” tool, or something to be used *to engender* composition?

Frequency results of this question were listed in Figure Three and showed that 65.8% of respondents regarded MNS as both a score setting and a creative tool while 30.7% thought of it only as a tool for setting scores. Only two respondents regarded MNS solely as a creative tool.

This outcome very clearly demonstrates a split in opinions about the prime use and purpose of MNS (see also analysis of the results of Question B1 at 2.5.13). It shows that while virtually all respondents who used MNS appreciated it for its score-setting powers, a lesser number (around two-thirds of these) considered it beneficial in creative endeavours.

This difference in opinion was most marked in the 20-24 age group, where 21 respondents considered MNS to be both a creative tool *and* a score-setting tool, compared with only two who regarded MNS solely as a score-setting tool. A flow-on effect in which older composers increasingly considered MNS solely as a score-setting tool was not greatly evidenced, though this was possibly due to a comparative scarcity of older composers in the sample.

Respondents who regarded MNS as both a score-setting tool and a creative tool said MNS offered them greater opportunities for compositional exploration and experimentation and that the ability to work dually with Western notation *and* with pure “sound” was creatively advantageous (see 4.4.2). Some composers compared the presence of playback with the working processes of the electroacoustic studio, though in a more limited fashion. Two respondents

offered interesting analogies between MNS-composing and the practices of the visual artist:

Over time I've come to regard using MNS as a process of 'carving' – I make most of the resource decisions at the beginning of the composition process and then 'carve' the work out of the sonic resources I have created. [See also 6.5.2.5]

The computer allows the composer to work directly with their musical material in the same way a visual artist can work with their visual material.

Several respondents in this camp acknowledged MNS's creative potentials but emphasised its primary role as a score-setter.

In discussion to support their positions, composers who regarded MNS solely as a score-setting tool argued primarily that MNS was not a creative tool because it was essentially "dumb" and did little or nothing to aid the creative process (see 4.5). MNS, these composers argued, removed the need for a musical imagination and became a crutch, hindering creative potential. The inadequacy and (timbral) inaccuracy of MNS playback rendered a potentially creativity-aiding feature impotent.

Other views in this camp contended that using dedicated sequencers rather than MNS was more creatively useful, that MNS was only a helpful creative tool when composing small ensemble works and that the "attempted integration in MNS packages of score-setting and creative potentials is flawed: the design of MNS should focus only on graphical concerns."

A few interesting alternative points were raised: that MNS is also an educational tool and is a good aid in learning to read music, that the terms "manipulative tool" or "transformative tool" are perhaps more appropriate than the term "creative tool" and that score-setting and creativity are closely linked.

2.5.13 What led you to adopt the use of music notation software in your work?

(Question B1)

The key interest in the response to this question was whether composers would report that they had adopted MNS for its high quality engraving abilities or because they wanted a tool to help in their creative processes. Composers overwhelmingly reported the former, the most frequent response centering on composers' wishes to engage a tool that would allow them to set scores in a manner akin to the output of music publishers. A number elaborated that performers increasingly expected to receive MNS-set scores and that they believed performances from MNS-set scores would be superior to performances from hand-rendered scores. A large number wrote that the ease, speed and neatness with which they could produce parts was an important motivating factor in adopting MNS (see 4.3.3).

The third most common response centred on MNS's ability to play back audio, although most composers said this facility was to help them with checking that elements (pitch, harmonies, rhythms etc) of their scores were realised as intended. Fewer composers mentioned aspects of playback that might point towards the use of MNS for creative purposes, as in "trial-and-error" composing and using playback for judging the form and structure of works. One composer noted the paradigm-shift represented by MNS with the comment, "Structure strengths and deficiencies tend to make themselves more obvious when the composer is the 'listening audience' as can be the case with 'playback'."

A sizeable number pointed to the enhanced speed, efficiency and practicality of MNS while a number seized on an environmental/situational interpretation of the question, stating that they adopted MNS because it was available for use in their secondary school or tertiary institution or was introduced to them by friends, family or colleagues.

Other responses given by two or more composers were concerned with issues surrounding education, the physical work environment (Occupational Overuse Syndrome, etc), the adaptability and ease of dissemination of digital media, the lessened monetary expense of producing materials, the enjoyment of using or a predisposition towards working with computers, the enhanced control over all aspects of the creative and production process and MNS as a work tool within the music publishing industry (see 4.3.4).

2.5.14 What, in your opinion, are the chief advantages of using music notation software over traditional methods? ...and the chief disadvantages?
(Question B2 – in 2 parts)

There was considerable overlap in the responses to these two questions with Question B1 and also Question A11, as a quick scan of results in Appendix B will make apparent. In describing the advantages of using MNS over conventional means, respondents again somewhat favoured the ability to create “professional” looking scores with MNS over the efficiency of MNS part production and, thirdly, its playback facility.

“Advantage” responses of note pertained to the future editability/adaptability of MNS scores, the ability to disseminate MNS scores and sounds via e-mail, new possibilities for archiving works using MNS, the ease of duplication of hard-copies of music and the ways in which MNS allows composers to experiment more widely because they always have recourse to “undo”. On this last point, one composer said, “You can change things and instantly get it to play it back to you. In some ways it allows you to explore things more as you can just cut it out or undo anything which you don’t like.”

It is of interest, but perhaps difficult to draw strong conclusions from the fact that individual responses in the “disadvantages” category outnumbered those in the “advantages” category by 44 (with 20 sub-answers) to 37 (also with 20 sub-answers). MNS’s most reported disadvantages were that playback

misrepresented the sonic characteristics of actual instruments and, as such, offered misleading feedback about ensemble balance, that it was especially misrepresentative of the output of instruments at extremes of range and resulted in composers becoming focussed on reacting immediately to sounds rather than thinking more globally about works (see 6.5.2.2 and 6.5.2.5).

A similar number of respondents wrote of the difficulties involved in adapting MNS to realise non-standard notations, the problem of such notations not playing back and the tendency for composers to compromise their work to accommodate only the notations MNS was designed to handle (see 5.4.1).

Slightly fewer respondents lamented the loss of individuality of hand-written scores (see 4.6.1) and fewer still addressed the tendency for composers to use MNS to write unplayable music (see 5.2.1). This last point prompted three composers to elaborate that they thought the playback facility resulted in a decline in music literacy (see 5.4.3). That musical illiterates could “get away” with quite a bit, because the software obeyed layout rules that the illiterate composer may be unaware of, was of peculiar interest as this sentiment was also expressed in the “advantages” responses!

The potential for compositional myopia resulting from being able to see only one monitor’s worth of music at one time concerned some composers (see 4.3.1.2), while some thought MNS’s cut-and-paste facility might result in neglect of musical aesthetics. Some composers asserted that MNS offered no more disadvantages than any other working method with the caveats that it must be used with an awareness of how instruments/voices actually sound and with the composer in control of the compositional process at all times.

2.5.15 What influence does playback have on the compositional decisions you subsequently make? (Question B3 – in 2 parts)

This was a key question: to what extent did the most potentially influential feature of MNS act on the myriad compositional decisions faced by composers? It was also a problematic question, given the anecdotally perceived stigma surrounding reliance on MNS playback as a guide for “how the piece goes” and the cultural stereotype of the “genius” composer who has the music ready-prepared in his (insofar as “genius” composers are popularly exclusively male) head. With the use of playback at the core of the working practices of many respondents, Poster’s normalisation effect was also likely to have been at work.

Respondents reported that, on average, MNS playback had a middling influence on their compositional decisions, with females reporting a slightly higher influence than males. As Figure Four (see 2.4.3) illustrated, scores formed a rough bell curve, with the weight of responses falling in the middle of the scale. This meant that the slightly above-average mean was not the result of an even spread of responses across the scale but rather an indication that the bulk of composers considered MNS playback influence to have a middling effect on their compositional decision making. A break-down of this result by age group was expected to reveal a tailing-off of playback influence in higher age brackets, however this and analysis by composing experience indicated no such tailing-off.

While the influence of playback on compositional decisions was highly personal and reflected the broad range of responses reported in many other parts of the questionnaire, it is the most important line of investigation into the ways in which music is shaped when composed using MNS. Focussed examinations of the characteristics of the works of disparate individual composers before and after the introduction of MNS use are seen as the best way of offering insight into this question and fall outside the scope of the present research.

2.5.15.1 Please explain why you don't listen to audio playback?

The six respondents to this question were older (mean age 50) and more experienced (mean composing experience of 35 years) than the sample and only one was female. Simply not liking the sounds MNS produced and, more specifically, regarding them as unrealistic or misleading, were the most frequent responses. One composer touched on the interesting issue of the effects of repetitive listening, subsequent over-familiarity and loss of critical perception:

If a passage of composed music is listened to repeatedly I may be less likely to modify it as the ear becomes used to it. Audio feedback could impede what I write and modifications are likely to be more mundane. [See also 6.5.2.2].

The following captures the sentiments of those most opposed to the use of MNS playback in the compositional process:

the most pernicious aspect of this technology-obsessed culture is the way some music is insidiously 'blanding out,' as composers rely on computer playback – with its limited expression, risible instrumental approximations, lack of dynamic and articulatory range, and compression of sound into characterless state, producing pieces which, in live performance, sound like their MIDI playback version!

While it might be difficult to quantify this assertion, an equally vexing question might ask the degree to which composers, intimately acquainted with the MNS playback “versions” of their works, actually *want* the performances of these works to sound like the simulation!

Another “additional thoughts” response, with resonance in the current context, highlighted the divorce between simulation and reality imposed by unthinking use of MNS playback:

It is unfortunate that so much emphasis has been placed on playback – it has led to an impoverished understanding of composing as “putting in notes,” and a corresponding ignorance of real sound and the physicality of instruments.

It should be noted that, for composers working with slightly older MNS versions (those prior to “software” sounds being bundled with MNS products), the quality of sounds was dependent (in the absence of third-party hardware) on the quality of their computer’s soundcard which, for off-the-shelf computers, was generally very poor. Had this group of composers used more advanced soundcards or, indeed, software add-ons such as Kontakt Silver and Gold, it is possible they would have listened to MNS playback and would have considered such playback in a more positive light.

2.5.16 Is the quality of playback (ie, the playback’s proximity to realistic representation of actual instruments) important to you? – please discuss
(Question B4)

This question sought to elucidate the degree to which composers desired a diminution of the gap between simulation and reality. Were composers content with the – largely – poor quality of MNS playback, or would they prefer to work with sounds that approached those of real instruments? The researcher was also interested in if composers had gone to the trouble and expense of acquiring hardware and software that would improve sound quality, however this subject was broached by only a few respondents and should have been an additional question.

Respondents were grouped into three categories: no, yes and “yes and no/neutral.” Those answering in the no category most frequently commented that the quality of playback was not important because they had a good understanding or imagining of how the music would sound when played by real

people with real instruments. Some of these respondents also said that they used playback as a guide from which to “hear” the actual music in their minds (see 4.7.3). An equal number said that, because the quality of playback was so poor, it could only be used for proofing pitch and rhythm.

Other “no” respondents mentioned that they didn’t trust playback and would only be interested in it if it was more realistic. Some said that playback quality would be a concern only if they could afford to buy hardware and/or software that would improve sound quality, while others commented that it was actually beneficial for sounds to be poor as this would force one to use one’s imagination more.

Composers who regarded MNS playback quality as important agreed in numbers on one point only: that sound quality was important in gauging the blend, balance and timbre of combinations of instruments. All other responses in this category were solitary contributions. Of interest was the comment that sound quality was important because:

If one cannot put in a particular sound (a ricochet, for instance), when one listens repeatedly the ‘instead’ sound becomes the norm [see 6.5.3]. This discourages experimentation with sounds that are not provided by the sound canvas available.

To this way of thinking, the simulated score becomes in the composer’s mind “the performance” and the composer who is quite reliant on this rendition of the music, limits his or her repertoire of sounds to accommodate the limitations of the MNS playback.

Another interesting point raised was that, for composers for whom the quality of MNS playback was of importance, it was possible to spend too much time tweaking playback to make it more realistic. The needs of the composer – and those of his/her performers and/or commissioners – to hear representative synthetic performances of works needed to be separated from the greater need to confront performance realities, the concert performance being the paramount

concern (see 5.2). Assuming a work was intended for actual human performance, a playback-devoted composer would need to decide at what degree of polish the computer simulation satisfied his or her creative needs.

The comments of two respondents warrant mention in full:

I've found recently that I become more excited and motivated about a piece if I have a more realistic representation of it. It's also useful in terms of orchestration to get a close approximation, as it improves one's sense of 'aural judgment.'

As I've worked with more realistic sounds I've realised I've been writing fewer and fewer notes. Also, the tempi I compose with and the final performance tempi are more aligned now. My reasoning is this: older sampled sounds have no sympathetic resonance, and no guts. They are certainly not beautiful...In a lot of my earlier pieces, I filled up all temporal space to accommodate the lifeless sampled sounds – invariably when the works were performed live the tempi had to come down – primarily because 'real' sounds need time to speak, and breathe. I now have a very realistic sample library...and my composing is evolving again.

(See section 5.3 for discussion on the effects of MNS on temporal perception).

Increased playback realism was for these composers both stimulating and, in their estimation, capable of improving their compositional powers.

2.5.17 Do you regard your interaction with music notation software as collaborative in any sense? – ie, do you regard the alternation of note input and listening to playback as a dialogue where the computer plays a real or imagined role? – please discuss (Question B5)

This question was designed to test composers' perceptions of their working relationship with MNS. While the word "collaboration" is problematic (it is obvious

that, in the absence of real intelligence, MNS cannot collaborate meaningfully with a composer), personal experience allows that there may be an imagined to and fro of ideas between composer and computer: the composer suggests some music by entering it into MNS and the computer plays it back, “suggesting” perhaps, ways in which said music might be altered or extended, any “suggestion” being a construct of the composer. This notion is explored extensively in 4.5.

Many more respondents rejected the idea of collaboration than endorsed it, the most frequent comment being that MNS is a tool and nothing more and, while playback “mirrors” or “parrots” the composer, its role is essentially passive. Others said that collaboration was by definition a human-to-human phenomenon and that poor quality playback deadened rather than encouraged interaction. One respondent branded MNS “negatively collaborative” in that its notational and sound-producing limitations demanded undesirable changes in process on the part of the composer.

While a number of composers could see ways in which MNS might be considered an active partner in the creative process, many regarded MNS alongside or somewhat superior to the use of other instruments (predominantly the piano) in the composing process. Indeed, one respondent thought of MNS as a kind of player-piano because of its ability to play back music far faster and more accurately than a composer could.

The author’s notion of a balanced and realistic view of the composer-MNS interaction may have been captured in this response:

I imagine the relationship [between composer and MNS] as a similar one to visualisation tools in other disciplines: eg CAD, storyboarding, etc. The idea is that it allows you to more closely model the physical and acoustical reality of your score. That doesn’t make you a better composer – just a less surprised one.

2.5.18 Do you ever use music notation software to plan the form and structure of your compositions? (eg, you might mark out a blank section of score with written indications of what might happen, etc...) – please discuss (Question B6)

While the efficiency, visual neatness and playback of MNS are often discussed by composers and must lead to alterations in work practices and sound outcomes, MNS's impact on the way composers conceive of, structure and shape their works at a macro level has been somewhat overlooked (see 4.4.1). This question was posed because the writer has seen examples of composers inserting text into empty portions of score, describing the nature of the yet-to-be-written music that should appear at that point. This practice has been used to a limited extent by the author himself.

In some cases, such textual (or sometimes musical) notings are devised in conjunction with MNS timecode. For instance, the software is able to show that an empty bar fifty bars hence will occur (maintaining prevailing tempo and meter) at a certain time in the work's duration. The composer may have predetermined to go with a certain musical idea at this point because it seems structurally appropriate. This alliance of time and space in the planning stage would have been difficult to replicate in the pen and manuscript paradigm and thus represents a departure in technique.

Compositional planning using MNS found far less favour with respondents than devising plans using pen and manuscript and/or blank paper. The difficulty of rendering graphical or diagrammatical depictions of musical shapes and structures with MNS meant some respondents regarded it as too inflexible as a planning tool. The display limitations of the computer screen (see 4.3.1.2) were also thought to stymie any potential planning usefulness because the shape of work could not be seen at a single glance.

The concept of "through-composition" (see 6.5.2.1) existed prior to the digital age, yet its employment is perhaps more readily suggested by MNS use than by

composing with pen and manuscript. While through-composition doesn't necessarily signify a lack of planning, it is suggestive of an approach in which music is generated in reaction to extant materials rather than by following predetermined paths. Two composers commented that they did not plan using MNS because they were through-composers. Form and structure for such composers is arrived at by reaction to extant materials. The further stimulation of instant playback distinguishes present-day MNS-assisted through-composition from this approach undertaken in the pen and manuscript paradigm.

Of those composers who did use MNS for considering form and structure, a few wrote of using MNS to map out the durations of sections or to help conceive of the pacing and unfolding of material. Two composers spoke of printing out "skeletons" of works and using blank areas as manuscript paper on which to compose by hand.

Single responses ranged from using text descriptions to denote the placement of yet-to-be written material to using playback to conceive the continuation of material (another through-compositional idea – see above) to using MNS at the end of the creative process to finalise the form by moving elements around.

The efficacy of MNS as a tool for planning, a function it was not designed to cater for, was considered limited, though useful for some composers in some respects. With older, more flexible methods of planning still in primary use, it is perhaps more pertinent to focus on the ways in which MNS use influences decisions made at a micro level.

2.5.19 Compared with writing by hand, how, if at all, does music notation software influence the process/methodology of your compositions? – please discuss (Question B7)

This question was problematic for some younger composers in that they have only ever composed with the assistance of MNS. Of those who had previously worked with pen and manuscript, a comparatively large number referred to enhanced speed and time saved when describing how MNS changed the process or methodology of their work. A lesser number said that being able, with MNS, to enact changes instantly and thus spend more time composing and less time re-writing by hand, sped up and enhanced their working practices.

Some composers referred to the cut-and-paste feature as impacting on their process and methodology while others acknowledged that MNS playback made for a greatly changed approach to composition compared with writing by hand.

From a large number of unique responses, two were of particular interest. The first was concerned with the micro-level composing that some composers are drawn into when using MNS (see 6.5.2.2):

In compositions where I have relied more heavily on notation software, I have found that my attention to detail – that is, finding just the ‘right note’ or ‘right chord’ – becomes so focussed that it can actually detract from the process and lead to its own dead-ends. Somehow I feel freer – though less confident in the final result – when working solely on manuscript. Manuscript allows me to concentrate on the ‘bigger gesture’, and I retain a greater sense of my progression through the piece.

This tendency will be examined in greater detail in Chapter Six, which deals with the author’s own compositional processes and methodologies, though it may be useful at this point to balance it with a relevant opinion expressed in Question B3(a):

Final decisions on architecture can be made at later stages in the composition process, which gives greater creative freedom and much greater flexibility. Options can be kept open for much longer. Traditional methods require substantial detailed planning in advance because the

costs of changing your mind can be quite large – mostly involving a great deal of time in physically reorganizing the draft score...

The second response of interest exposed one possible downside to the graphically “clean” nature of the MNS interface, which, as has been seen, accounts for a great many composers’ attraction to working with MNS:

The lack of documentation of the process (when notes are erased) removes the sense of progression of the piece and makes it difficult to see how the piece has evolved.

While one other composer noted that, for her, MNS’s “undo history” provided a kind of record of the compositional journey, the absence of disregarded hard-copy material means the MNS composer might feel that he or she is constantly “starting over” and might lose the sense of how a work evolved. Just how this impacts on the shaping of a work is likely a highly personal issue. It is possible that working “at the coalface” and to some degree losing touch with the greater scheme may result in less predictable outcomes, but whether this makes for stronger or weaker compositions is subjective. It must also be remembered that composers often save versions of work that they have decided are now ill-suited and that such work might later be crafted into some other work altogether (a practice not confined to working with MNS).

While not the inherent fault of MNS, it is possible that MNS-using composers might find it harder to talk about works they have composed because “memories” of the process have, in part, been consigned to a deleted digital ether. The nature of discourse between composers and other composers, performers, musicologists and the listening public is altered if composers’ recollections of the writing experience are clouded. Composers feed off the achievements of their peers and wish to know *how* certain works were realised; performers often like to know something of the journey of the composer in creating works in order to better interpret the music; it is the business of musicologists to know how composers work in order to document such workings; the listening public are

curious about the lives and processes of artists as such knowledge contributes to the listening experience. The needs of these extra-compositional actors in music are threatened if composers cannot communicate their battles with lines and dots.

2.5.20 Do you, or have you ever, created tapes or CDs of computer playback for the benefit of your performers? – what has been the reaction of performers? (Question C1)

This question was posed because the author had seen and used this practice personally, with a range of outcomes. Whereas the process of moving MNS sounds to recordable media was once difficult and often resulted in poor quality outcomes, the recent inclusion of “software” sound palettes in some packages and the ability to easily generate CD-burnable WAV files, means this is a practice that is likely to be undertaken more frequently by composers. Its effects are therefore worthy of examination.

Fifty-four percent of MNS users reported trying this practice and 73% of these said the exercise was a useful one. Most conveyed an air of caution surrounding handing MNS recordings to performers, due to the inadequacy of sound timbre, balance, absence of interpretive nuance etc, and said that such recordings were simply to help performers gain some insight into the nature of works in order to facilitate the note-learning process. (One composer mentioned that a performer of one of his works initially attempted to mimic the MNS version, producing “nonsense”!). Three composers commented that this practice allowed them to enter into meaningful dialogues with performers on technical issues which, usefully, resulted in corrections being made prior to the first rehearsal, while three other composers said that MNS recordings helped to allay the fears of performers confronted by graphically intimidating scores.

Many respondents highlighted the benefit of this practice especially when the recipients of MNS recordings were school groups, young musicians or amateur

performers. Performers were not the only targets of MNS-realised recordings: actors, choreographers and dancers in productions were also reported recipients. MNS has become an important vehicle for the improvement of communication between composers and non-musicians, providing musical representations for the musically illiterate, whose artistic niches are nonetheless entwined with music.

MNS sound realisations were also reported to have found their way to university lecturers, judges of composition competitions and commissioners, changing the nature of the process of assessment of works for people in these roles.

Specific performer reactions ranged from being genuinely grateful for having the resource to learn from to being annoyed or amused by the artificiality of the recordings or insulted by the mere suggestion that they be necessary. There were reports that most performers understood and accepted the limitations of MNS realisations (indeed, a few composers said they were careful to include quality disclaimers when presenting such recordings) and that many were won-over to their usefulness after repeated listenings.

That this practice is used, or has at least been tried by such a large number of composers surveyed, suggests it has a future as a means of conveying music to performers and might represent a coming-full-circle in the nature of the transmission of music from composer (or musical tradition) to recipient (performer) via a modification of orality (see 3.4.1).

It must be remembered that the similar practice of learning music from commercially-available recordings of standard repertoire works – be that “figuring-out” from the ground-up or listening simply to garner interpretational ideas – has been used by countless musicians since the arrival of the gramophone. Where help is available, musicians are likely to seek and be receptive to it.

2.5.21 Since you adopted the use of music notation software, has your output (ie, works completed) increased, decreased or stayed about the same?
(Question C2)

This question endeavoured to test whether MNS, a tool of an age in which high productivity is considered highly desirable, actually resulted in composers writing more compositions. The obvious time-saving benefits of the software – quick part production and printing, e-mail dissemination, word processor-like editability etc – suggested from the outset that composers would report increases in compositional output. However, the weightiest response held that output since MNS adoption remained at a status quo, factors such as non-compositional employment, deadlines, the difficulties of getting works performed and so on, holding greater sway over productivity than the use of MNS. Other composers, who reported neither an increase nor decrease in productivity, cited always having used MNS (thus having no point of comparison with older methods), using MNS only as a printing tool and regarding tools used as irrelevant to output frequency (see 3.5.1).

One respondent raised the interesting idea that the use of MNS required composers to re-allocate their compositional time but that this re-allocation did not necessarily result in completing compositions more quickly:

Any increase in productivity due to the speed of MNS has been offset by time taken to audition competing musical options (made readily possible by MNS).

In other words, for this composer, the chance provided by MNS to quickly realise a range of alternative musical ideas nullified any time savings he might have made (see 4.3.2).

Of those respondents who reported an increase in compositional output since adopting MNS, a large number attributed this to enhancements in speed inherent

to MNS use. One composer added that this greater composing speed provided, in itself, a stronger incentive to write.

Respondents who reported a decrease in compositional output since adopting MNS most frequently said this drop was unrelated to MNS. Two composers said that their lack of facility with the software had slowed their progress (the mean of their IT literacy score was a very respectable 4.75). Another two said that an abundance of non-standard notative practices in their works made score-setting with MNS particularly arduous.

MNS cannot, on the basis of the data gathered, be considered a tool capable of fulfilling the demands of the “Knowledge Economy” into which it has emerged. While enhancing the speed at which aspects of the compositional process might be carried out, MNS is divorced from the productivity-influencing extra-musical forces at play in the lives of composers.

2.5.22 Do you feel that music notation software has limited or extended the possibilities open to you in your composing life? – please discuss
(Question C3)

...and

On the whole, has the use of music notation software impacted on your compositions positively or negatively? – please discuss (Question C4)

Due to considerable overlap with previous questions, the responses to these two questions were not analysed.

2.5.23 Use of plug-ins for automatic note generation or tweaking of playback (Question C5)

Plug-ins are additional sub-programs, often written by MNS users themselves, which perform certain note-generating tasks such as inversion, retrograding, arranging or automatically adding drum parts. Such functions move MNS into an area of (albeit limited) automation, challenging an unspoken and rather conservative tenet of MNS which holds that music created using the software remains solely the work of the composer. While clearly far from the realm of artificial intelligence, plug-ins nevertheless herald the possibility that future incarnations of MNS might *generate* music at some distance from the specific intentions of composers.

The data showed that plug-in use was minimal. Sibelius users *very* occasionally applied inversion and retrograding operations and *very* seldom chose to instruct the software to add drum patterns and to pitch map. Finale users reported making some use of “TGTools” (a combination of several plug-ins dealing with presentational, note-generating and playback tweaking matters) and a few said they used canonic utilities and the automatic piano reduction. Other plug-ins were scarcely used or not used at all.

Plug-ins also aid in the tweaking of MNS playback (quarter-tone playback, glissandi, crescendi and diminuendi, etc) and their use was thus of interest in examining the extent to which composers cared for honing the realism of their playback. Sibelius users were somewhat fond of adjusting crescendo and diminuendo parameters, while plug-ins to alter the sound of glissandi and trill speeds were seldom used. Rare use of the plug-in to sonically realise quarter-tones must be weighed against the fact that few composers use quarter-tones in their compositional languages.

2.5.24 What are your feelings on the use of music notation software by fledgling composers? ie, composers with little or no experience of composing by any means (Question C6)

The aim of this question was to document opinions on the benefits and pitfalls of MNS use by beginner composers, there having been much anecdotally-observed opposition to this. The question provoked some of the most strongly-worded responses in the questionnaire, with arguments opposing MNS use by fledgling composers outnumbering arguments for by 57 to 17 (with 16 “neutral/off-topic” opinions recorded).

Recurring opposition responses included concerns that MNS might cause beginner composers to become reliant on MNS playback rather than on experience with live performers and real instruments, that default MNS settings might allow the software to unduly influence creative decisions, that using MNS was not an adequate substitute for training in counterpoint, harmony and orchestration and that it was dangerous for composers to use MNS with insufficient experience at writing by hand.

Slightly less frequent responses loosely centred on the importance of composers learning their craft by traditional means, lest learning with MNS degrade or inhibit true musical knowledge and development of “ear.” Another loose grouping of responses spoke of MNS simulations warping young composers’ perceptions of musical reality. One composer wrote:

By using the computer we cut ourselves off to a large degree from the body and the human scale of music. The analogy of line, time and ‘architecture’ with spacing on the page is completely by-passed as is the sense of the physical gesture and the effort of using one’s aural imagination. If students use the computer to compose they would appear to lose the opportunity to develop these vital mechanisms.

Another respondent claimed that most composition teachers thought the practice of young composers using MNS was dubious. This was confirmed in the data: of the 22 university lecturers surveyed (both currently serving and retired), 14 opposed or sounded cautionary tones about fledgling composer use of MNS and only two were in favour (with six non-responses).

It is interesting to note that, at the start of 2006, all undergraduate composition papers at the New Zealand School of Music adopted a new requirement whereby students were required to realise at least one work using pen and manuscript. On the rationale behind this move, lecturer Michael Norris said:

putting some students into the situation of having to rely on their hand, without the possibility of computer feedback, requires them to trust their instincts more, and it allows certain notational possibilities to become much more conceivable.

I also worry that for some students MNS can cause them to stress out about their work more (I know it does for me), and often means they neglect things such as expressive detail, in favour of rhythm and pitch.

It is my hope that by forcing them to work away from the computer, it might get them to think about music in other ways (particularly if you align it with the right sort of assignment, for instance, an assignment that would be quite technically challenging to realise on Sibelius anyway).¹³

The benefits of making young composers think outside of the limitations of the essentially nineteenth century engraving limitations of MNS were reflected by one respondent:

¹³ New Zealand School of Music composition lecturer Michael Norris, responding to the question of the rationale behind the NZSM's decision to require undergraduate composers to write at least one work per year of study "by hand." Quoted from a personal e-mail, 17/05/06.

It is critical that ‘fledgling’ composers (and experienced ones as well?) are aware of the limitations of the software, and the preconceptions of its designers. While the authors of commercial music notation software aim for a product which is ‘as transparent as a word processor’, this analogy is not necessarily appropriate to the creation of new music. Musical notation – the communication of music from composer to performer – is a space for exploration. Software which treats notation as a closed system has the potential to inhibit a whole area of musical creativity. The danger is that, if one is locked into a software designer’s assumptions about notation, and musical methodology, one might overlook this aspect.

Furthermore, notation (and beyond that, music engraving), is a craft in itself. With well-presented, easy-to-use software, it is easy to assume that the software’s decisions on musical orthography and presentation are the best solution to a notational problem, which is not always the case (and in some cases they are not even correct). Composers must still learn to notate, even when that requires ‘fighting the software.’

In an historical aside, another respondent brought to attention the opinions of a composer who died more than a century prior to the personal computer age. Hector Berlioz was lamenting the use of another technology by composers in a tone not dissimilar to the sentiments of many respondents:

when I think of the appalling quantity of platitudes for which the piano is daily responsible – flagrant platitudes which in most cases would never be written if their authors had only pen and paper to rely on and could not resort to their magic box – I can only offer up my gratitude to chance which taught me perforce to compose freely and in silence and thus saved me from the tyranny of keyboard habits, so dangerous to thought, and from the lure of conventional sonorities, to which all composers are to a greater or lesser extent prone.¹⁴

¹⁴ Cairns, David (trans. and ed.), *The Memoirs of Hector Berlioz*, 1990, p.13

Brought into the 21st Century, Berlioz would surely replace the piano with MNS and the “tyranny of keyboard habits” with the “tyranny of MNS playback.” While the respondent who supplied the quote supported Berlioz’s assertions, the composer’s myopic view that pen and manuscript are the only effective tools for composition should be questioned. These tools and their consequence, Western notation, had been, in Berlioz’s time, long since normalised (to again apply Poster’s term) and were thus (falsely) above suspicion, any limitations in Western notation being overshadowed by its advantages and quickly forgotten. The legitimacy of attempts to discredit use of a tool (the piano), which are essentially augmentations of a conceptually shaky paradigm, might therefore be doubted.

While a clear majority of respondents were opposed to MNS use by beginner composers, a smaller group had no such concerns. The most frequent of these responses spoke of the virtue of MNS if it encouraged young composers into composition and of the usefulness of MNS playback cutting the guesswork out of composition. A number of responses advised of the benefit of MNS for the inexperienced if balanced with certain precautionary measures. The following captured the essence of this school of thought and might serve as a counter to Berlioz:

As long as the approach to the software is wary, thoughtful, and musically motivated, then I think software has huge potential for opening doors (more so than the older equivalent of fledgling composers noodling away at the piano).

A clear theme emerged that neither endorsed nor discouraged new composers from using MNS. This held that fledgling composers should experiment with diverse approaches to composition, both electronic and manual in order to discover what they were most comfortable with.

2.5.25 If you have any other thoughts about aspects of the use of music notation software not raised in the questions above, feel free to present them here
(Question C7)

This question sought to bring to light issues of interest not dealt with in the body of the questionnaire. Most items of interest have been absorbed into the above, leaving only three matters to discuss presently.

The first asserted that, “Notation software still suffers from a lack of flexibility as notation software, despite an increase in the sophistication of its playback aspects.” While the leading MNS packages are accomplished setters of conventional notation, they are not particularly adept at rendering many of the graphical elements typical of the art music of more recent times. Michael Avery of Sibelius Software said that while there was much sympathy amongst the company’s staff for catering to the unconventional needs of composers working outside of notational norms and conventions, the software’s core clients (primarily band leaders in the United States) did not require such advanced capabilities. Avery did however express that with future updates of the software, such needs would eventually be met.¹⁵ In the interim, improvement of the quality of MNS playback is a clearer commercial imperative than advancing its graphical resources.

The second issue was in the form of a criticism of an aspect of the questionnaire:

I believe it may be helpful to know more about the kind of music each participant writes as this will radically affect their experiences. Using microtones immediately multiplies the process by several times, as does using ‘figurative’ rhythms. My music uses both these things which is why I find computer processing and editing very slow. I think it would also be interesting to know how much composers use the styles and templates the software gives them. Once you start caring about the details of

¹⁵ Interview with Michael Avery, Appendix E

presentation this also adds a time factor. I can think of a number of composers for whom none of these issues would apply and can imagine computer processing saves them a lot of time and labour.

This is a very valid point and is a reminder that each composer's approach to MNS is mediated to a high degree by the parameters of individual musical languages. It was previously noted that for some composers, modes of MNS usage and the combination with other physical compositional tools varied from project to project. While the nature of instrumentation was cited as an important factor in such alterations, the stylistic leanings of different composers is surely as important.

A third issue addressed the need for specialised training in MNS use:

Discussion/education in the function and purpose of notation as well as a knowledge of the norms of western music notation is sorely lacking both at secondary and tertiary levels.

That this study is seemingly the first in-depth exploration of the nature of MNS use is indicative of the lack of penetrative assessment of the technology. MNS packages are relatively user-friendly and – for Sibelius, at least – it is possible, with pre-existing mid-level IT literacy, to teach oneself to use them to a rudimentary level in a short period of time. While the level of training of school and tertiary students in MNS packages is unknown¹⁶ it is imagined to be minimal. The “norms of western music notation” are taught in a variety of tertiary papers and are particularly focussed on in composition classes, but hands-on tuition of the fine points of translating good practices from manuscript to MNS are largely neglected (see 3.6).

¹⁶ Unknown outside of the New Zealand School of Music, where training is currently limited to once-yearly demonstrations.

2.6 Conclusion

2.6.1 The typical New Zealand composer and his use of MNS

This questionnaire set out to discover the extent and nature of MNS adoption by New Zealand composers. A picture of the average (or most likely) New Zealand composer emerges, showing a 40 year old male with 22 years of composing experience. He has a good practical knowledge of computers and copes with them with a minimum of assistance. He uses the Sibelius MNS package, which he purchased in late 1995, though he may have previously used Finale or Encore. He started using MNS because he was attracted to the “professional” look it could lend his scores, its ability to efficiently produce parts and, to a lesser extent, because it could play his works back to him.

This typical New Zealand composer uses MNS in conjunction with a piano and manuscript, though the exact mix of his physical tools changes from project to project. He regards the software as both a score-setting and a creative tool, though it is not a tool he feels he has a great sense of collaboration with. He listens to MNS playback of his compositions and feels that playback has some influence over the compositional decisions he makes, but he is mindful that the playback is misrepresentative of the music his performers will later play. This composer prefers using manuscript over MNS when planning out his works and says that the biggest difference in the process and methodology of his music since coming to MNS is that tasks are now performed much faster. He is an occasional user of his software’s plug-ins, which he mostly uses to enhance the realism of aspects of his playback.

He has prepared MNS recordings for his performers to learn from and found this practice useful but somewhat problematic. Though his output has not increased since he began using MNS, he does report that MNS has extended the possibilities in his composing life and that its overall impact has been positive.

He harbours concerns that composers who are just starting out might be misled by MNS playback.

While this exemplar composer embodies the most common opinions of the artists surveyed, examination of Appendix B will reveal the breadth and individuality of responses garnered. Composers approach MNS with entirely unique musical and attitudinal backgrounds and their relationships with new technologies are equally unique. It follows that the ways in which each composer employs MNS is equally disparate.

2.6.2 Items for further examination

This chapter has highlighted a number of key points that require further and more detailed examination in a broader context. Chapter Three will cast the matter of resistance to technology adoption (as in 2.5.7.1) against a background of literature dealing with the “technology question,” and historical shifts in modes of information transfer. In Chapter Four, the physical and cognitive nature of the MNS work environment will expand on 2.5.12 and other questions. Chapters Five and Six will explore the possibility that the composer-MNS relationship may be in the order of collaboration, as discussed in 2.5.17. The important role of playback in MNS use will be central to Chapter Six, fleshing out views expressed by respondents in 2.5.15 and 2.5.16. The influence of MNS in planning the form and structure of compositions, as touched upon in 2.5.18, and the question of MNS-use by fledgling composers (2.5.24) will also be covered in this chapter.

Chapter Three

The adoption of new technologies

3.1 Introduction

Perhaps the most interesting finding of Chapter Two was that eighty-two percent of survey-responding composers reported using MNS in their work. As discussed previously, this high rate of adoption is, for such a recently emerged, paradigm-shifting and uninvestigated technology, quite startling, given the short amount of time that the major MNS packages have been affordable and available for use on standard computer platforms.¹

Yet MNS faces strong opposition from some quarters, raising a number of questions surrounding attitudes towards the adoption of new technologies. This chapter will set these issues against a background of literature concerned mostly with the effects of recently emerged communications media, the word processor in particular. As touched upon in 1.4, the sources used are not MNS-specific and, as such, the following will not constitute a literature review in any strict sense. Instead, the chapter will begin with a discussion of the strengths and weaknesses of applying the arguments posited by this literature to the MNS domain, moving to an assessment of the usefulness of the primary texts used.

The nature of resistance to new technologies will then be reviewed, and the transition from orality to literacy will be assessed as a comparative model for the present study. The ways in which MNS may be thought of as a vehicle for

¹ Sibelius Software, the MNS package exclusively used by 46 percent of MNS users surveyed in Chapter Two, first became available in New Zealand in 1993. At this time it was only available for use on the somewhat obscure Acorn computer, limiting access for many composers. Sibelius was released for the personal computer in 1998 (and in 1999 for Apple computers). Finale (exclusively used by 14 percent of surveyed composers in Chapter Two) was first available for the Macintosh in 1988. The less-accomplished and now discontinued Encore software first became available on PC and Macintosh around 1997-98.

“secondary orality,” in which multimedia replaces or at least rivals literacy as a chief conveyor of information, will also be considered. Cultural and composition-specific beliefs and values, which colour opinions about MNS, will be uncovered. The chapter will end with a discussion about the peculiar nature of error-making in the MNS environment.

3.2 The nature of literature employed

3.2.1 Balancing technological determinism for the musical context

The vast majority of literature surveyed for this study subscribes to the belief that technologies are the prime, if not the sole, determinants of cultural values, social structure, and history.² This technological determinism is related to biological determinism (the “nature versus nurture” debate) and linguistic determinism (the notion that language dictates thought).

While most of the literature referred to in this and the following three chapters is technologically deterministic in outlook, it is acknowledged here that technology is, historically, but one factor that has shaped music, and one which, until recently, could not be said to be primarily responsible for innovation and change. The invention of hand-held writing implements and inscribing surfaces, and their eventual alliance with Guido D’Arrezo’s modern notation, signaled the beginning of hundreds of years of near-stasis in the technologies used by composers. This stasis was upset or modified only by such things as the adoption of the use of musical instruments as compositional tools by some composers.³ The invention

² It is rare to encounter non-deterministic stances, such as those of Daniel Chandler, at <http://www.aber.ac.uk/media/Documents/tecdet/tecdet.html>, viewed 24/10/06

³ For example, Beethoven’s highly accomplished and inventive pianism pushed the technical boundaries of his writing for piano beyond that of his contemporaries and established technical grounds that later composers would exploit. The mechanical excellence of the pianos owned by Beethoven during the course of his life improved over time, allowing him to incorporate techniques that were previously difficult or

of the printing press had important implications for composers and the musical cultures of Europe, but did not change the physical manner in which composers went about their work. That music could, during this period of sustained technological stasis, undergo the massive transformations book-ended by the music of the pre-Renaissance and 20th century Modernism, tells of progress shaped not by changing technologies, but by advances in musical thought.

To place this in wider perspective, the history of economic progress, as driven by technology, can be compared to that of music. Says economic historian Joel Mokyr:

changes in technology, the mainspring of economic progress, have been rare relative to what we now know human creativity is capable of...stasis or change at very slow rates has been the rule rather than the exception.⁴

Mokyr continues: "It is our own age, and especially the rapid technological change in the Western world, that is the historical aberration."⁵ The aberrant nature of technological progress in the present day arguably elevates technology above aesthetics and style as determinants of musical change. Different music technologies of the past one hundred years have been shown to exert pressure for musical change that is stronger than that of stylistic trend. Mike Katz, in showing how recording technologies wrought change on the performance practices of string players,⁶ says "recording is not simply a preservational tool, but a catalyst as well...Necessity, it seems, may sometimes be the mother of

impossible to perform. (Newman, William S., *Beethoven on Beethoven: Playing His Piano Music His Way*, 1988, pp.67-76 and pp.50-54 respectively.) Beethoven's exploitations of the piano thus amounted to technological innovation in a time of supposed technological stasis.

⁴ Mokyr, Joel, *Innovation and Its Enemies: The Economic and Political Roots of Technological Inertia*, 1996, p.11 from <http://www.faculty.econ.northwestern.edu/faculty/mokyr/Delhi.pdf>, viewed 14/08/06

⁵ *ibid*

⁶ Katz argues that the emergence of recording technologies resolves the mystery over why string players adopted, en masse, the use of vibrato in the 20th century. The limited receptivity of early cylinder recording devices, the desire to obscure imperfect intonation and the need to communicate something of the "presence" of the performer, says Katz, were the reasons behind the adoption of vibrato. Katz, Mike, *Capturing Sound: How Technology Has Changed Music*, 2004, p.93

aesthetics.”⁷ The model of composition of the pre-MNS era, in which shifting musical thought rather than the introduction of new technologies was the chief determinant of change, no longer applies. Now new technologies *and* the natural flow of stylistic change, acting sometimes separately and sometimes in tandem, exert influence on the various developmental directions of music. The determinist approach must be properly weighed with other factors.

It should be noted that a new kind of stasis, or half-stasis, has emerged: while MNS packages – and most other software – are frequently “updated” and enhanced, the home computer platform on which they must necessarily run, essentially remains physically bounded by the CPU supplying screen-projected information, accessed via keyboard and mouse. The MIDI keyboard is employed by many MNS-using composers for the input of notes (in performative real-time, or note-by-note entry) but is essentially an old technology appended to a new one. Attempts to build new instruments and interfaces which might help composers reclaim a sense of instrument physicality tend not to come into the mainstream, ensuring that MNS remains tied to the “box and screen.”

3.2.2 Analogising MNS

In the absence of studies dealing specifically with the MNS phenomenon, the obvious path of investigation is to draw on writings about the effects on other art forms of technologies that share similarities with MNS. One might then relate the experiences of these mediums, and their practitioners, to the practices of composers using MNS.

There is much utility in choosing to look at the role of computer-aided design (CAD) in the field of architecture: such technology *models* that which will later be realised (via the interpretation of builders), in a similar fashion to the way in which MNS simulates, for the composer, the sounds that performers will later extract

⁷ *ibid*, p.98

from their instruments. Both are so-called “top-down” disciplines, in which a “plan” (schematic, notated score) precedes actualisation (building, performance). However, comparison between MNS and CAD is difficult because, while architecture is experienced temporally, it exists spatially and, while music has an important spatial dimension, it can only exist in time.⁸

The composed score has closer similarities with the written word: both provide the code for a “performance” that takes place in time – respectively, the live music performance and the reading of text, either aloud or in the mind. Literacy’s *tour de force* digital technology, the word processor, displays language in lines that are read from left to right and down the page in the same fashion as music notation. Text and music notation share language similarities in terms of the importance of the timing of events for the effective unfolding of drama.⁹ As reading and writing are skills that, it is assumed, all in the developed world have, literature is a convenient point of departure for comparative analysis.

While literature dealing with the effects of the (relatively) new computer technologies of architecture and literature on these mediums both hold appeal as sources for comparison with MNS, it is the latter that, for the reasons just given, will be focussed upon presently.

However, two problems emerge in attempting to compare the word processor with MNS. Firstly, while readers of this thesis comprehend written language, they may not necessarily read music notation, this being limited to those with musical training. Relating a tool (the word processor) which is surely used by millions for many different purposes (business, pleasure, etc) with one (MNS) that is used by

⁸ Although, Evan Eisenberg uses this difference as a means of drawing music and architecture together: “Goethe called all architecture frozen music, and Schopenhauer agreed, saying rhythm does for time what symmetry does for space. Another way of putting this would be to say that music is the architecture of time.” Eisenberg, Evan, *The Recording Angel: Music Records and Culture from Aristotle to Zappa*, 2nd Ed, 2005, p.23

⁹ Another similarity is that both the word processor and MNS facilitate a non-linear approach to creation of words and music – see 6.5.2.5

a small fraction of that number,¹⁰ and for the specific task of rendering Western notation, is problematic. Chapter Four will discuss the point that the word processor, in stimulating only sight, differs in important ways to a technology like MNS, which stimulates both sight and hearing.

Secondly, the written word, in its final, word processor-realised form, is *the end product*, notwithstanding further printing or publishing. It is realised by the reader, who most likely reads the text “in the mind” in an everyday – that is, not *performance* – situation. MNS produces not only a score but a sound simulation of the score and requires the highly specialised process of musicians learning scores in order to realise the end product: live performance to an audience.

3.2.3 Literature sourced in this chapter and beyond

Several publications about the effects of the word processor on modern-day writing and about historical changes in modes of knowledge transfer formed the core of literature-based comparative investigation for this and the following three chapters. A number of other texts, concerned with the wider implications of the adoption of technology in general and with technologies in music were also consulted. In lieu of a dedicated literature review, which is considered unnecessary due to the complete absence of academic writings on the effects of MNS, the contributions of these texts to the discussions of the present chapter through to Chapter Six will now be described.

3.2.3.1 Word processor and literacy-specific texts

Jay David Bolter's *Writing Space: The Computer, Hypertext, and the History of Writing* (1991) contributes, amongst other things, the notions that writing *is*

¹⁰ Sibelius Software is, according to its makers, used by “180,000 users across 100 countries”. Source: Sibelius Software press release, 03/08/06

technology and that, with the onset of literacy, the mind came to be understood as a writing surface in its own right. Bolter contends that the computer offers writers a new field for the creative play of signs which is no less natural than any of the writing technologies that preceded it.

Christina Haas's *Writing Technology: Studies on the Materiality of Literacy* (1996) lends this study two "interconnected cultural 'myths'," the subscription to which prevents constructive criticism of the technologies that people use. Haas supports Marx's assertion that the tools used to create things change the people using them and she furthers Marx's argument through Lev Vygotsky, who attempted to develop a psychology based on Marxist principles, in which tools were embraced not only as physical items, but as tools for the exercises of the mind.

Michael Heim's *Electric Language: A Philosophical Study of Word Processing* (1987) acknowledges itself as a broad "*philosophical* introduction to the phenomenon," a goal shared by this study. It is remarkably prescient in forecasting the degradation of literary standards due to the use of digital devices such as text messaging with cellular phones. Heim's take on the effects of word processing on literacy is often in the negative: he claims that with word processing, a "creative super-abundance" prevails over the composure of the mind and that the software results in poor access to feelings, an insistence on efficiency and speed and a lack of empathy for others. He contributes the assertion that computers allow writers to disregard the necessity of an "A to Z" approach to writing, instead inviting the pursuit of non-linear creativity.

Walter J. Ong's oft-cited *Orality and Literacy: The Technologizing of the Word* (1982) provides this study with historical background to societal shifts from orality to literacy and on to "secondary orality." Ong dismantles Plato's argument that writing is inferior to orality, showing that writing greatly enhances human thinking in a great many ways. With Bolter, Ong lends this study the notion that all technologies are artificial, but that artificiality is natural to humans.

3.2.3.2 Broader, technology-concerned texts

Mark Poster's, *The Mode of Information: Poststructuralism and Social Context* (1990) lends this study a vital concept that he has dubbed the "normalization effect." This idea holds that users of new technologies are often initially awe-struck by their power but that, with time, this sense is eroded, leaving the once new technology as a regular and unexceptional part of everyday life. In the sense that new technologies are often initially difficult to use, or cause problems for unpracticed users, Poster's normalisation theory diffuses many detracting arguments and as such is used throughout this thesis.

The example of Ella Fitzgerald's singing voice shattering glass is borrowed from Mike Katz's, *Capturing Sound: How Technology Has Changed Music* (2004) to show that many composers may be indoctrinated with the incorrect belief that, *in general*, music making/reproducing devices deal with "real" sound. Katz is used to illustrate that recording and, by implication, MNS is a catalyst for change rather than just an inert tool. His arguments are used to bolster the notion of the existence of a collaborative relationship between composers and MNS. Furthermore, in explaining changing societal attitudes to the LP and the CD, he reinforces the importance of Poster's normalisation theory.

Pierre Lévy's *Cyberculture* (Translated by Robert Bononno, 2001) lends a number of concepts and arguments to this study. Lévy is drawn on to illustrate the futility of simply assigning technologies the labels "good" or "bad," saying that it is not a matter for users and critics to speak of the "impact" of technologies, but rather to identify how technologies will go towards bringing about positive changes in the areas to which they are applied. *Cyberculture* very clearly explains how simulation technologies can ease the burden placed on the short-term memory, increasing through externalisation of elements the number of mental objects that the mind can process at one time; this is particularly relevant to the MNS environment. Lévy also identifies three states of reality: things such

as words in the mind, “quasi-virtual” information and images that are temporarily accessible. These are applied in various ways to MNS.

Jonathan D. Kramer’s book *The Time of Music: New Meanings, New Temporalities, New Listening Strategies* (1998) remains, from a composer point of view, perhaps the best text addressing the effects of music on human perception of time’s passing. As such, *The Time of Music* is the basis of 5.3’s speculative introduction to this subject, with particular reference to a study carried out by R.D. Meade and the “watched pot” phenomenon. Kramer is also sourced to back Lévy’s view that new technologies represent new opportunities for art forms rather than simply being inherently “good” or “bad.” He also contributes to the interesting idea that audio technologies played a part in the development of the information-dense language that characterises much music in the 20th century and beyond.

The radical challenges to perception of contemporary life and society presented in Jean Baudrillard’s *Simulacra and Simulation* (1994) are used extensively in Chapter Five to show that misuse of MNS may be attributable to the condition *hyperreality*. Walter Benjamin’s *The Work of Art in the Age of Mechanical Reproduction* (1936) is used to show that, while the MNS-induced explosion in the global sum of music scores is a blow to cultural gate-keeping, the score as a culturally revered article is diminished.

Denis Smalley’s article, “Spectromorphology: explaining sound-shapes” (1997 – in *Organised Sound 2*) is an important resource for judging the benefits and pitfalls of what he calls “reduced listening,”¹¹ a compositional measure that the author draws on extensively in the findings of Chapter Six. Smalley’s concerns are used as a backstop for explaining how the possible negative effects of reduced listening are – hopefully – mediated in the author’s own work.

Our Tool Making Society by Irene Taviss (1972) provides this study with a background to societal attitudes to technology throughout modern history. It is

¹¹ An idea first coined by Pierre Schaeffer

largely cautionary, warning that technologies do not exist in vacuums, their use being determined by preexisting political structures and traditions. Taviss contributes to a discussion about the effects of the greater choices that stem from technological advances, saying that these choices may be over-abundant and might actually have the effect of causing greater homogeneity in the outputs of users of similar technologies.

3.3 Resistance to new technologies

In Chapter Two, MNS users rarely reported complete and unreserved support for MNS. However, this user group stood in stark contrast to a small but particularly outspoken group of typically older and more experienced composers that emphatically rejected all use of MNS.

The combined pressures of peer adoption and marketing hype mean that virtually all living composers have had to decide whether to “make the move” from pen and manuscript to MNS. Lévy describes, in terms perhaps too strong for the present situation, the choices that individuals face at this time as producing a

violent sentiment of disorientation. Should we hold on to the procedures and models that gave us the old orders of knowledge? Or should we instead leap forward and jump headfirst into the new culture...¹²

Heim describes the writer, in contemplating computer use for the first time, as taking a

glimpse hopefully into the future and [a] glance longingly at the past. We see how the world has been transformed by our creative inventions, sensing – more suspecting than certain – that it is we who are changed by the things we make.¹³

¹² Lévy, Pierre, *Cyberculture* (Translated by Robert Bononno), 2001, p.147

¹³ Heim, p.13

Following from this, Lévy and Heim would have it that composers are aware, however unconsciously, that using MNS will, in some way, change the process and outcomes of their endeavours. Heim posits that, in finally choosing to refuse or adopt new technologies, users' questions are answered and that, to some extent, positions on the virtue of MNS are set at this point: "The ambivalence is resolved when we revert to one or another of two simplistic attitudes: enthusiastic depiction of technological progress or wholesale distress about the effects of a mythical technology."¹⁴ If true, the drive to arrive at a cleanly-defined embrace-or-reject position goes some way toward explaining the polarised nature of composer attitudes towards MNS.

The reduction of the worth of MNS to merely "good" or "bad" is, of course, unhelpful for an artistic community for which this new technology is already well-entrenched. Composers and teachers of composition require a greater understanding of the underlying phenomenon of MNS, not wholesale endorsements or rejections. Such delineation creates barriers to resolving shortcomings in the software and obstructs critical insight into the ways in which it is used. In labeling talk of the "impact of technology" a "ballistic metaphor" Lévy says:

A technology is neither good nor bad...or even neutral, for that matter (since it conditions or constrains, exposes or closes off, the range of possibilities). It is a question not of evaluating its "impact" but of identifying those points of irreversibility where technology forces us to commit ourselves and provides us with opportunities, of formulating the projects that will exploit the virtualities it bears within it and deciding what we will make of them.¹⁵

¹⁴ *ibid*

¹⁵ Lévy, p.8

Lévy would have composers view MNS not simplistically as beneficial or harmful, but as a well-considered departure-point for exciting new compositional experiences and developments. Jonathan D. Kramer supports Lévy's view:

technology is the enemy of neither humanism nor humanity. Rather, it is their partner in a new sensibility. We are products of a technological culture, and our art reflects our origins. Technology has done more than provide artists with new tools: It has shaken art to its core. A new kind of art has been born, even if the majority of artists have yet to respond to its challenges. In fact, the vehemence of some artists' reactions against technology simply proves its power. On the other hand, some of those artists who fully embrace technology have created a new aesthetic.¹⁶

In allowing that the inevitability of technology's march is not inherently good or bad in of itself, Lévy and Kramer have absorbed lessons from past technological shifts, namely that new tools for realising art *will* be adopted and *will* transform art forms in ways which cannot be accurately predicted. The nature of the shift from orality – the transmission of knowledge via the spoken word – to literacy – knowledge transmitted through writing – requires examination and application to the issues composers face in moving, or not moving, to MNS.

3.3.1 Writing and composition *are* technologies

However, it is first vital to acknowledge that MNS is by no means the first technology available to composers and that, long before the microchip, humans employed technologies in the communication of language and ideas. Walter Ong, in the following, is referring to the writing of text, yet his assertions apply equally well to composition:

¹⁶ Kramer, Jonathan D., *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*, 1998, p.71

Because we have by today so deeply interiorized writing, made it so much a part of ourselves...we find it difficult to consider writing to be a technology as we commonly assume printing and the computer to be. Yet writing (and especially alphabetic writing) is a technology, calling for the use of tools and other equipment: styli or brushes or pens, carefully prepared surfaces such as paper, animal skins, strips of wood, as well as inks or paints, and much more.¹⁷

Ong goes on to say that writing might be thought of as far more radical than the communications technologies we commonly think of today:

Writing is in a way the most drastic of the three technologies. It initiated what print and computers only continue, the reduction of dynamic sound to quiescent space, the separation of the word from the living present, where alone spoken words can exist.¹⁸

Composition, like writing, was technological in nature well before the silicon chip made MNS possible. Composition's single greatest technological shift came with its transformation from an oral into a literate phenomenon when, in around 1025, music theorist Guido d'Arezzo invented the basis for the notation used today. His five-line staff forced aside the older neumatic notation, which had emerged around the 9th century as an aid for the learning of plainchant. Guido's notation and the physical means of etching its symbology on to paper-like media were, despite their lack of digital wizardry, the first technologies of composition. Composition as it is known today depends on the *technologies* of both notation and the physical means of recording notation, which, until recently, was carried out exclusively with the writing implement and manuscript. Therefore the arrival of computers, far from redefining the nature of writing

¹⁷ Ong, Walter J., *Orality and Literacy: The Technologizing of the Word* 1982, pp.81-82

¹⁸ *ibid*

compels us to acknowledge that all previous forms of writing are as much technologies as fully computerized hypertext – that writing itself is not merely influenced by technology, but rather *is* technology.¹⁹

Of course, music notation is, for composers, so interiorised that a new means of its realisation, such as MNS, *gives the appearance* of being wholly radical. What is forgotten is that MNS is, notwithstanding that composers will use it to approach composition in new ways, simply a new tool for the use of an older form of technology.

3.4 Orality to literacy, pen and manuscript to MNS

Elements of the current debate over the perceived ills and benefits of MNS may be traced to society's shift from orality to literacy, when the technologies of writing were first popularised.²⁰ This was a monumentally important progression and history records its most important contemporary commentator, Plato, as both an unwitting advocate and an opponent. Ong situates the computer, and some popularly-held notions about its artificiality (which will later be dealt with), in describing Plato's concerns, which are worth quoting at length:

Writing, Plato has Socrates say in the *Phaedrus*, is inhuman, pretending to establish outside the mind what in reality can only be in the mind. It is a thing, a manufactured product. The same of course is said of computers. Secondly, Plato's Socrates urges, writing destroys memory. Those who use writing will become forgetful, relying on an external resource for what they lack in internal resources. Writing weakens the mind...Thirdly, a written text is basically unresponsive. If you ask a person to explain his or her statement, you can get an explanation; if you ask a stupid text, you get back nothing except the same, often stupid, words which called for your

¹⁹ Bolter, Jay David, *Writing Space: The Computer, Hypertext, and the History of Writing*, 1991, pp.239-240

²⁰ The question of the movements of various cultures from orality to literacy is intellectual territory fronted by Marshall McLuhan, Walter J Ong, and Eric Havelock.

question in the first place. In the modern critique of the computer, the same objection is put, 'Garbage in, garbage out'. Fourthly, in keeping with the agonistic mentality of oral cultures, Plato's Socrates also holds it against writing that the written word cannot defend itself as the natural spoken word can: real speech and thought always exist essentially in a context of give-and-take between real persons. Writing is passive, out of it, in an unreal, unnatural world. So are computers.²¹

Ong unravels Plato's concerns, revealing the limitations of preliterate narrative as compared with the many world-changing benefits that would accompany writing. He identifies a number of differences between the Homeric and the Platonic worlds, namely that orality employs simple word structures, is clichéd, epithetic and repetitious in order to aid memorisation and is preservationist and thus resistant to change. Orality tends to cast knowledge against a backdrop of conflict, seeks to be relevant to an audience rather than objective, is distanced and abstract and irrelevant to both the present and future.²² However, while there was "a long period of resistance to the use of letters"²³, in casting off the many limitations inherent to oral transmission of knowledge, literacy freed human thought. With literacy, the mind came to be understood as a writing surface in its own right, and thinking became the activity of inscribing on that surface.²⁴

Plato's concerns are both further debunked and the philosopher made to seem a champion of the very revolution he opposed when philosopher Jacques Derrida points out that, in the very act of recording his thoughts in literature, Plato affirmed the technology of writing.²⁵ While his teacher, Socrates, rejected writing

²¹ Ong, p.79

²² *ibid*, pp.31-57

²³ Gibson, Twyla, *Eric Havelock: Plato and the Transition From Orality to Literacy*, citing Havelock, Eric A. *The Muse Learns to Write* (1986), p.90, at http://www.mcluhan.utoronto.ca/tsc_havelock_orality_literacy.htm, viewed 02/08/06

²⁴ Bolter, p.207

²⁵ Haas, Christina, *Writing Technology: Studies on the Materiality of Literacy*, 1996, p.7

and committed none of his ideas to the page, Plato became the first philosopher to “adapt sustained oral teaching into written discourse.”²⁶

Pre-notational/literate music, it could be argued, shared many of the limitations of pre-Platonic orality identified by Ong. In the same way that the adoption of literacy would lead to Shakespeare and Joyce, Arezzo’s first technologising of music enabled it to advance beyond forms that depended on their ability to be orally/aurally transmitted (plainsong, etc) to the great works spanning polyphony to present. Says Howard Goodall, “Notation paved the way for great feats of musical architecture.”²⁷ If the notation and print revolutions could lead to the achievements of Bach through to Boulez, it then follows that, in this age of musical pluralism and a seeming perpetual searching for the new, there is a place in composition for reasoned experimentation with new technologies.

Composers in the early 21st century find themselves situated similarly to Plato: at a time of transition, when older technologies are considered by some to be perfectly adequate for creating music, while newer technologies offer clear immediate benefits but are untested over time and are thus shrouded with some uncertainty. Opposition to the first and second technologisings of language (writing and print) have long since fallen silent, while its third transformation, the word processor, today attracts little resistance; and this after only around twenty years of widespread adoption. The acceptance of technological change in composition seems set to follow that of writing: composition’s first and second technologisings (the inventions of notation and print) have not, for some time, been contested (with the exception of very legitimate arguments about the restrictive nature of Western notation, which will be discussed in 5.4.1). Already, it is seen that outright rejecters of MNS in Chapter Two’s questionnaire exist as a small minority of composers. It would then seem likely that, in the near future, the current opposition to MNS may be viewed with a sense of puzzlement.

²⁶ Gibson, p.111

²⁷ Goodall, Howard, *Big Bangs: The Story of Five Discoveries That Changed Musical History*, 2001, p.32

3.4.1 Secondary orality

Many modern-day technologies move society into a realm Ong labels “technologized” or “secondary” orality,²⁸ something that McLuhan pointed to as early as 1964 when he said, “With the return to simultaneity we enter the tribal and acoustic world once more. Globally.”²⁹ McLuhan’s use of the word “simultaneity” was in reference to the immediacy of electronic technologies in conveying their messages to users. Heim offers an echo: “Audio-visual electronics reawakens impulses of the oral culture”³⁰. This new orality holds that certain communications technologies, like television and radio, facilitate a reintroduction of orality as the primary form of knowledge transfer, bringing the nature of knowledge-transfer full-circle. The Internet is another secondary orality, as it holds in common with primary orality the condition of communication being instantaneous: just as the voice transmits instantly to a listener, e-mail or the information on a web-page travels immediately to recipients (as opposed to non-electronic written matter, which experiences a delay between creation and reading).

MNS is an interesting amalgam of these two kinds of secondary orality. Firstly, the MNS composer writes music via modified literate means, entering notation into MNS’s digital environment. The composer is then aided by the ability to listen to the music while composing, via synthetic or sampled playback. The music exists both as literature and as a modified kind of orality: in exteriorizing music (entering it into MNS) and having another agent (the computer) sound it, the computer becomes a vehicle for “teaching” the composer, both “orally” (aurally!) and visually (as notation). Secondly, the playback is available to the composer immediately (McLuhan’s “simultaneity”), there being almost no delay between composition, realisation and confirmation (the “performance”, however

²⁸ Ong, p.122

²⁹ McLuhan, Marshall, *Understanding Media*, 1964

³⁰ Heim, p.67

poorly rendered). In composition, the time between realisation of the score and the actual performance can be long delayed, so the application of the secondary orality tag to the instantaneous MNS is perhaps even more pronounced than in written literature.

Secondary orality is a precursor to a coming-full-circle that McLuhan and others label "post-literacy." Radio and television, now considered old technologies, are now joined by such devices as txt/pxt-capable cellular phones and the less word-dependent aspects of the Internet in driving society towards a state in which the written word is displaced or radically altered by multimedia. New Zealand company Right Hemisphere is but one manifestation of post-literacy, specialising in the animation of technical manuals: whereas once the instruction manuals for the operation of certain machinery filled volumes of printed material, Right Hemisphere now renders them as moving images and sound.³¹

Post-literacy, vis-à-vis music, is likely to centre around the controversial notion of the replacement of composers and performers by machines, an end to the interface with music via the notated score being a precursor to this. Such a musical epoch has, argues Herbert Russcol, been in the making for quite some time:

The moment man ceased to make music with his voice alone the art became machine ridden. Orpheus' lyre was a machine, a symphony orchestra is a regular factory for making artificial sounds, and a piano is the most appalling contrivance of levers and wires this side of the steam engine.³²

Michael Dellaira offers an echo:

³¹ <http://www.righthemisphere.com/>, viewed 30/10/06

³² Jacques Barzun, quoted in Russcol, Herbert, "Music Since Hiroshima: The Electronic Age Begins," in *The American Scholar*, Volume 39, No.2 (Autumn 1970), p.289

machinery and gadgetry – technology, if you will – has in a very significant sense been intimately bound up with the course of western music, at least since the day when instruments ceased being mere shadows of vocal lines.³³

Russcol and Dellaira hold that music has for some time been a cyborg phenomenon, in which humans and machines have intertwining roles. This very condition likely entails a fear that music making machines will, at some point, overtake and render unnecessary the human element (see also 4.5). While MNS has ended hundreds of years of relative technological stasis in composition, its foundation upon latterly-threatened music literacy may require that it is fundamentally transformed or totally replaced in the foreseeable future.

3.5 Resistance to MNS: cultural, compositional-historical and composer misuse factors

While debate about the utility of communication media such as MNS might be traced back to Plato's discourses, composer concern over MNS use stems from less antique sources. If the study of technology and society is "an examination of the processes of mutual adjustment among technologies, social structures, and values,"³⁴ it might then be said that resistance to or acceptance of MNS is in part due to real or perceived friction between it and cultural structures, beliefs and values of the present age. Frictions between MNS and beliefs and values that are exclusive to the field of composition, specifically the iconic notion of the composer-as-genius, also play a major role. Thirdly, the misuse of MNS by some, mostly inexperienced, composers has lead many to reject the software, blaming it rather than composer practices for errors in scoring or musical judgement. We will examine these three resistance factors presently.

³³ Dellaira, Michael, *Some Recorded Thoughts on Recorded Objects*, at <http://www.michaeldellaira.com/>, viewed 08/11/06

³⁴ Taviss, Irene, *Our Tool Making Society*, 1972, p.3

3.5.1 Cultural factors

There are historical precedents of resistance to new technologies. Says Mokyr:

technological progress in a society is by and large a temporary and vulnerable process, with many powerful enemies with a vested interest in the status quo or an aversion to change continuously threatening it.³⁵

Composition's technological status quo, the pen and manuscript, remained in place for hundreds of years, and in this time a great wealth of repertoire was created. It is therefore unsurprising that many would seek to defend the methods by which Bach, Brahms and Boulez composed music.

Elements of general societal attitudes towards the effects of all types of technologies throughout the 20th century remain, to a greater or lesser extent, today. Irene Taviss traces society's relationship with technology from a time before World War II when, "The obvious benefits of technology in the form of labor-saving machines and a higher standard of living seemed clearly to outweigh whatever spiritual costs the critics decried"³⁶ to a postwar "disaffection with technology"³⁷ spurred by the horrors of the atomic bomb. A decade after the war, "technological unemployment" and "automation hysteria"³⁸ became societal concerns. At this time, the distinction between "tools" and "machines" became sharply delineated, the former tied to the desirable notion that humans control the crafting of their own destinies, the later blackly "set loose from human control."³⁹ More recently, says Taviss, concerns over technology's environmental impact have existed alongside a kind of technological disenchantment, whereby humans

³⁵ Mokyr, p.11

³⁶ Taviss, p.3

³⁷ ibid

³⁸ ibid

³⁹ Bolter, p.233

are rendered “alienated and impotent in the face of a dominant and autonomous technology”.⁴⁰ “Counterculture” stances have held that the objectivity and rationality intrinsic to technology have led to the “crippling of human personality and the demise of meaning and value”.⁴¹

The technological climate into which MNS emerged in its shift to mainstream PC and Macintosh formats, was one dominated by the emergence of the Internet, cellular phones, mp3 players and other small and powerful devices. In this climate, all sense of surprise and wonderment at new technologies dissipates. The user-friendly WYSIWYG/point-and-click nature of new technologies results in disinterest in *how* new devices work, with little energy devoted to questioning their effects on the way people work, play and create.⁴² Dr Stephen Marshall⁴³ says that it is the purposes and uses of such devices rather than the means by which they work (or their broader effects on users) that are the key concerns of those sixty-eight percent of technology adopters that Everett M. Rogers (refer to 2.5.7) calls the “early” and “late majority”.⁴⁴

Disinterest in how things work is reflected in what Christina Haas identifies as two technology-related “interconnected cultural ‘myths’”⁴⁵. The first, the “transparent technology assumption”, holds that – if we apply it to a compositional context – composition is seen as composition regardless of the physical tools of production: composing with pen and manuscript is the same as composing with MNS. Mark Poster’s “normalisation effect”⁴⁶ might help explain this assumption: the composer is initially struck by the shortening of the distance from thought to realisation made possible by MNS. However, the normalisation effect soon has the composer accustomed to the MNS way of composing and he or she no

⁴⁰ Taviss, p.3

⁴¹ *ibid*, p.9

⁴² Such devices (the Apple iPod being the most recognisable current exemplar) are “embedded innovations,” in which the mechanics are hidden behind sleek plastic casings.

⁴³ Dr Stephen Marshall, Senior Lecturer, UTDC, Victoria University of Wellington, personal communication, 07/11/06

⁴⁴ Rogers, Everett M., *Diffusion of Innovations* (Third Ed.), 1983, pp.247-251

⁴⁵ Haas, p.21

⁴⁶ Poster, Mark, *The Mode of Information: Poststructuralism and Social Context*, 1990, p.113

longer perceives the differences between this method and older ones. The computer appears now to be fulfilling the exact same functions as pen and manuscript and might be viewed as the same means to an existing end: it is transparent.

Says Haas:

Viewing technology as transparent encourages a belief that writers [composers] can use computer technology without being shaped by it, and therefore discourages any examination of how technology shapes discourse [compositions] and how it, in turn, is shaped by discourse.⁴⁷

Katz, in talking about recording technologies, emphasises the two-way-street nature of people and technologies:

Although we often respond to technology within a context of limited options not of our own making, we must remember that in the end, recording's influence manifests itself in *human* actions...it is not simply the technology but the relationship between the technology and its users that determines the impact of recording...users themselves transform recording to meet their needs, desires, and goals, and in doing so continually influence the technology that influences them.⁴⁸

While Chapter Two's questionnaire illustrated that a great many composers maintain a critical and aware relationship with MNS, it is strange that the present study appears to be the first to specifically address the effects of MNS. The absence of scholarship in this area might suggest that the transparent technology assumption, a mindset formulated through composers' experiences with other technologies, is at work.⁴⁹ Another interpretation is that this study is one that

⁴⁷ Haas, p.22

⁴⁸ Katz, pp.3-4

⁴⁹ It is acknowledged that in areas of music in which audio technologies have long been integral, such as electroacoustic music, it can be strongly argued that technological transparency, insofar as it pertains to *listening*, is a desirable mindset. Denis Smalley, in "Spectromorphology: explaining sound-shapes"

might be expected to be conducted by dedicated musicologists rather than by composers. Those not involved with MNS-aided composition may not have come to an awareness of the extent to the role that it now plays in compositional practice.

A second “myth”, the “all-powerful technology assumption,” dictates that the effect of computers is “far-reaching and profound...wholly positive and always inevitable.”⁵⁰ According to this notion, users of technology must simply let the computer revolution take them and their work wherever it must. Taviss warns of the dangers of this belief, saying: “Like any technology, computers do not exist in a vacuum. The preexisting political structures and traditions help to determine how they will be used.”⁵¹

The advertising material of MNS’s chief proponents promotes the technology in line with the all-powerful technology assumption. MNS is pitched as wholly revolutionary, not for the cognitive changes it requires of composers’ approaches to work, as discussed in 4.4.2, but for its clear superiority over preceding composing methods. This superiority is variously couched as “civilized”: “The civilized way to create, arrange, edit, transcribe, orchestrate and print music”⁵²; somewhat intelligent: “Manuscript paper that thinks”⁵³; a tool that relieves the composer of all labours except for the necessary “creative spark”: “All you need is the inspiration to write music. Finale does the rest”⁵⁴; and fast and efficient: “Sibelius gets it done with more than seconds to spare.”^{55 56}

(*Organised Sound 2*, 1997, p.109) says that “technological listening,” in which listeners focus on the hardware/software and technique of sound production, detracts from the listening experience; treating the devices and techniques behind sounds as transparent is, in this context, desirable.

⁵⁰ Haas, p.22

⁵¹ Taviss, p.13

⁵² Litterst, George F, blurb on software box of Finale 1.2, 1989, Coda Software

⁵³ Sibelius 7 advertisement, printed on the back page of *CANZONETTA*, February 1996

⁵⁴ Litterst

⁵⁵ Advertising claims made at the Sibelius Software website, <http://www.sibelius.com/home/us/noflash.html>, viewed 31/07/06

⁵⁶ The language of this advertising might also be said to be the product of the genius/inspiration trope discussed in 3.5.2: MNS is claimed to lessen the severity of, or remove altogether the repetitive and

It is, of course, in the nature of advertising to push products as life-beneficial, but this kind of marketing hype places composers in “a subordinate position to technology, removing them from the realm of technology development and critique and setting them in positions to be merely receivers of technology.”⁵⁷ Composers would be, in this mindset, unable to assess the effects of their interaction with the software and would therefore be unable to compensate or adjust in those areas in which the computer might distort composerly intention. For example, it will be seen in 5.2 that MNS can, for composers, distort the passing of time, leading to miscalculations of tempi and other temporal notative instructions. In the absence of an awareness that MNS *is not* all-powerful, and that it should be subjected to critical evaluation, composers may (especially when they are inexperienced) to their detriment, miss this and many other of the transformative influences of MNS.

Connected with this is the air of inevitability one feels surrounding the adoption of many different types of technology. A contemporary example might be that while some people own a flat-panel television, many more would like to own one but cannot afford one, while most would imagine that, with time and falling costs, they *will* own one some time in the future and indeed *should* own one. In this latter sense, aggressive commercial carrots and “keeping-up-with-the-Joneses” mentality are to some extent likely to exert an influence on composers considering the move to MNS.

Once composers have bought an MNS package, the additional pressure of having to purchase software updates becomes an issue. By not owning and running the latest software versions, composers run the perceived, but not necessarily actual, risk of finding themselves in a ghetto of the obsolete, possibly

physically arduous elements of score production, leaving only the composer and his or her creativity. The MNS-using composer is hence aligned more closely with the Mozartian ideal: 100% inspiration, 0% perspiration.

⁵⁷ Haas, p.22

unable to share files with users of later software versions and feeling that others are “getting ahead” without them.

3.5.2 Composition-historical factors

Concurrent with these historically-reinforced societal attitudes towards technology are those ideals and icons that have developed out of more than 400 years of composition with Western notation. The “composer genius” ideal glorifies many (but not all⁵⁸) of the best composers of history, in doing so condemning latter-day composers, regardless of their excellence, to relative obscurity. Exemplar composers are, so the notion holds, long-dead, wig-wearing, white and always male. They are imagined hunched over desks, their music being not so much crafted, as “pouring” from them, as reinforced by genius of another kind, Albert Einstein: “the music of Mozart is of such purity and beauty that one feels *he merely found it* [italics added] – that it has always existed as part of the inner beauty of the universe waiting to be revealed.”⁵⁹

Beethoven physically composed at a desk, but formulated his music while walking in the woods – the Romantic notion of the composer at one with nature.⁶⁰ Mozart, in *Amadeus*, a film with great popular appeal, was observed by Salieri to compose “in his head”, while playing billiards.⁶¹ The seminal image of Beethoven is the Joseph Karl Stieler portrait of 1820, in which the composer strikes an intense gaze, his tools, the pencil and manuscript, clutched in his hands. The

⁵⁸ Kivy describes composers such as JS Bach and Haydn as “odd men out,” composers of genius by any *musical* measure, but too (respectively) “working class” and “uneventful” to occupy the popularly conception of genius. Kivy, Peter, *The Possessor and the Possessed: Handel, Mozart, Beethoven, and the Idea of Musical Genius*, 2001, pp.164-174

⁵⁹ Einstein, Albert, as quoted at <http://en.wikipedia.org/wiki/Mozart> (viewed 19/09/06) and at numerous other Internet locations (primary source of quote not locatable)

⁶⁰ Kivy, pp.129-130

⁶¹ *ibid*, p.158

composer looks toward the artist as his pencil hovers close to the paper, it being almost implied that he could resume composing without even looking at the page.

The genius ideal holds that composition journeys directly from brain to manuscript. Composition by this process alone is the foundational litmus of composer prowess. Nowhere, in the popular figuring of what it is to be a great composer, is the composer understood to commune with a computer and MNS. The iconic 1946 photograph of Stravinsky seated at the piano⁶² is perhaps the exception that proves the rule that genius composers do not even work with musical instruments.⁶³

The effortless, profound, innate, other-worldly (and often personally flawed: the *tortured or absent-minded*⁶⁴ *genius*), nature of the media-popularised composer of history is, one would like to assume, seen by most living composers as the misconceived stereotype that it is.⁶⁵ Yet one suspects that, in some composition quarters, elements of the romanticised vision of the composer are alive and, consciously or otherwise, work against infiltrations, such as MNS, that would challenge it. While this notion was not overtly detected in responses to Chapter Two's questionnaire, one composer did reveal (in responding to Question C6) the presence of a certain resistance among senior composers to MNS-use by fledgling composers on the grounds that such composers had not "paid their dues" by composing at any stage using the physical methods employed in the pre-MNS/Romantic era.

⁶² Photograph taken by Arnold Newman. Newman was attempting to capture the composer posing with the tools of his trade – an "environmental portrait." Haworth-Booth, Mark (ed.), *The Folio Society Book of The 100 Greatest Photographs*, 2000, p.150

⁶³ See also 2.5.17 for Berlioz's sentiments on composer use of the piano

⁶⁴ Kivy, pp.121-123

⁶⁵ High-profile composers such as John Adams, who is forthright in his endorsement of the use of acoustic instruments and computer technologies in notated music, are helping to expose the fallacy of this stereotype. Jemian, Rebecca and De Zeeuw, Anne Marie, "An Interview with John Adams" in *Perspectives of New Music*, June 1996, p.92

3.5.3 Composer misuse factors

Secondary school music teachers and university lecturers frequently encounter cases in which students have used MNS to compose music that is poorly typeset and/or impractical for musicians to play. The most common complaints are well documented in Appendix B, Questions C6 and C7. Often, MNS itself is held responsible for causing such mistakes. However, a great many composers produce work of the highest quality using MNS, music that conforms with all of the conventions of Western notation and takes into account the abilities of the instruments written for and the intended performers. The reader will recall Mike Katz's view on this: "it is not simply the technology but the relationship between the technology and its users that determines the impact of [MNS]."⁶⁶

Clearly, MNS is not the cause of notational and performance-practical errors, but rather the composers themselves who, through lack of experience, insufficient MNS operating knowledge or carelessness, have rendered problematic music. There is a deeper cause too, in which MNS plays with the composer's sense of reality and perception of time, in effect turning the composer away from the primary concern of writing for live performance to that of writing *for the software*. This notion will be explored at length in Chapter Five.

The very *appearance* of MNS-rendered notation could quite possibly amplify the sense of horror that experienced composers feel when viewing such notational abuses. Heim quotes one writer:

Much as I loathe the typewriter, I must admit that it is a help in self-criticism. Typescript is so impersonal and hideous to look at that, if I type out a poem, I immediately see defects which I missed when I looked through it in manuscript.⁶⁷

⁶⁶ Katz, pp.3-4

⁶⁷ Heim, p.193

With all of the elements (the perfectly formed note-heads, correct-width stems and beams, ruler-straight barlines, etc) looking like they are the makings of top publishing houses, teachers find themselves *expecting* publishing house quality in all aspects of scores.⁶⁸ Mistakes are, in this environment, amplified. It is likely that similar errors, made in the course of writing by hand, will seem less egregious because of the (typically) lower quality of hand-written presentation. Students of composition have always made notational errors and teachers must realise that these will look especially poor in the MNS environment.

3.6 Conclusion

MNS has achieved widespread use among composers in a relatively short time period. While it may not warrant universal respect, its high adoption rate means it surely warrants measured analysis of its place in the history of music literacy. All literacy revolutions encounter opposition that, with time, is subsumed by practitioner experience and the benefits of the new vistas that invariably open up. Useful analysis of MNS requires the stripping away of the misnomer that it is a technology, whereas notation itself and writing are not. It must also be realised that new technologies, while rarely perfect, are neither “good” nor “bad” nor “impacting,” but are tools that can augment existing practices for the exploitation of new possibilities. Such tools are neither all-powerful, uncontrollably leading composers in unpredictable directions, nor transparent, acting merely as new means to existing ends.

MNS is subject to the same cultural factors as all new technologies, while struggling under the weight of inherited composition-specific baggage. While it is true that MNS introduces a new context in which errors are amplified in an otherwise “correct” visual environment, that (mainly) inexperienced composers

⁶⁸ Báthory-Kitsz says: “The clarity of computer engraving has raised the level of expectation.” Báthory-Kitsz, Dennis, *Not So Technophobic*, at <http://www.maltedmedia.com/people/bathory/waam-20060622.html>, viewed 10/10/06

sometimes commit notational errors while using MNS is not the fault of the software itself, but of a lack of general awareness of theoretical norms and/or of inadequate training. The meeting place of MNS and composer has resulted in changes in compositional practice that suggest the necessity of changes in pedagogical approaches. To repeat Katz, “it is not simply the technology but the relationship between the technology and its users that determines the impact”⁶⁹ of MNS.

In sum, MNS is firmly established. A broad and pragmatic approach to understanding of its function in composers’ creative arsenals is needed. As such, Chapter Four will analyse the physical and cognitive nature of the MNS work environment, conceptually framing an attempt, in Chapter Five, to identify some specifics about the ways in which MNS affects composer practices and outcomes.

⁶⁹ Katz, pp.3-4

Chapter Four

The nature of the MNS work environment

4.1 Introduction

MNS is, primarily, a digital environment for the realisation of (Western) music notation. Jay David Bolter's definition of the word processing environment of the modern-day writer is analogous with the MNS environment of the composer. One could reasonably replace his words "writing" with "composition" and "text" with "music" in the following:

Writing is the creative play of signs, and the computer offers us a new field for that play. It offers a new surface for recording and presenting text together with new techniques for organizing our writing. In other words, it offers us a new writing space.¹

This new writing space "lives" in the computer CPU, is engaged with via the computer keyboard and pointing device (and sometimes MIDI keyboard) and is sighted on the computer monitor. As has been seen, only a minority of composers (the writer includes himself in this group) use MNS exclusively, so it cannot be said that, in 2006, the computer interface *replaces* pen and manuscript. Rather – in most cases – it *augments* the older technology. With the ratio of MNS to pen and manuscript usage in flux, it is problematic to talk about "the MNS composing environment" because this cannot be understood as a singular, concrete entity. The focus will therefore be on the experiences of the fully MNS-immersed, image-*and*-sound-using composer, both because the author personally identifies with this manner of working and because – with an

¹ Bolter, Jay David, *Writing Space: The Computer, Hypertext, and the History of Writing*, 1991, p.10

eye to the (post-literate?) future – younger generations of composers seem likely to work in this manner.²

This chapter will describe the physical nature of MNS, look at the dissonance between it and the Romantic ideal of composers and composition and identify the surface differences between it and the pen and manuscript paradigm. It will discuss the ways in which MNS makes new cognitive demands on the composerly mind, examining the altered employment of the composer's short-term memory, leading to the condition whereby MNS might be thought of as a collaborative partner in the creative process. The negative assumption that MNS is more technological and artificial than methodologies of the past will be challenged, while the loss of "signature of myself" and of tactility will be subjected to Poster's theory of "normalisation." An examination of the degrees to which the MNS work environment might be thought of as real, virtual reality, simulation or prosthesis, will close off the chapter.

These issues will, while offering some explanations of how MNS changes compositional practices and outcomes, be primarily concerned with *conceptually framing* the nature of the MNS phenomenon, laying the groundwork for exploration into the deeper effects of MNS in Chapter Five. Texts dealing with the effects of computers in the field of literature, as well as broader studies concerning technological adoption, will again be turned to, these offering useful points for comparison with MNS.

² Baroness Greenfield notes that "one recent survey of eight to 18 year-olds claimed that children were now spending on average 6.5 hours a day using electronic media." Greenfield, Baroness, *Education: Science and Technology*, speech to the House of Lords, 20/04/06, column 1219, at <http://www.publications.parliament.uk/pa/ld199900/ldhansrd/pdvn/lds06/text/60420-18.htm#>, viewed 09/10/06

4.2 Dissonance between the physical tool and the Romantic ideal

The physical nature of MNS can immediately be seen to be at odds with the Romantic ideal of composition identified in the previous chapter. The historically acculturated romance and simplicity of the chair and desk, the quill, ink well and manuscript is gone, replaced by the plastic of the CPU, screen, keyboard and mouse. The enduring nature of the Romantic ideal renders such notions as the members of the First Viennese School ordering Sibelius software upgrades via e-mail, or meeting at drinking houses to discuss RAM requirements for the rendering of WAV files as absurd. Musicology offers no depictions of Bach chatting with his patrons via Skype, Brahms hunting for a wireless router at his local Dick Smith or Webern hiking in the alps with his iPod. The modern computer started out as a physically massive device designed to churn out thousands of calculations in a short amount of time, often for the military; its best known personality is the decidedly unsexy Bill Gates; SPAM and slow download speeds daily aggravate the lives of countless millions.

The computer comes up against the previously discussed myth of the composer-genius because it looks and *feels* like such a departure from the recognised working model. In part, it is hampered by the perceived sterility of its box-like physical being, a presence that has not had sufficient time to accrue any cultural value outside of the mostly negative cachet of nerdism. While the sleek futurism, nomadic wireless urbanism and domestic chic of certain technologies has certainly found a place with exponents of cool, the box-and-screen lags behind, largely seen as a tool of the clerical masses or of adolescent video gamers.

It might also be argued that the Romantically essential *invisibility* of the mental processes of composition is somewhat eroded by MNS. That one might see the work of the composer unfolding on a computer, a device that could instantly send any composition anywhere, detracts from the transcendence and mystery of the process. That the author was able to capture digital video footage depicting nearly the entire unfolding of one of his compositions (see Chapter Six) shows

that the compositional process may in theory now be witnessed in its entirety by anyone.

While pen and paper might be used for any number of purposes, they were simple and “innocent” tools that could not be used to display such things as video games or dubious downloaded images. Composition now shares the same standardised platform that is used to produce or view just about everything else in the world that can be printed or projected. Says Eisenberg: “Music – like everything else – has become ‘information’...music is poised to enter the noosphere, Earth’s whirring halo of mind.”³

Hegel would be concerned. While the overtly religious dogmatism of his writings warrants caution, his views on music contribute to the Romantic ideal. Hegel said that music is superior to architecture and sculpture because it resists the aesthetic cheapening of these *objets d’art* which, being material, can be bought and sold:⁴

In this region the sensuous medium [music] displays itself as divided in its own being and universally set down as ideal. Thus it has the highest degree of conformity with the content of art, which, as such, is spiritual, and the connection of intelligible import and sensuous medium develops into closer intimacy than was possible in the case of architecture and sculpture.⁵

In Hegelian terms, recording and recording media, and, latterly, music purchased (or stolen) from the Internet, constitute degradation of this high form of art. MNS attacks Hegel’s esteem of music at a more fundamental level: its very composition. That composition with MNS requires such *machinery* for its realisation detracts from the ethereal condition of the Hegelian ideal: the

³ Eisenberg, Evan, *The Recording Angel: Music, Records and Culture from Aristotle to Zappa*, Second Ed., 2005, p.213

⁴ Bosanquet, Bernard and Bryant, W.M., *Selections from Hegel's Lectures on Aesthetics*, Journal of Speculative Philosophy, 1886, at <http://www.marxists.org/reference/archive/hegel/>, viewed 26/09/06

⁵ *ibid*

transcendental nature of the act of composition is tied to the earthly object of the computer, rendering the spiritual mundane.⁶ This thread will be picked up again in 5.4, when MNS's dematerialisation of the written trace will be examined.

Moving from Hegel's Romanticism to Theodore Adorno's discussion of the fetishization of "great works," the transcendental is again rendered mundane when music is fragmented and used repetitiously:

The works which are the basis of the fetishization and become cultural goods experience constitutional changes as a result. They become vulgarised. Irrelevant consumption destroys them...reification affects their internal structure. They are transformed into a conglomeration of irruptions which are impressed upon the listener by climax and repetition, while the organisation of the whole makes no impression whatsoever.⁷

The marketplace in which music, as a commodity, might be sold in fragmented form defeats, in Adorno's thinking, the necessity for "structured listening" and degrades the art form.

Yet a type of musical consumer romanticism thrives and is found to be a fluid and constantly-updating concept. Katz identifies some of the reasons why, for many people, purchasing compact discs is considered preferable to downloading music from the Internet, citing amongst other things the physicality, permanence and superior appearance of CDs. These are very Romantic notions. Reversing only twenty or so years, it would have been possible to detect feelings of regret for the replacement of the LP by CDs on the grounds of "warmth" and cherished tactile/ritualistic concerns surrounding the playing of records. New technologies eventually acquire Romantic currency. It is likely that the future surpassing of MNS by some new tool will provoke sentiment not unlike that of those who lamented the passing of the LP and the CD.

⁶ Though, of course, the pen and manuscript are no more earthly than computers

⁷ Adorno, T.W., "On the Fetish-Character in Music," 1938, p.298 in Gillespie, Susan H. et al trans., *Essays on Music*, 2002.

4.3 Observable differences: MNS versus pen and manuscript

A number of surface observations can be made on the nature of the differences between MNS and pen-and-manuscript composition. These provide fairly obvious ways in which MNS affects compositional practices and, to a certain extent, outcomes. These are all identified at length in Chapter Two and its appendices (particularly under questions B1 and B2) and can be summarised thusly:

4.3.1 Appearance

4.3.1.1 Notation

The issue of MNS's "clean look" amplifying errors was discussed in 3.5.3, while the loss of personal "signature" is examined later, in 4.6.1. To recap earlier discussion, MNS provides composers with the ability to realise in their own music the clean, standardised and easily-read notation of the music engraver.

Individual noteheads, stems, beams, rests, slurs, ties, clefs, time and key signatures and all other elements of Western notation are always, with MNS, perfectly presented. The correct placement and spacing of objects and the rationalising of rhythms remain largely the task of the composer and many scores fail visually and theoretically when these aspects are neglected.

This has had many positive implications for composer-performer relations: the composer no longer has to worry that the performer will struggle to read his or her hand-written scores. Says Báthory-Kitsz, "Think about this: Would today's players play Mozart's parts? Unless they were making a historical point, *absolutely not.*"⁸ Well-prepared MNS scores should be as easy to read as those worked-up in the best of music publishing houses.

⁸ Báthory-Kitsz

4.3.1.2 The visual environment

The display of notation by way of digital pages in the MNS environment is quite different from that experienced by composers working with paper manuscript. Such composers might stack scores as piles of pages, or spread works out on a desk or possibly pin them sequentially to a wall. In an environment in which understanding of the “shape” of works is most readily conveyed by recourse to playback, the importance of visual inspection and interrogation of materials might seem of lesser importance. However, the ability to instantly sight materials at any point in scores (that is, without the inconveniences of scrolling over pages, or requesting instant jumps to specific pages or bar numbers) remains important. A number of Chapter Two questionnaire respondents commented that having, with MNS, to scroll to see whole pages of scores is inconvenient, inefficient and disruptive.⁹

The visual architecture of entire works is better portrayed on paper than on computer monitor, as the MNS composer can only see as many pages as can be rendered on a screen at one time. For large ensemble works, it is often impossible to see one whole system of music on a monitor at a readable degree of zoom. A poor sense of spatiality, argues Andrew Ballantyne, is rendered by the screen,¹⁰ though this will likely change (to an extent limited only by monitor size) as the cost of large monitors decreases and more composers are able to increase their screen size.

⁹ Refer Appendix A, Question B2

¹⁰ Ballantyne, Andrew, “Architectonics of ‘The Box’,” in *Television: Aesthetic Reflections* edited by Ruth Lorand, 2002, pp.133-134

4.3.2 Speed of input and editing: reallocation of composer time

Input of material with MNS is, once the composer is well-versed in the software, very fast, with computer keyboard “shortcuts” and MIDI keyboards allowing for entry of materials at nearly the same rate as compositional thought. While a hand-writing composer may be able to write just as quickly, the same degree of neatness is physically difficult to achieve in a short time-frame. More importantly, the MNS composer has at his or her disposal the means to copy, cut, paste, transpose (or even invert or retrograde) material with the same speed as those same basic transformative manoeuvres might be performed on words with a word processor.

The effect of greater input speed on the composer’s working practices is that large amounts of time and effort are saved compared with working by pen and manuscript. This freed-up time is now either spent constructing and auditioning alternative musical paths (something that can be achieved relatively quickly with MNS), or is put into raising the standard of the score’s presentation (see below under publishing), or is time freed for non-compositional activities. Using freed-up time to construct and audition alternative musical options is arguably of benefit to composers in that, to some extent, it ensures better-considered compositions. However, one composer in Chapter Two’s questionnaire argued against this: “Any increase in productivity due to the speed of MNS has been offset by time taken to audition competing musical options.”¹¹ It is also possible that the power to quickly create a number of scenarios might overwhelm composers, detracting from the final outcome. As Heim says of word processing:

Possibility dominates over consistency of vision...With word processing a creative super-abundance prevails over the composure of the mind characteristic of traditional formulation. Mental excitement and stimulation supplant mental composure.¹²

¹¹ Refer Appendix A, Question C2

¹² Heim, Michael, *Electric Language: A Philosophical Study of Word Processing*, 1987, p.212

As with most criticisms of MNS, it is well to recall Lévy's caution that new technologies are "neither good nor bad...or even neutral."¹³ MNS is neither inherently useful nor damaging – the manner of its employment is what determines the specific nature of composer methodologies and creative outcomes. In other words, it is the relationship between the technology and the nature of its usage that is at stake.

4.3.3 Part-making

Parts are now generated in a fraction of the time that was required when working by hand. This part of the compositional process is arguably the place where MNS saves composers the most time and effort. In theory, part-making with MNS is less error-prone than when working by hand, meaning less chance of embarrassing and financially costly errors during rehearsal. However, it is not uncommon to see errors produced primarily when "floating" elements (those symbols not attached to staves) go missing from parts because they were originally attached to the incorrect staff in the full score. While many composers still consider part-making a chore, it is, with MNS, a significantly reduced chore.

4.3.4 Publishing

With the ability to render scores to the level of the professional engraver comes the attraction of self-publishing, or at least, the temptation to spend time making scores resemble publishing-house quality. Says Heim:

Computerized word processing opens up powers of self-publishing in a print format which imitates mechanical print but does so without the complex specialization and capital investment necessary for mechanical

¹³ Lévy, Pierre, *Cyberculture* (Translated by Robert Bononno), 2001, p.8

print. The individual with a laser printer can create virtually typeset manuscripts, with the user controlling more of the final product...¹⁴

While the innovations in note-entry and part-making described above save large amounts of time, self-publishing may well be said to consume that time which was saved:

with the new approach comes more labor spent on controlling the look of the result; concern shifts toward technical problems; the price of freedom [from editors and publishers] is greater responsibility for thinking out technical procedures.¹⁵

Heim links self-publishing with erosion of artistic ownership, arguing that with a “profusion of sprawling possibilities,”¹⁶ electronic publishing means that the “authorial voice will deteriorate as a model of mental integrity.”¹⁷ A more positive view might contend that the ability, with MNS, to self publish, allows composers to side-step the cultural gate-keeping of publishing houses. The Internet then allows for rapid dissemination of music that is independent of the needs of a publishing industry intent on catering only to the mainstream.

To summarise 4.3 to 4.3.4, it is important to identify the surface changes to the composition process rendered by MNS. However, these changes are, once “normalised”, of little lasting consequence to composers. There are, however, a number of deeper issues that emerge as a result of the above changes, which act on composers in less obvious ways. These will be identified and discussed in the following sections.

¹⁴ *ibid*, p.219

¹⁵ *ibid*

¹⁶ *ibid*, p.220

¹⁷ *ibid*, p.221

4.4 MNS and changes in cognition: differences between compositional approaches

4.4.1 The new possibilities of non-linear approaches and subsequent changes in compositional planning

Technologies like MNS and the word processor greatly increase the likelihood that composers and writers will approach their tasks in non-linear ways. It has always been possible to commence the writing of compositions at any point in what will become the final scheme, building in elements before and after such points and developing other “bridgeheads,” finally drawing these together. But the power of MNS’s copy/cut-and-paste and other instantaneous transformational tools makes this manner of working so much less time-intensive and allows for greater experimentation with alternative musical scenarios. That extant threads, cast adrift at various locations in an incomplete score, can instantly be placed side-by-side, the break between them “healed” by the construction of a transition and then playback-auditioned to test the feasibility of their coexistence, far exceeds the practical possibilities of the pen and manuscript paradigm.

Michael Heim notes that the organisational powers of the word processor render a strict “A to Z” approach to writing unnecessary. The writer is able to “jump in” at any point, shaping materials forward or backward from this point, which itself is open to relocation, modification or deletion. Says Heim:

Formulation in word processing is more immediate [than in the pen and paper paradigm], resulting in sets of symbols that are less developed on the basis of sequential organization. With the word processor, the difficulty of getting started is less of a problem. Starting with random sentences and phrases, one finds it easy to begin writing, only later to elaborate and structure what has been entered into a file. With a word

processor, the logical beginning point of a sequence is less dominant over the material it orders.¹⁸

Some questionnaire respondents from Chapter Two (refer Questions B5, B7 and C2) noted their exploitation of non-linear approaches, with statements such as “The ease of ‘throwing notes about’ has increased my output” and “I use cut and paste to throw ideas around” and “MNS allows me to be more reckless with throwing ideas around – something I’m less inclined to be when writing by hand.”

With this methodology comes significant changes in the manner in which composers pre-plan their works. Christina Haas, in writing about the planning undertaken by writers using word processors, says

planning – a critical subprocess of writing – [is] shaped in significant ways by the material technologies that writers use. Not only is planning diminished in total when writers use computers...the patterns of planning over time and the focus of planning are also shown to be different.¹⁹

Haas cites the work of Lillian Bridwell-Bowles et al, in which it was found that college students using word processors spent a great deal of time testing “sentence-level options”²⁰ at the expense of “high-level planning.” In 6.5.2.5, this very phenomenon will be illustrated by using the author’s own compositional practices, in which localised and detailed composition may be seen to come at the expense of concern for larger, architectural parameters.

¹⁸ Heim, p.207

¹⁹ Haas, Christina, *Writing Technology: Studies on the Materiality of Literacy*, 1996, p.73

²⁰ *ibid*

4.4.2 Removing the duty of constant sonic imagining

The cognitive character of the pen and manuscript paradigm and that of full-immersion MNS use are markedly different. Western art music composition is the writing of musical intention in codified form for *later* interpretation and sonic rendering by performers, rather than an art form in which the end result emerges before the artist's eyes, as in the visual arts, or in literature. Instead, composition requires that composers have a deep understanding of how any given work *will* sound. This understanding starts, often but not always, as imagined music, which is then transferred to manuscript. The duty of always "hearing" the work in the mind is maintained throughout the composition process and is central to the successful creation of music. In some extreme cases, this world of sonic imagining is claimed to surpass live performance and recorded music: "With all the progress that we have made in the reproduction of sound, I have yet to hear on record what I hear in the concert hall or what I hear in my mind when I read a score."²¹

The iconic writing-implement-and-manuscript composer devotes a large portion of his or her concentration to maintaining an in-the-mind sound image of the work, because the sonic aspect of the imagining can never be fully externalised during composition. That is, although a piano (or other instrument) may be employed to offer some "real" feedback and external commentary on how the score is progressing, the act of both playing *and* trying to compose concurrently means that pure composition is interfered with. The playing of an instrument is a specialised and mentally strenuous task that detracts from the ability of the composer to focus on compositional matters: in playing the score on the piano, the composer is concerned primarily with locating and sounding notes and not with the compositional matters of evaluation, alteration and generation of materials.

²¹ Gould, Glenn, quoting George R. Marek, vice-president and general manager of RCA Victor Record Division, in "The Prospects of Recording" in *High Fidelity Magazine*, vol.16, no.4, April 1966, pp.46-63 at <http://www.collectionscanada.ca/glenn Gould/028010-502.1-e.html> - viewed 04/10/06

The traditional view, formed prior to MNS, is that the composer's comprehension of his or her music is arrived at through examination of the notated score (and, to a lesser extent, through use of the piano). MNS is an argument for turning this precept on its head. Composition is, after all, the art form that *makes music*, so it seems only natural that *sound* and not its purely functional and intermediary *code*, should convey to the composer a working understanding of his or her music. Stravinsky, in appraising the importance of the use of the piano in his work, said: "I think it is a thousand times better to compose in direct contact with the physical medium of sound than to work in the abstract medium produced by one's imagination."²²

The MNS composer, further to Stravinsky's emphasis on composing with sound, has easy and instant recourse to synthetic (and/or sample-based) playback, meaning that no effort, beyond mentally compensating for the playback's shortcomings, need be expended on imagining how a work sounds. Lévy argues that the short-term memory (the brain function constantly called on by the paper and manuscript composer) is crucial to creative thought, but is inherently limited and that simulation technologies help the creative mind to overcome some of its short-comings:

Simulation technologies, especially those that make use of interactive graphics, do not replace human reasoning but extend and transform the capacities of imagination and thought. Our long-term memory can store an extremely large quantity of information and knowledge. However, our short-term memory, which contains the mental representations we use in conscious thought, is limited. It is, for instance, impossible for us to represent clearly and distinctly more than approximately ten interacting objects.²³

²² Joseph, Charles M., *Stravinsky and the Piano*, 1983, p.239

²³ Lévy, p.146

MNS, in providing the composer with playback, effectively de-clutters the mind, releasing it from the taxing task of constantly recalling how materials sound and allowing it instead to focus on purely compositional tasks. This is especially true of works with large instrumentation, in which many more than ten interacting objects may be in play: by combining a large number of concurrent happenings (for example, an orchestral *tutti* passage) into a single sound, MNS allows the composer to physically hear, rather than painstakingly imagine, the complexities of that which he or she has written.

In sum, the score remains (whether printed on paper or displayed on a screen) the primary device from which composers comprehend and act upon their materials. However, Lévy points out that the interactive and animated nature of modern simulation technologies makes them especially adept at helping the creative mind and its short-term memory:

Although we can mentally evoke the image of the chateau of Versailles, we are unable to count all its windows ‘in our head.’ The degree of resolution of the mental image is inadequate to the task. To achieve this level of detail, we require the use of an external auxiliary memory (engraving, painting, photograph [and notated score]) with which we can perform new cognitive operations: counting, measuring, comparing, and so on. Simulation is an aid to short-term memory, which works with dynamic complexes rather than static images, text, or tables of numbers. The ability to easily vary the parameters of a model and immediately, and visually, observe the consequences of this change can be considered an enhancement of the imagination.²⁴

MNS, in augmenting the visual with the sonic, further aids the composer’s short-term memory.

²⁴ *ibid*

4.5 Closing the distance between thought and realisation: MNS as collaborative tool

With this new cognitive paradigm comes a closing of the temporal distance between thought and realisation and, more importantly, between realisation and *confirmation*²⁵: the physical means of actualising thought into notation is greatly sped-up by the MNS interface, while playback instantly allows for aural confirmation of what has been composed. Of the writer's synthesis with his or her tools, Bolter notes that it is becoming difficult

to say where thinking ends and writing begins, where the mind ends and the writing begins...The writing space becomes a metaphor, in fact literate culture's root metaphor, for the human mind.²⁶

In a counter to the earlier-described manner in which MNS opposes the Hegelian notion of music as thought, transcendent of the physical,²⁷ Bolter demonstrates that MNS, by increasing the "immediacy" of the transfer from thought to realisation, may be understood as an extension of the Romantic trope:

Electronic technology suggests a kind of writing that denies its limitations as writing and becomes unmediated thought. It would seem that writing is no longer separate from the mind, if the computer can forge an instantaneous link between the writer's thoughts and the writing surface.²⁸

Heim says that the immediacy of the word processor is in part due to the nature of the display of information. Words metaphorically "stream out" of the computer monitor, rather than simply "lying quietly on a page."²⁹ MNS provides the additional condition of music quite *literally* "streaming out" of computer loudspeakers or headphones. MNS's means of feedback are more immediate

²⁵ It is conceded that not all composers may require confirmation outside of their musical imaginations.

²⁶ Bolter, p.11

²⁷ see 4.2

²⁸ Bolter, p.217

²⁹ Heim, p.208

and engaging than the pen and manuscript, allowing that that which is seen on the computer monitor and heard over the computer speakers are, more than ever before, mirrors of the workings of the composerly mind. Donna Haraway takes this one step further, suggesting that the dynamism of technologies like MNS actually overshadows the degree of engagement displayed by their users:

Late twentieth-century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines. Our machines are disturbingly lively, and we ourselves frighteningly inert.³⁰

In reducing the gap between thought, realisation and confirmation, a curious and dichotomous thing happens. The fully-immersed MNS composer becomes at once further distanced from *and* drawn closer to his or her work than the pen and manuscript composer: further distanced in that the composer is less immediately engaged with his or her materials by having a knowledge of the materials learned by aural absorption and repeated listening, rather than through having to constantly “translate” the visual notation into imagined sound; closer in that, with multiple listenings, works – or fragments thereof – can become extremely familiar and intimately understood.

The notion that MNS and composer relationship might be quasi-collaborative was mostly rejected by the questionnaire respondents of Chapter Two. The suspicion is that respondents largely misunderstood the researcher’s intended meaning of the term “collaboration,” regarding it as descriptive of an exchange between human equals. Had the question on this subject been more clearly expressed, it is possible that a greater proportion of respondents would have acknowledged the merit of a collaborative relationship being implied by the to and fro of ideas between composer and software. In such an exchange, the composer “suggests” music by entering it into MNS and has MNS provide feedback in sonic

³⁰ Haraway, Donna J., *Simians, Cyborgs, and Women*, 1991, p.152

form, thus “suggesting” – insofar as “suggestions” are a construct of the composer’s mind – strategies for further alteration or addition of materials.

Bolter would seem to support this in contending that the nature of the writer’s relationship with the computer is not just a one-way phenomenon, but that, “In the act of writing, the writer externalises his or her thoughts. The writer enters into a reflective *and reflexive* [italics added] relationship with the written page...”³¹

While there is no relational difference between manual and digital commitment of language (textual, musical) to static or dynamic media, Lévy’s assertion about the dynamism of the digital domain is recalled when Bolter writes, “The reflexive character of each technology permits writers to find themselves in the texts they create and therefore to know themselves in a new way”.³²

The dynamism of MNS not only redefines the role of the short-term memory, but suggests that the composer may come to think of MNS as an actively *helpful* partner – albeit one of a fundamentally non-human order – in the compositional process.

The composer and computer relationship is different from a writer’s relationship with stone, clay, papyrus or paper. MNS provides composers with something that written text or notation does not: apperceptive stimulation. It actualizes and makes physical the otherwise purely mental object that is notated music, by means of sonic feedback. The quasi-collaborative nature of the digital composing environment and the shortening of the gaps between thought, realisation and confirmation, make MNS fundamentally cognitively different from prior technologies.

Said one questionnaire respondent, “Notation in any form is a kind of collaboration with one’s own imagination.”³³ MNS changes the nature of this bridge between the imagination and the physical act of notating by immediately

³¹ Bolter, p.11

³² *ibid*, p.207

³³ Refer Appendix A, Question B5

providing a visually exacting representation of materials as well as their playback. The animated nature of screen effect described earlier by Lévy is an important element in this: MNS is arguably a more compelling and encouraging “partner” in the compositional process than are hand-written notes, “lying quietly on a page.”³⁴ Though this might be the case, we recall Heim’s caution that the over-abundance that is easily generated with digital technologies can result in “stimulation supplant[ing] mental composure.”³⁵

Anecdotally, composers have reported that the imagined collaborative partnership with MNS reduces the peculiar kind of loneliness that can be generated by extended periods of composition in isolation from the eventual release and vindication (or failure!) of performance (or, for that matter, the first rehearsal).³⁶ In allowing composers to hear a representation of the work in a hands-off manner (that is, without having to labour at playing works on an instrument), many uncertainties fall away: the software is stimulating and encouraging.

However, caution is required. Taking an extreme stance that completely destroys the assumption of transparent technology, R.W. Janney compares the human-computer interface to that of the

schizophrenic suffering from severe 'intrapsychic ataxia' – the psychiatric term for a radical separation of cognition from emotion. Its flame [sic] of reference, like that of the schizophrenic, is detached, rigid, and self reflexive. Interacting in accordance with the requirements of its programs, the computer, like the schizophrenic, forces us to empathize one sidedly

³⁴ Heim, p.208

³⁵ *ibid*, p.212

³⁶ New Zealand composer Ross Harris has frequently expressed this sentiment. The image of American composer Elliott Carter retreating to the New Mexican desert in “monastic near-isolation” to compose the groundbreaking First String Quartet comes to mind as an example of the composer as hermit.

[sic] with it and communicate with it on its own terms. And the suspicion arises that the better we can do this, the more like it we become.³⁷

The dangerous lop-sidedness of the power balance in such a collaborative partnership would obviously be of great concern for composers. Here, concern would be focussed on the extent to which users might be “enticed” (insofar as this enticement is a construct of the composer’s mind) to employ certain features of the software that enable the creation of the clichéd, the technically impossible or the unidiomatic.

Craig Brod’s concept “technostress” reflects many of Janney’s fears. In it, sufferers

begin to adopt a mindset that mirrors the computer itself. Signs of the technocentred state include a high degree of factual thinking, poor access to feelings, an insistence on efficiency and speed, a lack of empathy for others, and a low tolerance for the ambiguities of human behaviour and communication. At its most serious, this form of technostress can cause aberrant and antisocial behavior *and the inability to think intuitively and creatively* [italics added].³⁸

Detractors of MNS may well fear the conditions described by Brod and Janney - that the software is dehumanising, working against the necessity that music is the result of mental *and emotional* effort.³⁹ There should also be concerns about the limits composers place on their understanding of the collaborative dynamic, especially the ways in which playback is interpreted. It is pertinent to repeat Lévy’s earlier statement: “Simulation technologies, especially those that make use of interactive graphics, do not replace human reasoning but extend and

³⁷ Janney, R.W., *The prosthesis as partner: pragmatics and the human-computer interface*, proceedings of the 2nd International Conference on Cognitive Technology, 1997, at <http://portal.acm.org/citation.cfm?id=794204.795326>, viewed 06/10/06

³⁸ Heim, p.202

³⁹ See also Dellaira, under 3.4.1.

transform the capacities of imagination and thought.”⁴⁰ For the collaborative dynamic to work properly, composers must draw upon what they know about the technical limitations of instruments and human players working under real-world conditions in performance spaces. One questionnaire respondent captured the importance of this caveat well: “The composer-computer relationship is collaborative in that it informs the creative process but doesn’t replace the imagined/planned live performance.”⁴¹

4.6 The human hand and MNS: “natural” versus “artificial”

4.6.1 MNS and loss of the “signature of myself”

In Chapter Two’s questionnaire, some composers said that while MNS allows for the direct and immediate realisation of engraver-standard notation, the uniform appearance of MNS-produced scores meant a loss of the personalised nature of hand engraving that they considered unacceptable. Said one respondent:

The only advantage that I can see is that notation software produces a neater, cleaner score – on the other hand we are gradually losing precious, personal handwritten manuscript scores in favour of these computed copies. A similar loss occurs with the prevalence of e-mail over handwritten letters.⁴²

Such sentiments are echoed by some literary commentators, struggling not with the uniformity of MNS’s notational fonts but with the typeface of the word processor: “I pen a letter and am appalled at my handwriting. The keyboard,

⁴⁰ Lévy, p.146

⁴¹ Refer Appendix A, Question B5

⁴² *ibid*, Question C7

through which thousands of my words pour each day, is obliterating this sign – this signature – of myself.”⁴³

While the speed and efficiency of input in the digital environment is appreciated, some feel that elements of the craft are lost. Says Heim:

Computerized writing combines the subjective immediacy of the private thought process with the public, typified look of written text. When I feel the ease of managing the nearly liquid electronic text, I experience my own private thought process as directly impersonal, presentable, public. The “signature of myself” is subtly disowned by the writing element. The typified automation of word processing removes the graphic stamp of character and does so with no apparent loss of personal immediacy.⁴⁴

While this is clearly an insurmountable issue for some composers, it is suggested that for most composers who persevere with MNS, with normalisation comes a sense that the loss of the “signature of myself” is perhaps an unfortunate but necessary sacrifice when balanced with the many enhancements to working life that MNS engenders. One could assume that even composers who work by hand harbour hopes that their work will go on to receive publication, whereupon scores are realised with the engraver’s typeface: with time, such composers might come to think of MNS as merely cutting out one step in this process.

It is also possible that hand-writing composers might, in the MNS environment, shift whatever proportion of their energy that was dedicated to presentational style to concern for musical content. A sense of individuality might then be derived not from the uniqueness of the physical appearance of scores, but from those *musical* stamps that distinguish one composer’s work from that of another.

⁴³ Heim, p.193

⁴⁴ *ibid*, pp.193-194

4.6.2 MNS and loss of tactility

Many of the same respondents who lamented the loss of the hand-personalised score, also reported that they had eschewed MNS because they valued the physical *feel* of the pen and manuscript over that of the computer interface. It was claimed, amongst other things, that music conjured in the mind and conveyed down the human body, through the hand and onto the score, was more naturalistic, humanly expressed and therefore superior to music realised using MNS. Martin Heidegger is also of this opinion, saying:

Human beings 'act' through the hand; for the hand is, like the word, a distinguishing characteristic of humans...The human being does not 'have' hands, but the hand contains the essence of the human being because the word, as the essential region of the hand, is the essential ground of being human.⁴⁵

Heidegger states that the typewriter does not, with experience, become a natural and neutral extension of the hand, but rather that it “snatches script from the essential realm of the hand – and this means the hand is removed from the essential realm of the word. The word becomes something ‘typed’.”⁴⁶ The philosopher grants that the typed word is acceptable when it “serves as a mere transcription for preserving handwriting, or where typewritten script substitutes for ‘print’.”⁴⁷ In Heidegger’s terms, final-phase MNS-rendering of scores is desirable, but the act of composition with MNS is not, for it dehumanises the act of composition. This opinion was also expressed in the questionnaire, with some of the composers who rejected MNS as a compositional tool embracing it as a means for engraving.⁴⁸

⁴⁵ *ibid*, pp.194-195

⁴⁶ *ibid*, p.195

⁴⁷ *ibid*

⁴⁸ Refer to Appendix B, Questions A10 and A11

Some MNS packages offer users the option of working with visual representations of certain paper “grains” and “textures.” This might be interpreted as an admission by the software makers that, for many composers, the tactility (“tactile”: encompassing the visual nature of physical materials as well as skin-touch) of the interface replaced by MNS is of lingering importance. If this is not the case, the facility to control the appearance of the digital “paper” is curious in light of MNS marketing language that all but rejects the pen and manuscript model.⁴⁹ The recourse to alter digital paper appearance belongs on the same continuum as the use of digital pen interfaces in some graphic design applications, which is essentially a digitisation of “wetware.” A humanised or, at least, *familiar* interface with the machine is the underlying aim of this measure.

4.6.3 All composing technologies are artificial

The notion that the unaided hand is crucial to the actualisation of thought denies that the hand’s tool, the pen, is every bit as artificial as the typewriter, the word processor or MNS. In this sense, Heideggerian perspective is at odds with Poster’s previously-discussed theory of normalisation, and is also challenged by Ong, who states that technologies are indeed artificial, but that this does not preclude that they may be used to creative ends. His fittingly musical statement is worth quoting at length:

Technologies are artificial, but...artificiality is natural to human beings. Technology, properly interiorized, does not degrade human life but on the contrary enhances it. The modern orchestra, for example, is the result of high technology. A violin is an instrument, which is to say a tool. An organ is a huge machine, with sources of power – pumps, bellows, electric generators – totally outside its operator...As musicologists well know, it is

⁴⁹ As illustrated by such advertising claims as: “Throw away those scribbled charts – we’ll help you write quicker and better than ever” (of Sibelius at the company website) and “Now you can compose, edit, transcribe, orchestrate, and publish without using a pencil” (from Finale software packaging).

pointless to object to electronic compositions such as Morton Subotnik's *The Wild Bull* on the grounds that the sounds come out of a mechanical contrivance. What do you think the sounds of an organ come out of? Or the sounds of a violin or even of a whistle? The fact is that by using a mechanical contrivance, a violinist or an organist can express something poignantly human that cannot be expressed without the mechanical contrivance. To achieve such expression of course the violinist or organist has to have interiorized the technology, made the tool or machine a second nature, a psychological part of himself or herself. This calls for years of 'practice', learning how to make the tool do what it can do. Such shaping of a tool to oneself, learning a technological skill, is hardly dehumanizing. The use of a technology can enrich the human psyche, enlarge the human spirit, intensify its interior life.⁵⁰

"Practice makes perfect," and imbues the tools of the well-practiced composer with creative power. With practice comes mastery, artificiality giving way to a feeling that MNS is a natural extension of composers' expressive apparatuses. Composers who have used MNS for long enough to be classed "expert" users, which might mean that they have extensive knowledge of shortcuts and the extended capabilities of the software, are likely to be familiar with this feeling.⁵¹

Bolter furthers Ong's assertions, but with an historical context:

Writing with pen is no more natural, no less technological than writing at a computer screen...The ancient Sumerian inscribing clay tablets with wedge-shaped marks was adopting the same technical attitude toward his materials as the contemporary writer seated at a computer terminal: both are shaping a writing space by filling it with visual signs.⁵²

⁵⁰ Ong, Walter J., *Orality and Literacy: The Technologizing of the Word* 1982, pp.82-83

⁵¹ Said one questionnaire respondent, "Once I had really gotten to grips with Sibelius's shortcuts, working with the software felt very natural – like working with manuscript, only faster." Refer Appendix B, Question C2

⁵² Bolter, p.37

Singer and electronic musician Moby makes a more contemporary comparison: “A piano or a violin is just as inorganic as a synthesizer or a sampler.”⁵³ And Karlheinz Stockhausen argues that naturalness is determined by *how* tools are used rather than by the tools’ origins.⁵⁴ These examples are further evidence that all writing technologies, not to mention writing itself, have, on their inception, been unwieldy and unnatural, initially suggesting that the technologies they superseded were superior at communicating writers’ intentions. But all those that have achieved lasting employment after successful and sustained testing of the human-computer interface – and MNS must be counted as one of these – have come to feel natural and expressive, instruments for the physical realisation of the artist’s thoughts.

4.7 MNS: virtual reality, simulation, prosthesis or real?

MNS reassigns notation from manuscript to monitor display, in the same manner as the word processor’s digital re-presentation of words. However, MNS diverges from the word processor in that it introduces an additional sonic element: the ability for the composer to *hear back* the signs. In adding sound to sight and touch, MNS becomes a more sense-enveloping tool than the word processor. It *gives back* to the composer much more information than the writer’s Times New Roman font or the architect’s 3D simulations.

In the same way as it has been shown that composition is inherently technological and therefore, prior to normalisation, artificial, virtual reality is tied not to the microchip but is a much older phenomenon and a thoroughly human one. Says Bolter, “There is nothing monstrous or wrong about constructing a world of perception, since human beings have been engaged in reconstructing

⁵³ Taylor, Timothy D., *Strange Sounds: Music, Technology and Culture*, 2001, p.201

⁵⁴ Waters, Dr Simon, *The musical process in the age of digital intervention*, 2000, p.7 at

http://www.ariada.uea.ac.uk/ariadatexts/ariada1/content/Musical_Process.pdf, viewed 03/10/06. (Waters recalls Stockhausen’s sentiment from an anecdotally-remembered radio interview).

their perceptual world through art and technology for thousands of years.”⁵⁵

MNS might be thought of as inhabiting, in various contexts, the worlds of virtual reality, simulation, prosthesis, or, through the very insistence of its virtuality, reality. The ways in which MNS might be thought to inhabit various places along the continuum from virtual to real will now be examined.

4.7.1 MNS is virtual

Lévy identifies three types of virtuality: things such as words in the mind, which exist even though we are “unable to assign...[them] any spatial and temporal coordinates”, “quasi-virtual” information preserved permanently or semi-permanently on storage media and images (and sound) that are temporarily accessible via Random Access Memory, observed *while* we are working with computers.⁵⁶ Music composed with MNS (prior to the act of actualization) thus exists as different degrees of virtuality, respectively, the composer’s yet-to-be recorded “ideas,” work stored quasi-virtually as files of the software and music being manipulated in the “now.” Virtuality in the MNS context is a fluid concept, not a singular entity.

The notation and sound that the composer works with in MNS is in the “*very process of representation.*”⁵⁷ Ballantyne notes that “some television studios are sometimes decorated so as to persuade us that they are a continuation of our living room.”⁵⁸ In a similar way, the digitally rendered page, as displayed by MNS, seeks to be as perfect a representation of the paper score as possible. As previously noted, some packages even offer a range of paper “grains” and “textures,” presumably so that the composer might feel less like he or she is working with pixels of phosphor and more with traditional materials.

⁵⁵ Bolter, p.230

⁵⁶ Lévy, pp.30-31

⁵⁷ *ibid*, p.28

⁵⁸ Ballantyne, p.133

While the visual arrangement of notation on the digital screen is a duplicate of what will later be printed, it is, in its digitised state, malleable and incomplete. The hand-written score has been replaced by something that only becomes real when its file (stored on a hard-drive, a CD-R, a USB drive, a network, etc) is printed, or “actualised”. The print-run is likely to be carried out by the composer alone, who will print as many copies as are necessary for the realisation of a performance, with further, but likely limited, dissemination of copies for the purpose of perusal by those associated with the composition-to-performance process.

The scores of composers not represented by a publishing house will increasingly exist in cyberspace, be sold or lent over the Internet, downloaded from websites, transmitted in pdf and mp3-file formats by e-mail and discussed with performers, teachers, musicologists and journalists via Voice (and video) over IP (VoIP). It is only when materials are placed in paper form on the music stands of performers that these scores assume the tangible qualities of the pre-computer age. The MNS creative environment is virtual and the music, when finished, continues, largely, to exist virtually. In other words, while in “1877 music began to become a thing”⁵⁹ with the invention of the phonograph and the subsequent saleable media on which music was recorded, in the present “Music has slipped its thinghood. It has reentered the lepidopteral realm of the fleeting, the flitting, the ephemeral...”⁶⁰

4.7.2 MNS is a simulation

Virtual realities “exist” to *simulate* the real, the actualised, creating a model that provides the user with, “the subjective sensation (although rarely the complete

⁵⁹ Eisenberg, p.13

⁶⁰ *ibid*, p.235

illusion) of personally and immediately interacting with the simulated situation.”⁶¹
 Lévy illustrates the concept of simulation using an example from aircraft design.⁶²
 That MNS is a kind of music simulator is revealed through a point-by-point
 paralleling with Lévi’s aircraft model:

Pre-computers:

- Wings on a plane were subjected to wind-tunnel testing before production models were built. This was expensive.
- Music was tested on actual performers. This was expensive and impractical.

The computer age:

- Exact descriptions of the wings are given to the computer, which simulates the wings’ air resistance.
- Exact descriptions of the music are fed into MNS, which simulates the music through its playback engine.

Details:

- The result of the simulation reveals the exact pressure experienced by each square centimeter of the wing.
- The sound that is generated by the simulation provides the composer with an accurate representation of rhythm, volume (assuming this parameter is described sufficiently by the composer) and even colour (this parameter is often inaccurate, though gradually being improved).

Such analogizing may seem fanciful, but it reveals much about the nature of MNS. As with MNS, where materials are rapidly transformable, the computer simulation of the effects of air on a wing are “displayed on-screen; we can manipulate variables of the model in real time and observe the resulting

⁶¹ *ibid.*, p.51

⁶² *ibid.*, pp.47-48

transformations at once.”⁶³ While Lévy describes his wing simulation analogy as an “*interactive graphic simulation*,” we might think of MNS as an interactive graphic *and sonic* simulation. However, experience shows that it would be a poor and utterly dangerous wing-testing simulator that would let through as many errors and miscalculations as the average composer seems to endure when the time comes for the first rehearsal!

The condition whereby MNS simulation reaches a state in which composers cannot distinguish it from reality will be discussed in detail in 5.3.

4.7.3 MNS is a prosthesis

Occupying an area slightly adrift from virtual reality and simulation is the notion that MNS acts as a *prosthesis*. There are two branches to this line of thought. The first is that playback functions, for many composers, as a mere *indicator* of certain parameters of sound events, but does not attempt to render an *actual representation* of the music. For such composers, MNS playback may offer accurate reporting on the temporal placement of events and something of the “flavour” created in the use of certain pitches, but in doing so does not offer the composer anything that could be considered a model useful beyond these limitations. Eleven composers in Chapter Two’s questionnaire reported using MNS playback in this capacity (see Appendix B under Questions B4 and B5), one noting “I can imagine the real sounds and hear the difference between them and the computer.”⁶⁴

⁶³ *ibid*, p.48

⁶⁴ Refer Appendix A, Question B5

In another sense, MNS functions as a prosthesis⁶⁵ through the notion that the “use of tools and artifacts requires a degree of incorporation into the body.”⁶⁶ In Freud’s terms, all manner of devices can be thought of as “auxiliary organs” and thus, “modern transportation becomes our prosthetic foot, glasses and telescopes our eyes, and computers serve to augment our brain.”⁶⁷ In the same way, MNS becomes, for many composers, a prosthesis for composing. The composer becomes someone who “wears” MNS, just as the person with poor eyesight is a wearer of spectacles. Composition in this context depends, to varying extents, on *being there*: it depends on physical engagement with MNS, on “suiting-up” to compose.

Technologies, thought of in this *cybernetic*⁶⁸ sense of prosthesis, arouse questions about the degree and extent of their transformative powers. Sarah Jain, in using the extreme case of the computer through which famous scientist Steven Hawking communicates asks, what “is the importance of the precise difference between his voice (as intention), made audible through his black box, and another speaker’s amplified voice?”⁶⁹ As an extension of the composer’s body and mind, to what degree does the computer and MNS filter away, enhance or otherwise change the composer’s intentions? This question will be tackled from a number of different angles in Chapter Five.

⁶⁵ It is important to note that *prosthesis*, usually defined in the negative as “...‘that which supplies the deficiency’,” can also be applied positively, signifying “the fulfillment and creation of a need.” - Jain, Sarah S., “The Prosthetic Imagination: Enabling and Disabling the Prosthesis Trope”, *Science, Technology & Human Values*, Vol.24 No.1, Winter 1999, 1999, p.33, at <http://www.stanford.edu/dept/anthroCASA/pdf/Jain/Sci%20Tech%20Human%20Values.PDF>, viewed 27/09/06

⁶⁶ *ibid*, p.32

⁶⁷ (Author unknown), at <http://www.regent.edu/acad/schcom/rojc/mdic/man.html>, viewed 01/11/06

⁶⁸ Haraway, p.150: “By the late twentieth century...we are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs.”

⁶⁹ *ibid*, p.41

4.7.4 MNS is, or soon will be, real

A technologically utopian view would hold that, under Poster's "normalisation theory," (and, arguably, as a result of Baudrillard's third order of simulacra, discussed in Chapter Five⁷⁰) it is possible, perhaps even likely, that composers will come to regard the new virtuality of MNS as *the new reality* and, in doing so, functionally forget that MNS was ever anything but real from its outset. Indeed, many composers would agree, on reflection, that they are already of this mindset. Scores existing as highly transportable pixels of phosphor will become every bit as real as printed matter, while hand-written scores will become a thing of curiosity and possibly even acquire antique or nostalgia ("retro") value. The entire paradigm shift offered by MNS will become internalised and normalised and the industry will become expectant of the next advances in realistic sound modeling and *Minority Report*-style GUIs.⁷¹

The recklessness of this kind of utopianism is lent credence in light of some present-day technologies that intersect with MNS. One such advance concerns research conducted at the University of Waikato that points to a future in which arrays of digital displays could supplant the paper score and the music stand.⁷² This would have important implications for composers wishing to make in-rehearsal changes, for reducing noise during recordings and for helping players with poor eyesight, amongst other benefits. MNS, or a similar technology, would likely play an important part in this digital music stand.

"Sinfonia," a digital system for replicating the sounds of live orchestras, thus encroaching on traditional practices in music performance, is another example of

⁷⁰ The difference between Baudrillard's "hyperreal" and the "real" discussed in this section is that the former is viewed as a falsehood whereas the latter is a truth. A hyperreal interpretation of MNS is incorrect, leading to flawed compositions, whereas the application of MNS in the "real" sense discussed presently is quite legitimate.

⁷¹ *Minority Report*, 2002, dir. Steven Spielberg – <http://www.imdb.com/title/tt0181689/>, viewed 08/11/06

⁷² McPherson, John R., *Page Turning – Score Automation for Musicians*, www.cs.waikato.ac.nz/~jrm21/OMR/honours.pdf, viewed 25/08/2006

the kind of technology embodied by MNS foretelling one possible future. Made by Manhattan company Realtime Music Solutions, Sinfonia was the subject of a dispute between the American Federation of Musicians and the music producers of a benefit concert by the Opera Company of Brooklyn, who wanted to use the technology to replace expensive human musicians.⁷³

Advanced, commercially available software sample libraries, such as the Vienna Symphonic Library, are also capable of high-end simulations. Some users devote considerable energy with this software preparing simulations of their own and “standard repertoire” works.⁷⁴

The virtual music stand, Sinfonia, the Vienna Symphonic Library and other “innovations,” such as totally simulated film scores, are likely to gradually alter perceptions of what constitutes musical reality. It is likely that it will soon become necessary to reconsider MNS’s “virtual” tag and instead regard digital notation as a real-world truth: simulation so normalised that it acquires real status. This conceptual paradigm shift would make MNS the focus not only of the making of works but of their performance too.

4.8 Conclusion

MNS is very much the “new kid on the block” and as an “upstart” it threatens to replace hundreds of years of technological stasis with a radically *new means* of composing, which itself might suggest *new methods* for composing. The CPU-and-screen challenges the Romantic/Hegelian model by increasing the visibility of the compositional process, eroding something of the enigma of the art form, bringing composition to the same work platform used by countless millions for just about any task. The greater efficiencies that come with MNS save

⁷³ Wakin, Daniel J., *Concert Canceled Over Use Of Electronic Musicmaker*, New York Times, 15/12/04

⁷⁴ See <http://www.vsl.co.at/en-us/67/90.vsl>, viewed 04/11/06

composers time, time which is then lost in bringing compositions up to the standards of professional engravers.

The new “writing space” and its playback releases the short-term memory from the burden of constant sonic “imagining,” the new ability to instantly vary the parameters and instantly observe alterations changing the composer’s approach at a fundamental level. This new approach might also be characterised as collaborative in effect, the composer and software involved in an imagined but functionally real exchange.

While physically and cognitively new, MNS has more in common with those technologies it usurps than is popularly thought. Many composers have rejected MNS on the grounds of the loss of “signature of myself,” while others have maintained that it is inherently inhuman to record art via any other physical means than the flesh and bone of the human hand. Here, Poster’s theory of normalisation and the historically informed defences of Ong, Bolter and others, have convincingly debunked these notions. MNS is only as unnatural, as artificial as any of the writing technologies, long assimilated and accepted, that have preceded it.

MNS is a child of an era of virtual reality, of digital simulation and of the notion of prosthesis as extension and enhancement to the agency of the human body. It might also be thought of as entirely real; simulation replacing reality. In toto, it has been established that MNS presents composers with very new ways of working, while the perception that this newness is completely alien and without precedent has been shown to be untrue. It is now necessary to dig deeper, looking at the tangible and theoretical outcomes of this new tool. The various *truths* of MNS and their consequences will be examined in greater depth in Chapter Five.

Chapter Five

Towards identification of the effects of MNS on compositional practices and outcomes

5.1 Introduction

In acquiring new productive forces, men change their mode of production; and in changing their mode of production...they change all their social relations.¹

Karl Marx

We could be stumbling into a powerful technology, the impact of which we understand poorly at the moment.²

Baroness Greenfield

It has been demonstrated that there are clear dangers in subscription to both the so-called “transparent” and “all-powerful” technology assumptions. MNS is not merely a new tool for the realisation of existing ends, nor is it a technology that we should uncritically allow to take us where it will. Marx, quoted above, held that the tools we use to make things change the ways in which we think and create. Lev Vygotsky, in attempting to develop a psychology based on Marxist principles, extended Marx’s definition of “tools” to encompass all sign systems, including, presumably, music. In the words of Haas, Vygotsky held that, “Tools

¹ Marx, Karl, *The Poverty of Philosophy*, 1969, p.92

² Greenfield, Baroness, *Education: Science and Technology*, speech to the House of Lords, 20/04/06, column 1221, at <http://www.publications.parliament.uk/pa/ld199900/ldhansrd/pdvn/lds06/text/60420-18.htm#>, viewed 09/10/06

and signs can have a profound impact on both individual mental functioning and cultural change.”³

There is a wealth of support for the technological determinist line. However, Bolter acknowledges that technology is not the only factor in change:

The very idea of writing, of semiosis, cannot be separated from the materials and techniques with which we write, and genres and styles of writing are as much determined by technology as by other factors.⁴

Lévy widens the context in which we must, in 2006, place a technology like MNS when he writes:

The emergence of cyberspace will most likely have – already has had – as radical an effect on the pragmatics of communication as the discovery of writing.⁵

And Ong asserts that the “mode by which the mind organizes reality in its characteristic cultural formulations” is “transformed by basic alterations in writing technology.”⁶ Changes to composition are not limited to MNS. They extend to the technological climate as a whole, with particular emphasis on the ways in which this climate affects modes of literacy.

While Daniel Chandler⁷ and others see new technologies as but one of many drivers of change, few observers would dispute that recently-popularised tools, used in the communication of written, musical and pictorial language, exert transformative powers on the works of those who use them. Yet identification of the *specific nature* of the changes wrought is deeply problematic. Rogers says

³ Haas, Christina, *Writing Technology: Studies on the Materiality of Literacy*, 1996, p.15

⁴ Bolter, Jay David, *Writing Space: The Computer, Hypertext, and the History of Writing*, 1991, pp.239-240

⁵ Lévy, Pierre, *Cyberculture* (Translated by Robert Bononno), 2001, p.94

⁶ Heim, Michael, *Electric Language: A Philosophical Study of Word Processing*, 1987, p.65

⁷ Chandler, Daniel, *Technological or Media Determinism*,

<http://www.aber.ac.uk/media/Documents/tecdet/tcet13.html>, viewed 25/08/06

that there has been an historic dearth of research into changes wrought by new innovations and that

the nature of the data make[s] it difficult to generalize about consequences. We can describe consequences and establish categories for classifying consequences, but cannot predict when and how these consequences will happen.⁸

Haas, writing about Vygotsky, says that the impact of tools and signs on individual and collective cognitive functioning

are related in complex ways, [but] they are not simply reducible to one another. Further, Vygotsky's concept of psychological tools mediating development (both cultural and individual) suggests that the effects of technological change (e.g. computerization) on writing are profound, but certainly not unitary, easily predicted, immediate, or consistent across contexts.⁹

The highly individual range of responses to many of the questions posed to composers in Chapter Two supports the idea that it is unlikely that umbrella hypotheses can be formulated that pertain to the population of MNS-using composers.

Heim grapples with the problem by asking

On what level of analysis shall we look for the transformations, on the level of biology, neurophysiology, or perhaps psychology? Or is there a still more fundamental level of description? How do we come to terms with the phenomenon?¹⁰

⁸ Rogers, Everett M., *Diffusion of Innovations* (Third Ed.), 1983, p.371

⁹ Haas, p.16

¹⁰ Heim, p.98

Haas casts the net even wider, positing that historians, cognitive psychologists, social psychologists, organizational behaviourists, critical theorists, educational researchers, rhetoricians, computer scientists and linguists must act collaboratively, in order that the “technology question” be properly addressed.¹¹

This chapter will elaborate on some of the issues identified in Chapter Four, applying them more directly to the MNS phenomenon, in order that approaches to explaining several key questions surrounding MNS use and compositional outcomes might be forged. Firstly, there will be an examination of the virtuality of MNS that builds on the foundation laid in Chapter Four, with special emphasis on Baudrillard’s “orders of simulacra” as a possible explanation for misuse of the software. This will then be widened into a look at the effects of *screen consciousness*, a condition fostered by many of the computing devices used in the modern world.

The chapter will then lay a foundation for enquiry in subsequent studies into the interesting notion that MNS, in imposing scientific time on human and musical time, alters composers’ temporal perception. The ways in which MNS both reinforces and dematerialises the score and how these things cause changes in musical values will be uncovered. Related to this, MNS’s agency as a proponent of both compositional homogeneity and diversity will conclude the chapter.

5.2 What it is to be virtual: MNS and the altering of the perception of reality

The conditions of virtuality, simulation and prosthesis, which were ascribed to MNS in the previous chapter, cause changes in perceptual response in those engaged with the technology. This section will further examine the ways in which the virtuality of MNS alters the ways composers experience the (un)reality of the compositional process. This theoretical examination will be lent empirical weight

¹¹ Haas, p.28

in Chapter Six, when the MNS-related compositional processes of one of the author's works will be subjected to aspects of the present findings.

5.2.1 MNS and (un)reality: Baudrillard's orders of simulacra as explanation for MNS misuse

The score, as it is projected by MNS at the composer via the computer monitor, might be assigned, in postmodern terms, the condition of *simulacrum*, "a state of such near perfect replication that the difference between the original and the copy becomes almost impossible to spot."¹² Jean Baudrillard, in contending that the "hyperreality" of the present age has established a truth which is hiding the fact that there is no truth or "reality," proposes four levels or orders of simulacra, which he defines thusly:

- [1] it is the reflection of a profound reality [symbolic order]
- [2] it masks and denatures a profound reality [first order of simulacra]
- [3] it masks the *absence* of a profound reality [second order]
- [4] it has no relation to any reality whatsoever: it is its own pure simulacrum [third order]¹³

If we take MNS as a tool designed as a phenomenon of the second order of simulacra, a tool with the effect of masking the *temporary* absence of reality (that reality being human performers reading from a printed score in a concert setting) then the governing "truth" of the software should be that it is used to render music that can be played on the concert stage. Understood in the second order, MNS gives the composer only the *appearance* that the digitally-displayed and hard drive-stored score is real. The composer knows this "reality" for the temporary, purely utilitarian phenomenon it is, existing only as a malleable version of that which, when eventually finalised, will be printed and performed from. In the same

¹² Giles, David, *Illusions of Immortality: A Psychology of Fame and Celebrity*, 2000, p.51

¹³ Baudrillard, Jean, *Simulacra and Simulation*, translated by Sheila Faria Glaser, 1994, p.6

way, the composer is aware that MNS's sonic rendition of the score is an imitation, an illusion of a later human actualisation.

However, composers may allow MNS to come to be understood as an expression of the third order of simulacra. Here, the composer has left the desirable bounds of the truth (insofar as the truth is a convention, that is, a temporarily tolerated fiction): the MNS score and its playback has superseded the condition that it is only a temporary state that will *lead to* actualisation, functioning now as a reality in *its own right*.

In a wider sense, MNS, thought of in this way, is one of many symptoms of Baudrillard's "desert of the real,"¹⁴ a "cultural space where television, film, and computer images are more 'real' to us than the non-media physical reality that surrounds us."¹⁵ Baudrillard's totalised application of hyperreality is problematic,¹⁶ it implying that humankind really does live in something like the world depicted in the film *The Matrix*.¹⁷ Nonetheless, one could argue that the proliferation of devices and narratives that imply a simulated reality have become cemented in the minds of a great many people, to the extent that many exist in a mental space in which the real has been absorbed into the hyperreal. In such a mental space, it becomes acceptable to the composer to use MNS to break the shackles of the much older practices upon which it is modelled.

Emancipation from established models or limitations is a near requirement of successful art revolutions, so it might seem that MNS, thought of as a vehicle of the hyperreal, could offer exciting new potential for music. Sophisticated virtual music is one such example of this: simulated music realised via sequencers with

¹⁴ *ibid*, p.1

¹⁵ Mann, Doug, *Jean Baudrillard: A Very Short Introduction*, <http://publish.uwo.ca/~dmann/ baudrillard1.htm>, viewed 15/09/06

¹⁶ Poster, Mark, *The Mode of Information: Poststructuralism and Social Context*, 1990, pp.63-64

¹⁷ The film's script writers were inspired by the philosopher's ideas – indeed, the protagonist Neo is seen reading from Baudrillard's *Simulacra and Simulation*. *The Matrix*, 1999, dir. Andy and Larry Wachowski - <http://www.imdb.com/title/tt0133093/>, viewed 08/11/06

high quality playback engines (possibly involving the use of MNS) is now regularly heard in film soundtracks and in other theatrical settings.

However, for the composer of concert music, a third order interpretation of MNS is undesirable, for two reasons. Firstly, the composer operates in a world in which he or she is dependent upon the services of performers literate in a long-established language: Western notation. The composer is obliged (notwithstanding that he or she might employ invented means of describing sound) to adhere to the strictures of this system, conforming to the rules that govern its rendering. MNS will, within certain boundaries, allow the composer to stray from notational norms, but not in a manner that develops the language in any constructive manner. Notational errors are usually just that: erroneous.

Secondly, the world of musical instruments and their human players is one of physical and mental limitations. While notational errors are an annoyance that is usually easily mended, the miscalculation of performance possibility is a deeper problem. MNS allows the composer to create music that exceeds the capabilities of instruments and their players in that “anything” may be scored and played back to the composer. The third order composer can easily legitimise his or her “impossible” writing because it exists outside of the sobering realities of the physical realm and does not require justification. It is “real” in its own right and the composer might fairly expect that the live performance will be the same as the simulated version, a bizarre simulacrum of a simulacrum.

While pianist Glenn Gould¹⁸ and others of his mindset would disagree, the visual aspects of live performance, that is, the physical bodily and facial gestures made by musicians while playing, appear to communicate a great deal about the intent and expressivity of music. Katz points to work carried out by music psychologist Jane Davidson, in which her experiments showed that the “understanding of the

¹⁸ Gould, in his famous essay “The Prospects of Recording” (High Fidelity Magazine, vol.16, no.4, April 1966, pp.46-63) argues that the recording studio is a setting superior to the concert stage for the realisation of great performance. Accessed at <http://www.collectionscanada.ca/glenn Gould/028010-502.1-e.html> - viewed 04/10/06

performer's expressive intentions" were, surprisingly, far more dependent on visual feedback than sonic.¹⁹ We would need to know more about the musical backgrounds of the participants in Davidson's study in order to know whether composers might experience this same effect. However it is possible that, while composers do not literally see their intended performers while composing, it is detrimental for composers to not even *imagine* them, as might be the case while working with a third order understanding of reality. It is possible that sense of physical gesture and the emotional content of this (insofar as this is a concern of the present-day composer) is not composed into works written *for the software*.

As will be discussed in Chapter Six, the actual performance rarely, if ever, matches the MNS simulation and it is detrimental to foster expectations that it might. This writing *for the software* rather than *for reality* is, it might be argued, the background to much of the conflict between present-day composers and those musicians who must grapple with the "impossible" score. That composers might continue to mis-notate or compose the unplayable *after* one or more difficult encounters with performers, is testament to the strength of the third order effect. The third order composer conscience might have serious problems understanding that it is disconnected from true reality and that, in order to compose successfully, it must come to regard the virtual world of MNS as simulation, not fact.

The problem is exacerbated for young composers who have perhaps *never* notated by hand. Such composers do not experience the shift from pen and manuscript to MNS and are perhaps unable to learn caution from the sensation that older composers, consciously or not, feel when moving from the first²⁰ to the second (and possibly third) orders of simulacra. Composers who move from pen and manuscript to MNS, and find themselves interpreting their compositional reality in the second and/or third orders, do so with the benefit of first order

¹⁹ Katz, Mike, *Capturing Sound: How Technology Has Changed Music*, 2004, p.96

²⁰ Pen and manuscript composition is perhaps best defined as a first order practice, except where the piano is used to supplement understanding or devices like the photocopier are used for mechanical reproduction.

hindsight. They maintain the core understanding that instrumental/vocal composition is *for performers*. An objective evaluation is possible in the event that such composers come to feel that what they write does not translate well into the sphere of rehearsal and performance. By contrast, the composer who *begins* a career using MNS has not the benefit of hindsight with which to construct an objective view of his or her compositional reality. The importance of study in orchestration and instrumentation, together with the forging of productive relationships with performers is, for composition students in the MNS era, inestimable.

5.2.2 The effects of other audio technologies

It might also be argued that running parallel with a third order perception of the world is a certain confusion about the function of tools used in different genres of composition. Many composers of notated music also work in the electroacoustic domain, where auditioned sounds *are* the (eventual) performance. Says Kramer, referring to “technology” and “equipment” in the sense of the recent and electronic:

music born of technology demands its own vocabulary and syntax. It demands methods and results appropriate to its equipment, not pale imitations of performance practices.”²¹

This assertion is highly problematic for composers working with notation. The present-day composer must be very aware that the digital technologies of the electroacoustic and notated mediums are designed to achieve outcomes for very different performance vehicles. That modern audio technologies might confuse matters for the MNS using composer is perhaps traceable to the recording

²¹ Kramer, Jonathan D., *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*, 1998, p.72

industry. Katz points, as one example,²² to the advertising campaigns in the 1970s and 1980s of recording company Memorex, in which Ella Fitzgerald's *recorded* voice is depicted shattering glass. The consumer is then asked, "Is it live, or is it Memorex?," the implicit answer being that the taped version and Fitzgerald's live voice are indistinguishable.²³

The present-day composer might be forgiven for thinking that the aim of all audio technologies is the perfect replication of human performance. However, MNS, considered from the perspective of concert music composition, is not a means of organising sonic materials with human performance as a mere afterthought: while extending the bounds of performance practice is healthy for the art, practical limitations and human vagaries must be a primary concern from the very outset of writing.

5.2.3 MNS and the effects of screen consciousness

Closely linked with the effects of audio technologies is the argument that a certain *screen consciousness* pervades modern life and that its psychological effects on users are the same or similar, regardless of the type of screen-based media. In a speech to the House of Lords,²⁴ Baroness Greenfield questioned the effects of screen and multimedia culture on thinking and learning, proposing that the linear accumulation of knowledge embodied by traditional forms of learning was threatened by multimedia presentation of information. In this learning environment, recipients could not develop a "robust conceptual framework"²⁵ for evaluation of content. She quoted technology writer Kevin Kelly:

Screen culture is a world of constant flux, of endless sound bites, quick cuts and half-baked ideas. It is a flow of gossip tidbits, news headlines and

²² The "Edison Realism Test" is another – in Katz, p.18

²³ Katz, pp.1-2

²⁴ Greenfield, column 1219

²⁵ *ibid*

floating first impressions. Notions don't stand alone but are massively interlinked to everything else; truth is not delivered by authors and authorities but is assembled by the audience. Screen culture is fast, like a 30-sec. movie trailer, and as liquid and open-ended as a website.²⁶

The experience of using MNS *can* be somewhat akin to Kelly's description as, often, the composer is dealing with material in a fleeting, jumpy, fragmented manner (see, as an example of this, the appended video footage of the composition of the work *inter-*, captured for analysis in Chapter Six). The degree to which individuals might be drawn into multimedia content varies to the extent that, while some might not be prone to being "fooled" by the most technologically "cutting edge" digital experiences, others find that the reading of mere *books* can result in such a depth of immersion that "they literally almost stop sensing the immediate physical reality around them...their world simulation process is generating imagery and feelings controlled by the content of the book..."²⁷ If static, printed media can effect such a response, it is likely that, *under certain conditions and for certain people*, the psychological effects of dynamic screen media share similarities.

While manipulation of degrees of mental acuity as the result of some universal screen-effect is difficult to establish, screen users' interpretations of reality might be said to be similar across the board due to all screen media having the capability of expressing the third order of simulacra. Television is often, though not always, an agent of the third order, possessing the power to blur the distinction between "art" and reality. Whereas, in the pre-television age, art was "enframed", its "status...set apart from everyday reality"²⁸ the modern television viewer can be "transported" to non-fiction events (news, sports, documentary

²⁶ Kelly, Kevin, "Will We Still Turn Pages," in *Time Magazine*, June 2000, at http://www.kk.org/writings/time_turn_pages.php viewed 09/10/06

²⁷ Bard, Sharon, *Virtual Reality: An Interview with Charles Tart*, Noetic Sciences Review, Autumn 1991, pp.6-17, at http://homepages.ihug.co.nz/~sai/tart_vreal.html, viewed 11/10/06

²⁸ Higgins, Kathleen Marie, "Television, Realism and Distortion of Time", in *Television: Aesthetic Reflections* edited by Ruth Lorand, 2002, p.108

etc),²⁹ see advertisements presented as short fictions and experience fictional programs that appear quasi-documentary because they present real-world situations and characters. Television can appear to “represent reality without artifice”.³⁰

One effect of this, argues Kathleen Marie Higgins, is that television tends to incite a certain *Schadenfreude*-like response in the viewer, in which it is possible to deflect television’s often negative content with “a sigh of relief in the realization that ‘that’s not me’.”³¹ This occurs in a more active sense in cyberspace, which is said to be “an appealing alternative reality because it implodes all concepts of distance, spacing and separation...it stands as an idealized realm devoid of the problems of the material world.”³² When one is able to assume false identities, to lie, deceive, “kill” virtual enemies or participate, however innocently, in completely simulated worlds, a virtual consciousness that, at best, allows for total freedom and, at worst, allows for total abuse, can seem routine. Applied to MNS, the *Schadenfreude*-like effect of the screen consciousness that the software shares in may well lead to a certain failure of the sense of responsibility that composers would ideally like to have for their compositions; responsibility for addressing the music’s crises might seem to belong elsewhere.

5.2.4 Orders of simulacra as one explanation for difference in generational views of MNS

Chapter Two revealed a clear age/generational disparity between exponents and detractors of MNS. This may partly be explained by aligning Baudrillard’s orders of simulacra with the progression of popular entertainment history, showing that, as the orders gain popular traction, society becomes more accepting of new and

²⁹ *ibid.*, p.110

³⁰ *ibid.*, p.111

³¹ *ibid.*, p.122

³² de la Cruz, Denise, *Jean Baudrillard: Simulacra. Simulations. Cyberspace*

<http://www.duhkneez.com/baudrillard/>, viewed 15/09/06

extended bounds of reality. MNS's detractors typically (with exceptions) learned their craft during an age that embraced classic science fiction, in which present technology was projected into the future in the manner of the original *Star Trek* television series (guns = "phasers", ham radio = "communicators", etc). This milieu occupied the second order of simulacra, where fantasy was firmly rooted in factual basis.

Today's generation of young composers is more likely to sympathise with *The Next Generation* update of the original *Star Trek*, in which phenomena that spring from no historical precedent other than the imagination, such as the "holodeck" and virtual reality characters (for instance, the doctor on *Star Trek: Voyager*) abound.³³ This generation is also familiar with the virtual environments of the modern video game, in which third order phenomena are not only witnessed – as in the *Star Trek* example – but are "participated in" and controlled by the gamer.

A number of generational transitions appear to be taking place. While older generations of composers seem, for the most part, excluded from these changes, younger composers display a greater willingness to adopt MNS partly because the technological and social conditions evident during their formative years have required and encouraged the use of new technologies. The formative years of the youngest currently-emerging composers intersected with the emergence of the Internet, the mass use of cellular phones and the iPod, to name but a few technologies; this generation is even more likely to embrace MNS.

³³ Mann

5.3 MNS and temporal perception

5.3.1 Background

Time perception is a most difficult concept, in which scientific, philosophical and psychological definitions and agendas criss-cross. This section will refer extensively to Jonathan D. Kramer's *The Time of Music: New Meanings, New Temporalities, New Listening Strategies* (1998). Although this book is substantial and perhaps the leading text about music and time, Kramer admits that if it is taken as "theory of perception or cognition,"³⁴ that is, as driven by the findings of the above disciplines, then it is "little more than a starting point, a set of speculations."³⁵ It quickly becomes evident that a full treatment of music, time and MNS warrants a thesis of its own, and would ideally be a collaboration including scientists, philosophers, psychologists, composers and musicologists. As such, a quick summary of some of the key points, with some suggestions for further investigation based on some known theories surrounding music-time perception, will suffice presently.

Time experienced by humans is, obviously, very different from that measured by the sundial, hourglass or atomic clock: while scientific time is relentless and constant,³⁶ human time perception is altered by fun or boring tasks (respectively, time speeds up or slows down), is perceived to accelerate with advancing age and is changed in various ways through the use of psychoactive substances or through meditation.³⁷

Listening to music also alters time perception. Taken as crude "opposites", certain types of music may, in simple terms, evoke quite different perceptions of

³⁴ Kramer, Jonathan D., *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*, 1998, p.328

³⁵ *ibid*

³⁶ "In music...technology has made duration an absolute." Kramer, p.71

³⁷ <http://en.wikipedia.org/wiki/Time#Psychology>, viewed 04/10/06

time's passing: slow and fast music (*adagio* vs *presto*), music that is information-heavy and music that is simple and repetitive (New Complexity vs Glassian Minimalism) and music without an easily discernable structure vs music with a readily discerned structure (for instance, Indian raga³⁸ vs a Mozart sonata). Tempo, texture, structure, duration, complexity and many other musical parameters, not to mention the disposition of individual listeners and the contexts of their listening experiences,³⁹ all play with time perception.

Time in composition is of critical importance. The composer must judge sectional and overall duration, tempo and the temporal placement and flow of sonic events, and must hope that his or her perception of these parameters equates roughly to the perceptions of listeners in order that the intended emotional and/or musical effects are successfully conveyed. MNS, a meeting place of scientific time and human time, complicates matters. The ticking clock seen on the MNS toolbar when material is auditioned is scientifically exact, as is the computer's "perfect" placement of visual notational objects and sound events during playback. These are at odds with the composer's time perception, which is governed partly by everyday human time perception and partly by the ways in which this everyday perception is acted on by music. That the music in question is that *of the composer*, and is thus understood in greater detail than it is by other observers, adds further complications.

5.3.2 Application of specific theories in music-time perception to MNS

Specific known theories about music's effects on time are worth noting.

Questions might be formulated around these and addressed in subsequent

³⁸ For the unaccustomed Western ear, at least.

³⁹ "Richard Block identifies four different kinds of context, all or any of which may affect perceived duration: 1. characteristics of the observer...2. contents of the duration perceived...3. activities while experiencing the duration...4. types of durational information demanded by the situation." Kramer, p.342

studies. For one such theory, Kramer points to the research of psychologist R.D. Meade, who

has demonstrated that perceived duration seems longer relative to absolute duration as we approach completion of a goal-directed task, whereas there is no distortion of measured time when goal direction is absent.⁴⁰

Although Meade's research did not concern music, Kramer insists that his findings might be applied to music: sense of duration expands (time slows down) when cadence or climax are thought to be approaching. It is certainly true that one tendency of performance practice is to stretch time at such moments in music, especially at final cadences.⁴¹ It might then be asked whether listening to MNS has the same effect. Does the rigidity of MNS playback provide composers with the same sense of time slowing when approaching a musical goal? If not, then it must have the opposite effect: time speeding up. Are composers then more inclined to write in rubato markings and "tweak" the playback to satisfy the need to slow down, or do they employ increasingly longer note values? It follows that it is possible that MNS-realised scores might contain directions that have the effect of unduly exaggerating temporal change around musical goals.

Another "time-lengthening effect" is that of the "watched pot."⁴² In this, "attention to time has a strong influence on perceived length."⁴³ Specifically, time passes more slowly when duration is actively concentrated upon than when one is not trying to perceive duration. If it is true that MNS's toolbar timer has the effect of making the composer aware of (scientific) time's passing and of durations, then time will seem to move more slowly for the composer. It would follow that MNS

⁴⁰ *ibid*, p.331

⁴¹ As one of countless possible examples, this phenomenon is evident in most treatments of the final "Hallelujah" in Handel's *Hallelujah Chorus*

⁴² Kramer, p.332

⁴³ *ibid*, p.332

may tend to encourage composers to write faster music to compensate for perceived slowness (see also 6.5.1.2).

It would be interesting to devise and conduct experiments to gauge the validity of this concept. One such hypothetical experiment could run as follows: MNS-using participants would be asked to write a short monophonic line using a string of notes consisting of a single time value, say, quavers. They would be told to listen to MNS playback several times and then enter what they considered an appropriate tempo marking, given that the fragment is, for the sake of argument, an *allegro*. This task would be performed twice, once with the toolbar timer visible and functioning and once with it disabled. Should the “watched pot” effect be at work, it should be possible to observe that composers specify a slower tempo when there is no toolbar timer on display.

The cases of time stretching around musical goals and the “watched pot” might be said to be evidence of Baudrillard’s second order of simulacra in action. MNS playback, a simulation, is prompting composers to change temporal instructions in order to adjust to temporal shifts incorrectly perceived due to disagreements between computer time and human time. Such actions bear no relationship to reality.

The above speculative points serve merely as an incomplete basis for further empirical research into this area.

5.4 Reinforcement and dematerialisation of the written trace: MNS and compositional values

MNS both reinforces and erodes the status of the score. These effects and the wider implications of technologies and their impact on cultural values will be examined presently.

5.4.1 Reinforcement of the score

In catering only for Western notation,⁴⁴ MNS largely limits composers to a language that has, for around sixty years, existed alongside a range of other important and effective means of music codification. Chapter Two's questionnaire showed that prolonged MNS use can have the tendency of forcing composers to embrace notational practices limited to those of the early twentieth century, at the expense of exploring the non-standard methods of notation that emerged from the 1950s. Sixteen respondents mentioned the difficulties involved in realising non-standard notation. They reported that notative compromises tend to be made when the software does not provide the best graphical solution and that, with MNS, composers might steer away from non-measured textures or tricky-to-notate music because it is difficult to implement.⁴⁵ (The lack of catering for notation for non-Western instruments and musical traditions was also mentioned.)

MNS use can lead to difficulties in thinking outside of the limitations imposed by the software. Says engraver and composer Dennis Báthory-Kitsz of the lack of graphical capabilities in MNS: "This limits the composer's opportunities to the software's capabilities. 'Writing to the software' has become a creativity curse for those not strong enough to push back at technology."⁴⁶ Playback has an important role in this: in not being able to sound graphic notations, composers who are reliant on playback are less inclined to "gamble" with notation that will not provide the "confirmation" discussed in 4.5. When composers have

⁴⁴ The industry-leading MNS packages appear to have been designed to render notation as it had been developed and accepted by the wider music community up to around 1950. (It should be possible to replicate late-Schoenbergian scores with MNS). However, MNS packages do allow for limited "drawing" of graphical elements, meaning that the notative languages developed by Stockhausen, Cage et al, are catered for to some extent. Good results are possible, but this work is usually painstaking and frustrating. More recently, importation of graphical elements rendered with specialised graphics software has become possible. Neither of these methods of extra-notative input generate playback, although if the intention of graphical notations is to produce music of chance, this is probably of little concern.

⁴⁵ Refer Appendix B, Question B2

⁴⁶ Báthory-Kitsz

established a routine of in-the-mind sonic imaging, followed by note-input, and then confirmation via playback, it can be difficult to compose when that critical confirmation is removed from the process. Without the security of playback confirmation, composers might tend to abandon plans to express imagined sounds in unconventional ways. Instead, they might try to engineer complicated conventional notative solutions that would have best been expressed in a graphical manner, leading to difficulties for performers and loss of the performative benefits of chance elements that the composer may have wished to incorporate.

In essentially limiting composers to a certain, at worst aged, notative language,⁴⁷ MNS has the effect of confirming the traditional score (that is, the pre-1950 model) as the best vehicle for music codification: the score is monumentalised. By extension, that which is *specifically* being monumentalised is the *engraved* score. As Heim pointed out in 4.6.1, use of the word processor renders words that are “impersonal, presentable, *public* [italics added].”⁴⁸ Similarly, we can say that the music publishing-house score tends to be monumentalised by MNS. In this sense the score conforms to its most widely-accepted or conventional form (its *public* form in Heim’s terms).

5.4.2 The score is demonumentalised, or is it? – Walter Benjamin

It follows that MNS undermines the unique value that once surrounded composers’ hand-autographed scores, as discussed at length in Chapter Four. But the status of the MNS-engraved score also suffers: with a proliferation of professional looking scores and the ease with which they might be indefinitely reproduced, the MNS score is, for many people, of less reverential value than scores written prior to MNS. Here, ideas introduced in Walter Benjamin’s

⁴⁷ These limitations are not apparent in the software of pure audio manipulation and MIDI, where platforms allow for a high degree of customisation or user-programming.

⁴⁸ Heim, p.193

seminal essay, *The Work of Art in the Age of Mechanical Reproduction* (1936) come to the fore. Benjamin said “even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be.”⁴⁹ The verifiable history of the art work, including changes to its physical condition over the years and the hands of ownership through which it has passed, identify it as original. Benjamin: “The authenticity of a thing is the essence of all that is transmissible from its beginning, ranging from its substantive duration to its testimony to the history which it has experienced.”⁵⁰

The “aura” attached to original works is not present in their reproductions. However, far from lamenting mass-reproduction, Benjamin takes the Marxist stance that reproduction is no bad thing, saying “mechanical reproduction emancipates the work of art from its parasitical dependence on ritual.”⁵¹ With the score thus demonumentalised, Benjamin regards its greater accessibility as a boon and not a failure, leading to the politicisation of art and the abolition of elitism.

Ironically, in allowing composition to be widely reproduced and disseminated, MNS makes the sheer weight of scores that are “out there” mean that the score is once again monumentalised, but in a very different manner. Whereas scores were once conveyors of the “living proof” of compositional genius, they now pour unchecked into a huge catalogue of works that was once limited in size by the cultural gatekeeping traditionally provided by publishing houses. That this mass of undifferentiated scores exists is well illustrated by the website www.sibeliusmusic.com which, in October 2006, held 58,451 scores for visitor perusal and audition via MIDI playback.⁵² Few of these scores would stand up to

⁴⁹ Benjamin, Walter, *The Work of Art in the Age of Mechanical Reproduction*, 1936, at <http://www.marxists.org/reference/subject/philosophy/works/ge/benjamin.htm>, viewed 19/10/06

⁵⁰ *ibid*

⁵¹ *ibid*

⁵² The popular website www.youtube.com illustrates the same concept, only for home video.

critical scrutiny, testimony of the “everything, by everyone, for everyone, now!” rubbish heap that is often lamented in postmodern culture. Says Eisenberg:

It was the freedom, once the cathedral of culture had been wrecked, to take home the bits you liked and arrange them as you pleased...The cathedral of culture was now a supermarket.⁵³

5.4.3 Changes in values

With the advent of MNS, the status of the score also changes in other ways that are related to its dematerialisation and altered monumentalisation. These lead to shifts in artistic and musical values. As noted in 2.5.19, composers are able, with MNS, to discard unwanted material instantly and permanently, removing any “history” of the compositional process. That is, composers no longer keep archives of hard-copy material that might reveal the nature of the compositional process.⁵⁴ This, it was contended, had consequences for the facility with which composers could later talk about the process of their work, with further implications for the wider music community. Says Báthory-Kitsz: “And then there are the musicologists. No longer can scores be dated by the papers, can drafts be seen in their development, can revisions be examined on the page for their handwriting.”⁵⁵

Technology literature supports the idea that digital technologies dematerialise the written trace. Poster asserts that computers demonumentalise the act of writing by providing a canvas (ASCII codes as pixels of phosphor) that is “instantly

⁵³ Eisenberg, Evan, *The Recording Angel: Music Records and Culture from Aristotle to Zappa*, 2nd Ed, 2005, p.24

⁵⁴ Relatedly, the lifespan of digital consumables is limited and file formats need constant updating to remain compatible with current hardware and software.

⁵⁵ Báthory-Kitsz

transformable.”⁵⁶ Says Poster, in an observation that recalls Ong’s “secondary orality”:

Once transformed from a mental image into a graphic representation [using traditional means], words become in a new way a defiant enemy of their author, resisting his or her efforts to reshape or redistribute them. To a considerable degree, writing on a computer avoids the transformation of idea into graph while achieving the same purpose. The writer thus confronts a representation that is similar in its spatial fragility and temporal simultaneity to the contents of the mind or to the spoken word.”⁵⁷

Bolter says that, with greater freedoms being afforded to the individual, the *network* is supplanting the *hierarchy* in Western culture. He says that while the printing press “enriched as well as standardised vernaculars”⁵⁸, electronic writing “opposes standardization and unification as well as hierarchy.”⁵⁹ With culture splintered, there is no “single favored literature or music. Nor is there a single standard of grammar or diction in writing.”⁶⁰

Eisenberg agrees that there has been a loss of music as a social monument and means of ritual:

According to Nietzsche, images splinter, music unites. Images, digitization, the Internet all tend towards the same effect: Dionysius is torn apart, gobbled up by Apollo. The feeling, though, is anything but Apollonian – a frenzy, not a calm. Promising to meld all people in a global mind, digital culture leaves the actual minds of real people fragmented.⁶¹

⁵⁶ Poster, p.111

⁵⁷ *ibid*

⁵⁸ Bolter, p.233

⁵⁹ *ibid*

⁶⁰ *ibid*

⁶¹ Eisenberg, p.215

Taviss similarly argues that as society becomes more complex – government institutions multiply and the knowledge of individuals is outstripped by a spiraling knowledge pool, rendering individuals powerless to make informed decisions – the resulting increase in technological prominence results in changes in values. She quotes Mesthene:

By making available new options, new technology can, and generally will, lead to a restructuring of the hierarchy of values, either by providing the means for bringing previously unattainable ideals within the realm of choice and therefore of realizable values, or by altering the relative ease with which different values can be implemented – that is, by changing the costs associated with realizing them.⁶²

MNS redefines compositional values on both counts. Firstly, it provides, for the inexperienced composer, the temptation to compose music that is quite spectacular, but which is humanly impossible to play (or which is so spectacularly dull that only machines should be given the inhuman task of its performance). Suddenly having the technology to do things that were always desirable, thus transforming the “ideal” into the “real”, creates “new tensions and perhaps ultimately a redefinition of values.”⁶³ Secondly, MNS makes it far easier for composers to render scores which may be self-legitimised on the basis of the excellence of their playback rather than the quality of the visual score. That is, with far less effort required to make music that “sounds” good, the score might be reduced to being an almost *inconvenient* vehicle for the conveyance of musical information. The effort required of the composer has been eased, or at least channeled from the score to the “sound,” bringing about a readjustment of values. Evan Eisenberg queries the effects of being able to compose electronically on the traditional notion of music as the result of hard work:

⁶² Taviss, Irene, *Our Tool Making Society*, 1972, p.48, citing Emmanuel G. Mesthene, “How Technology Will Shape the Future”, *Science*, 161 (July 12, 1968), 137

⁶³ Taviss, p.49

What happens...to the idea of music as a test of the human body and spirit, a distillation of one earthling's hard-won skill and experience?⁶⁴

Bolter has also picked up on the possible outcomes of digital technologies making the process of writing easier. In writing about the fate of the printed book, he says:

the idea and the ideal of the book will change: print will no longer define the organisation and presentation of knowledge, as it has for the past five centuries...What will be lost is not literacy itself, but the literacy of print, for electronic technology offers us a new kind of book and new ways to write and read. The shift to computer will make writing more flexible, but it will also threaten the definitions of good writing and careful reading that have been fostered by the technique of printing.⁶⁵

In 1987, Heim wrote that new technologies were changing the written language of youth. That his observation was made well before the advent of e-mail and text messaging makes it especially prescient:

It has also been noted, especially by observers of telecommunications, that grammatical liberties and certain uncultivated aspects of informal spoken language are especially perceptible in digital writing...there is greater informality – because less formation, less formulation.⁶⁶

Heim later says that

if the mind is made truthful by the fixity of the stable idea, as Platonism maintains, then the volatility of the electric element insures that the felt sense of truth is undermined...Possibility dominates over consistency of vision.⁶⁷

⁶⁴ Eisenberg, p.214

⁶⁵ Bolter, p.2

⁶⁶ Heim, p.210

⁶⁷ *ibid*, pp.211-212

It is clear that the status of the music score is in a state of flux: it is both ossified by the limiting nature of MNS and effaced by the ready nature of its reproducibility which, ironically, re-monumentalises it through the sheer mass availability of scores, regardless of their quality. The reverence with which it was once held is threatened by the restructuring of values that new technologies bring. In moving composers towards a secondary orality, while society at large may be said to be trending towards post-literacy, MNS poses many questions about the place of the score in musical life.

5.5 MNS: agent of both homogeneity and diversity

Related to changing values, consideration can be given to ways in which MNS, and new technologies in a wider sense, offer new possibilities that both splinter artistic communities and, in a contradictory manner, bring artists closer together.

The art-music scene of the last few decades contrasts with that of the post-war era in that no one movement (the Darmstadt School, minimalism, etc) can be said to be the stylistic flag-bearer; as Paul Griffiths put it, “we now live with many musical histories and many musical presents.”⁶⁸ This non-emergence of “schools” may partly be the result of technological change. Says Taviss:

[it is] unlimited possibility [stemming from technological advance] and an excess of freedom that pose a challenge for identity. If almost anything is or will be technologically feasible, choice becomes difficult to the point of creating a serious psychological problem.⁶⁹

Griffiths argues that the introduction of the compact disc in 1982 and a resulting expansion of the available recorded repertoire in all genres and periods, has led to questioning of “the criteria and even the value of selecting an agreed canon of

⁶⁸ Griffiths, Paul, *Modern Music and After: Directions Since 1945*, 1995, p.238

⁶⁹ Taviss, p.64

masterpieces.”⁷⁰ Technology has democratised choice for listeners and composers.

It might then be argued that MNS increases the chances for composers previously anchored in one stylistic area to branch out into others. To a certain extent, playback means composers might circumvent the need for close study of scoring techniques and instead attempt to hew desired music through trial and error and sheer will. While the results of such an approach may not be satisfactory, the very fact that MNS makes this possible changes the compositional playing field: composers can now tackle a greater variety of music in different stylistic areas. More so now than ever, it is unlikely that the schools of the sort of the pre and post-war eras will be able to become established.

While MNS itself is essentially a new tool for performing an old task, the conditions that allowed the creation of MNS (invention of the silicon chip, development of advanced Graphic User Interfaces, etc) increasingly diversify humankind, allowing for new forms of both community and alienation and shaping a society in which

the store of knowledge concerning the consequences of action is large and is rapidly increasing...in which received norms and their ‘justifying’ values will be increasingly subjected to questioning and reformulation.⁷¹

Paradoxically, while musical trends are now more splintered than at any time in musical history, the adoption of MNS by a large proportion of composers counters this by bringing composers of all stylistic leanings closer together. MNS ensures that a large number of composers now perform the same actions in the same working environment in the course of their working days: computer is turned on, MNS software started, file being worked on opened, last point of work located, etc. Because the tools used are the same (or very similar), composers

⁷⁰ Griffiths, p.238

⁷¹ Taviss, p.56, citing Williams, Robin M Jr, “Individual and Group Values” *Annals of the American Academy of Political and Social Science*, 371 (May 1967), p.30

can now communicate with each other about their working lives in the knowledge that each will understand the nature of the performance of certain physical aspects of the compositional process. There are, for instance, a finite number of ways in which one might instruct MNS to turn a B \flat into an A \sharp .⁷² While it could be argued that the same was true in the pen and manuscript era, it is the exactness of the order and type of mouse clicks and keystrokes and resulting changes on screen that draws composers to a common ground.

In a wider sense, MNS's digital environment allies it closely with the sort of community building that is possible through Internet user-group discussion lists,⁷³ the weblogs of MNS users (both composers and engravers)⁷⁴ and other websites. Through these, MNS-specific information can be instantly exchanged and relationships between composers working with identical interfaces forged. A sense of community is furthered when many of its participants use the same tools and this, argues Taviss, can mean a trending towards homogeneity:

Under conditions in which social groups maintaining differing values are relatively insulated from one another [individual composers working alone with pen and manuscript], it is easy to maintain the group identity or value system [stylistic/aesthetic individuality, notwithstanding the pressures of prevailing musical trends, the demands of commissioners, etc]...However, as contact with representatives of other value patterns becomes more frequent and routine [as more and more composers find a common ground via the tools they use, that is, MNS], a greater consciousness of values emerges which may bring with it a degree of value relativism.⁷⁵

⁷² This kind of discourse turns traditional notions of what composers might talk about to each other on its head: an emphasis on tools used rather than the manipulations wrought by the tools is a characteristic of computer music as a culture, an observation supported by perusal of back issues of *Computer Music Journal* (Massachusetts: MIT Press), which tends to place more emphasis on technology than on music.

⁷³ Such user lists include <http://tech.groups.yahoo.com/group/sibelius-list/> and <http://www.sibelius.com/cgi-bin/helpcenter/chat/chat.pl>, viewed 09/10/06

⁷⁴ Such as <http://www.maltedmedia.com/people/bathory/waam-20060622.html>, viewed 10/10/06

⁷⁵ Taviss, Irene, "Changes in the Form of Alienation: The 1900's vs The 1950's" *American Sociological Review* 34 (Feb 1969) pp.54-55

The effects of this are twofold. The bringing-together of composers due to shared tools might be said to be positive, encouraging more dialogue between composers about the equipment they use and how these tools affect what they do, leading to more coordinated solutions to common difficulties. A less desirable effect is that compositions might start to sound similar because many composers use the same tools. This is of special concern in electroacoustic composition, where preset sound manipulations can lead to a similarity of musical outcomes. Of this, Denis Smalley has written that “technological listening” (listening in such a way as to guess the “technology or technique behind the music rather than the music itself”⁷⁶) becomes difficult to avoid, leading to a situation in which the technology imposes clichés on the music.⁷⁷ In instrumental composition the detection of MNS-related cliché is more difficult to detect, with the exception of such obvious things as copy-and-paste or mass transposition, used only because the technology makes such things readily executable.

Any such homogeneity may be a temporary condition, driven by a symbological stasis that is the result of the relative youth of MNS and digital technologies in general. Bolter describes how, with Gutenberg’s invention of the printing press, it took printers a few generations to realise they could move away from trying to imitate the style of hand-written manuscripts and impose a new “writing space”.⁷⁸ He contends that a similar reorientation of the physical “look” of writing will take place in the age of the digital word. It is possible that MNS will, in time, make provision for a wider set of notational languages, encompassing many of the notational innovations of the past fifty years while providing for entirely new, invented symbologies.

What is more, MNS is likely to be able to combine with other software to render some kind of playback for these new languages. The August 2006 takeover of

⁷⁶ Smalley, Denis, “Spectromorphology: explaining sound-shapes” in *Organised Sound* 2, 1997, p.109

⁷⁷ *ibid*

⁷⁸ Bolter, p.3

Sibelius Software by Avid Technology, a digital editing and broadcast technology company, would seem to point to the inevitability of such software fusions. In much the same manner as there are currently available integrated “suites” of software such as Microsoft’s Office (including word processor, spreadsheet and database applications) and Adobe’s Studio 8 (WYSIWYG web-page editor, graphics designer and Flash builder), future music suites will likely consist of MNS, Pro Tools-like environments and associated MIDI applications that cooperate and integrate closely with one-another. It might be said that such suites will draw composers even closer together, though much of this depends on the extent to which software companies allow users to modify these products.

5.6 Conclusion

The reader will have noticed that few specific effects of MNS on compositional practices and outcomes have been identified in this chapter. While MNS certainly acts on the processes and results of most composers who use it, the nature of any influence is specific only to individual composers. It is therefore of far greater use to identify the nature of the phenomenon and to place it in contemporary society. In doing this, it has been found that there is a strong case for stating that MNS exists as a phenomenon of unreality, a tool which, at best, models a fantasy that can later be realised as a reality and which, at worst, models a fantasy that would best remain in the realm of fantasy. Baudrillard’s “orders of simulacra,” in implying that all of society is permanently in a state of fantasy, is an extreme philosophical stance from which to build an understanding of the place of MNS on a continuum from real to unreal. However, a wider take on the effects of *screen consciousness* tend to lend weight to Baudrillard’s thesis.

It is only possible in the context of this thesis to scrape the surface of inquiry as to MNS’s effects on composer temporal perception. However, it was established that everyday, musical and compositional time perception are quite different phenomena and that the particular ways in which they mingle in the MNS

environment must have an effect on tempo and duration in compositions. This is a potentially rich and fascinating area that warrants dedicated analysis.

The ways in which MNS simultaneously reinforces and effaces the score as a vehicle for codification of music, largely defines the place of MNS in society as a tool that both progresses and stagnates the approach to composition. Leading on from this, the ways in which MNS and other digital technologies alter artistic and musical values is indicative of a society in which the “hierarchy of values” is shifting. In the same way that MNS both reinforces and effaces the score, it both homogenises and diversifies composer communities, allowing for new avenues of exploration, while tending to bring composers together in ways that may further understanding, or limit innovation.

With a conceptual framework now built, it remains for a specific study of the author’s own interaction with the MNS interface to be carried out, in doing so illuminating and testing many of the parameters identified in this and the previous chapter.

Chapter Six

MNS use in the author's own work: a case study

6.1 Introduction

In this chapter – written, for ease of reading, in the first person – I seek to build on the discoveries of Chapter Two, and the concepts outlined in Chapters Four and Five, by investigating my own use of MNS. The composition process of the violin and piano work *inter-* is the vehicle for this investigation.

I originally intended to examine the in-situ working practices of *a number of* composers, as a way of contrasting and comparing different approaches to MNS. While the questionnaire of Chapter Two yielded a wealth of valuable data, it could not provide an intimate, detailed and objective portrait of the composer-MNS relationship. However, for reasons discussed later in this chapter, I decided that a multiple subject study would be beyond the scope of this thesis and would likely not yield useful data. Instead, a study of my own interaction with MNS was considered a manageable task.¹ While general notes on the role of MNS in the composition of all pieces in Volume One of my PhD were taken (and appear towards the end of this chapter), a more rigorous way of generating a record of my interaction with MNS was required.

The approach chosen to examine my use of MNS is related to “usability testing,” from the field of Human-Computer Interaction (HCI), as well as to a branch of enquiry known as “diary studies,” in which research subjects maintain records of their activities. Human-Computer Interaction/usability testing laboratories are facilities designed to observe research participants using different kinds of

¹ This chapter also functions as a fulfillment of PhD statutes in terms of linking works composed with the written thesis component.

software and hardware.² An improvised, software-based usability lab was devised for the purpose of digital video capture of the composition of *inter-*.

The chapter will begin with a description of the compositional project used for evaluation and the methods used to capture video footage of its unfolding. A tabulation of the results of this footage follows, before an extensive discussion of findings. In this, the methodological issues of reflexivity, generalisability of findings and the advantages and limitations of the method of research undertaken will be covered. I will look at the nature of my compositional working practices with MNS and question the issue of working at a detailed level compared with working on overall shape vis-à-vis the maintenance of structural control. I will ask what the effects of repeated listening are (with specific reference to Baudrillard) and investigate how MNS influences the concept of compositional planning. The shift from comprehension of the work as a computer simulation to its life on the concert stage will be explained. The chapter will conclude with suggestions for further research and an unscientific summary of the role of MNS in the creation of the remaining works in Volume One.

6.2 Aim

To arrive at an empirical description and analysis of the nature of my compositional practices vis-à-vis MNS, particularly through analysis of the role of MNS playback in stimulating generation of musical materials.

² Usability laboratories include those of Sun Microsystems (<http://www.sun.com/usability/>) and the University of Waikato (<http://usability.cs.waikato.ac.nz/facilities.html>).

6.3 Methodology

6.3.1 Chronology

The process of investigation was based around the usual process of composition and performance. A work for violin and piano was solicited through New Zealand composer Jack Body for Japanese musicians Yuji Takahashi (piano) and Rieko Suzuki (violin) for a brief concert tour of New Zealand in May 2004. It was decided that the composition of this work should be captured in some way for later analysis. The timeframe for composition was limited, it being solicited on 12 February and the final score being required by the musicians later in the month. The work was completed on 5 March. The first rehearsal with the musicians took place on 22 May and the work was performed in concert at Soundings Theatre in Te Papa on 24 May. Analysis of video capture commenced early in June 2006.

6.3.2 Data capture

Key-stroke software – notorious for its use by identity-thieves – presented itself as a means of logging actions in-situ and unobtrusively. However, this would neglect to record the large number of operations performed with the computer mouse and would fail to capture sounds emitted from the computer during composition. Such a record would be far from comprehensive.

HyperCam software,³ an application that captures digital video footage (.avi files) of everything that takes place on the computer screen, including sounds emitted by the computer's sound card, was therefore settled on. Nearly the entire composition process of *inter-* was captured using HyperCam. The application was set running at the commencement of work with MNS (Sibelius 3) and ran "in the background," generating digital video files for later analysis.

³ <http://www.hyperionics.com/>

6.3.3 Selection of video sessions

Video clips were reviewed for content and three were selected for analysis according to the following criteria:

- 6.3.3.1** Temporal heterogeneity of samples: the spacing of selected video clips over the course of the composition of inter- was considered desirable. Samples were taken from the first, ninth and twenty-second days of composition, representing the beginning, middle and end of the composition process. This was in order to illustrate my perception that the experience of working with MNS changes as more material is realised.

- 6.3.3.2** Scarcity of periods of non-composition: many clips depicted extended periods when I had become distracted for various reasons and was not engaging with the composition. While such periods were reflective of the reality of composing, they were considered disruptive to the collation of useful data. Work-intensive sessions were given preference.

- 6.3.3.3** Duration: clips needed to be neither too lengthy, nor too brief.

6.4 Results

6.4.1 Video capture

Video clips depicting seventy-four minutes of work were selected for analysis from the archive of twenty-five hours of footage. The footage selected is viewable as .avi files on the appendicised DVD-R (Appendix C). The reader should open and view these through a media player on a computer.

The actions depicted in the .avi clips were tabulated, using a coding system devised for this task. The tabulations and a guide to the coding system may be reviewed in Appendix D. A breakdown of these results appears in Table Five.

TABLE FIVE: *Three composing sessions for inter-*

	SESSION ONE 12/02/04	SESSION TWO 20/02/04	SESSION 3 03/03/04
Duration of session	18:05 minutes (adjusting for a 92 second pause at 05:28)	25:33 minutes	30:52 minutes
Music realised	1 bar	Slightly more than 1 bar	- Half of 1 bar - Rhythmic scheme of climax altered
Time listening to playback	29% of session (310 of 1085 seconds)	30% of session (457 of 1533 seconds)	44% of session (815 of 1852 seconds)
Total playback auditions	73	82	90
Average duration of auditions	4 seconds	6 seconds	9 seconds
Auditions between 1 and 5 seconds duration	81%	67%	66%
Average number of auditions between editing actions	2.61	2.83	3.10

Auditions by time period	0-5 mins:	13	0-5 mins:	17	0-5 mins:	12
	5-10 mins:	18	5-10 mins:	17	5-10 mins:	14
	10-15 mins:	19	10-15 mins:	12	10-15 mins:	14
	15-19 mins:	22	15-20 mins:	18	15-20 mins:	22
			20-25 mins:	18	20-25 mins:	13
				25-31 mins:	15	

6.5 Discussion

6.5.1 Methodological issues

6.5.1.1 Reflexivity and “practice-based research”

As discussed in 2.5.1.1, reflexivity is a concept that addresses the extent to which preformed prejudices influence the formulation of research questions and the manner in which data is analysed. It is held that total objectivity in research is impossible and it is thus incumbent on researchers to declare their perceived prejudices and to try and mitigate these as much as possible.

While reflexivity is a concern for researchers in all fields, it is a core consideration for artists examining their own working practices. It could be argued that the emotional nature of artists’ relationships with their works makes it even more difficult for them to achieve a position of objective evaluation than non-artist researchers: artistic integrity and pride may lead to artist-researchers forming less than objective criticisms of the processes employed due to the understandable tendency for them to defend or valorize their own works.

Another problem might arise when artists are aware of the measures taken to record the realisation of art works to the extent that works are created in the constant knowledge that they will later be subjected to formal scrutiny. The process is, in this situation, denaturalised, the artist working less out of the need to satisfy an inner artistic drive than out of the desire to create work that can be

readily defended at a later time. The extent of any negative influence wrought by the use of HyperCam software is discussed below.

While artist self-study is clearly problematic, there is clearly much to be learned from what artists have to say about their approaches to work and, as such, a field of research called “arts-practice-led research” or “practice-based research” has emerged. Dr Linda Candy describes this field thusly:

Practice-based Research is a form of research that aims to advance knowledge partly by means of practice. The type of research is an original investigation undertaken in order to gain knowledge and understanding. It includes the invention of ideas, images, performances and artefacts including design, where these lead to new or substantially improved insights.⁴

Devising correct methodology is of the utmost importance in order to minimise bias in the capture and analysis of data. It is hoped that bias is limited in the present study through the precise nature of data capture (the video clips used are an exact and honest representation of work undertaken). The long time gap between video capture and data analysis is also, arguably, beneficial in this regard. It is hoped that this long delay minimised the extent to which in-situ prejudices – the various motivations for compositional acts – were projected. In a sense, this delay made the work less *mine* in that I could no longer remember why I did many things: the work became, to some extent, as if observed from the outside, despite remaining very much my creation.

6.5.1.2 Personal and global generalisability of findings

The degree to which the video clips chosen for analysis may be considered representative of *my* typical practices might be assessed next to several factors:

⁴ Candy, Dr Linda, *Practice Based Research: Synopsis*, 2006, at <http://www.creativityandcognition.com/content/view/80/103/>, viewed 13/10/06

instrumentation, the characteristics of the commission, changing compositional practices and changes to software and hardware over time.

inter-, a duo, was not conducive to the application of many of the MNS working techniques that might be employed when working with larger ensembles. Copy and paste, for example, might be used more extensively in the composition of an orchestral or large ensemble score than it is in the writing of a duo, as a means of experimenting with the colouristic potentials of “doubling.” Much might be learned, in working with large ensembles, from auditioning certain combinations of material in isolation from other instruments and this can often lead to the development of further ideas. By comparison, the very *nakedness* of the piano and violin combination (exacerbated by the harsh sound of the playback violin, the default sound of my computer’s soundcard) probably lead to greater attention to pitch selection: the concept of working with “large brush strokes” and “broad gestures” is likely to have been negated by the intimacy of the instrumentation. These and many more factors mean the findings generated by the compositional process observed with *inter-* are of limited transposability to works of different, especially larger, instrumentations.

The time period between the solicitation of *inter-* and its due date was much shorter than would normally be expected for commissions. Composition was thus “pushed through” more rapidly than usual, meaning it was likely that fewer constructions of “alternative scenarios” were undertaken than in the realisation of works composed over a longer time period.

My compositional approaches change from work to work, and even develop during the writing of single works. As such, comparison of the creation of *any* two of my works is problematic because different processes are required to express changing aesthetic aspirations or commission-related aesthetic requirements. While the composition of *inter-*, might share many language similarities with the wind quintet, *e pari, e te tai*, it could not be said to share as many similarities with the composition of *Jangeran*, which employed an entirely different pitch and rhythm language. 6.7, below, discusses the differences

between the works of Volume One and the compositional approaches to them vis-à-vis MNS.

Changes in MNS by way of software updates or the addition of allied software or hardware improvements present another way in which the composition of *inter-* might be said to differ from the processes employed in other works. One example of this is that the sound canvas used for playback during the writing of *inter-* was that of my computer's soundcard, which carried a very basic collection of sounds. By the time I came to compose *circuit:spiral*, I had acquired and was using the more advanced Kontakt Gold collection of sampled sounds. The relative realism of the instrumental sounds, including their attack and decay parameters would have resulted in different reactions to and interpretations of auditions and resulted in the making of different compositional choices. While it is conceded that *circuit:spiral* employed a pitch language that did not demand the comparative density of sonic information used in *inter-*, it is possible that the more realistic playback sounds used in the making of the former contributed to it having a greater sense of musical space. In this, I find myself in general agreement with the composer who, in Chapter Two's questionnaire, stated:

as I worked with more realistic sounds I've realised I've been writing fewer and fewer notes. Also the tempi I compose with and the final performance tempi are more aligned now. My reasoning is this; older sampled sounds have no sympathetic resonance, and no guts. They are certainly not beautiful (Arvo Part "a single note, played beautifully, is enough for me"). In a lot of my earlier pieces, I filled up all temporal space to accommodate the lifeless sampled sounds – invariably when the works were performed live the tempi had to come down – primarily because 'real' sounds need time to speak, and breathe. I now have a very realistic sample library...and my composing is evolving again.

The *global* generalisability of the process of composing *inter-*, or any of my works, is limited. A myriad of factors mean the below findings are of little benefit in understanding the MNS practices of other composers, although it is likely that

my practices intersect with those of other composers on many levels. The nature of composition is such that a great many aspects of the process are in constant flux. Capturing the making of one particular work will never reflect the processes undertaken in other works by the same composer, and will reflect even less of the processes of other composers. It would, however, be interesting to compare my compositional approaches in the writing of *inter-* with those of other composers working with the same instrumentation and with whom I share similar aesthetic goals.

6.5.1.3 Advantages and limitations of HyperCam study

In using HyperCam to record my working methods, I was in effect setting up a simple usability lab of my own, in which I was both the research subject and, at a later time, the researcher. The low-tech nature of this “laboratory” was both beneficial and detrimental. The “in the background” nature of HyperCam meant it was a minimally-invasive method for recording my actions. It could be switched on to record any composition session (rather than being limited to lab times), was located on my computer and in my study (again, as opposed to being located in a lab somewhere else) and I was only ever minimally aware that it was running. The captured footage was thus a naturalistic depiction of my practices. However, the lack of video monitoring of my facial expressions, bodily gestures and the lack of audio commentary that would likely be generated in a dedicated usability lab,⁵ meant that certain aspects of the act were not captured. Given the limited scope of this study and that, with the approach taken I could work fairly naturally, the loss of such aspects is not considered to be of major concern.

⁵ In advanced HCI laboratories, research subjects are observed from a control room, with the two rooms separated by one-way and sound-proofed glass to circumvent immediate loss of subjectivity. The behaviours of participants are captured by cameras trained on users’ faces and hands. Microphones record running commentaries of researchers and research participants. All actions that take place on-screen and all keystrokes and mouse clicks are captured by dedicated software.

Selection and analysis of video footage took place some two and a half years after completion of the work. This separation was advantageous in that it partially mitigated the problems of researching the “self.” With most memories of *inter*’s creation forgotten, I could more objectively analyse the processes taking place; to an extent, the work now gave the impression of having been composed by someone else entirely. However, it was often difficult to work out the nature of the thought processes that were taking place in the mind of “the composer” – and this was unfortunate. It is likely that, had a dedicated usability lab been employed for this study, in which measures such as audio commentary were used, the motivations behind my thought processes would have been captured.

A further note: with the exception of fairly unsuccessful early attempts at composition without the aid of MNS, I have always used the software to compose. As such, this study cannot be considered a vehicle for comparison with the pen and paper paradigm. Although I do speculate on how I might have approached writing *inter*- without MNS, the below findings are not for the purpose of paradigm comparison.

6.5.1.4 The difficulties of group study of MNS practices

As stated earlier, my original intention was to study a number of composers as they worked with MNS, in order to see how they used the software and to compare the extent to which the software impacted on their decision making and overall compositional results. This study would have involved composers being asked to complete a specific compositional task in a set time using MNS. It would have employed the usability laboratory at Victoria University’s Computer Studies Department, a facility designed and equipped to document, with video footage, screen-capture and voice recording, the computer-using behaviours of research participants. Participants would have been prompted by me to maintain a running monologue, explaining the reasoning behind their actions and the role of MNS in such actions. The study would have been modelled on the work

undertaken by numerous institutions primarily interested in developing and honing computer hardware and software through examination of users in-situ.

It was eventually concluded that it would be very difficult to extract meaningful findings from such a study because, while interesting data about specific composers' approaches to MNS use would have been generated, it is unlikely that this would have led to findings generalisable to composers globally. While MNS "usability testing" may remain open as a vehicle for future research, such research would be mediated by a number of factors, including the histories of individual composer working practices, compositional aptitude, general IT and MNS-literacy, composers being reluctant to reveal "trade secrets" and the unnaturalistic nature of the laboratory setting. Other factors inhibiting such a study might be that many composers use other tools in conjunction with MNS to compose while some do not, that the devices used to document the study and the need to provide a commentary would likely be distracting and that attempts to analyse and compare musical exercises produced under study conditions would be, for a large variety of reasons, meaningless.

For such a study to produce meaningful outcomes, it would need to focus on composers with similar degrees of compositional experience and aesthetic goals. Or, it might need to be very large in scope, allowing for comparison both within and across a number of groups of composers with similar abilities and aesthetic outlooks.

It is likely that paradigm comparison (that is, comparison between pen and manuscript composition and MNS composition) would be an aim of the study. The composers studied using MNS would also have to be studied undertaking the same or similar exercise using only pen, manuscript and possibly a musical instrument. This is problematic because the "control" study and the MNS-based study would likely cross-contaminate, the inevitable second-guessing of participants sully the data.

While testing of numbers of composers for the purpose of comparison is highly problematic, the single composer study of this chapter, possibly improved by

more sophisticated means of data capture, is invaluable as a means of better understanding one's own compositional practices. Such study, in my experience, should be considered an excellent way of gaining fresh and objective insight into practices that might have slipped from the consciousness of composers. It would, for many composers emulating this study, be the first occasion on which they had paused for in-depth reflection on the nature of their work practices, something that in most cases should lead to better considered compositions.

6.5.2 Compositional working practices in *inter-*

6.5.2.1 The general nature of exchange between myself and MNS

The results tabulated in Appendix D and condensed and analysed above in Table Five reveal a great deal about the nature of my interaction, indeed, my *relationship*, with MNS. That this relationship is in the order of *collaboration*, as discussed in 4.5, can be in little doubt: there is a very clear link between material entered, that material auditioned and my response to the aurally "learned" music with modification, addition or deletion. My relationship with MNS can be described as a "question" and an "answer," followed by an action.

Between 29 (Session One) and 44 percent (Session Three) of total working time was spent listening to playback. No time was spent attempting to formulate understanding or sonic "imagining" by way of score reading. All such understanding was achieved solely through listening. Modification or input of new materials was typically limited to fairly brief tasks, such as the addition of a few notes, a new tuplet, a pitch added, deleted from, or moved in a chord, and so on. Such actions were typically interspersed with short auditions of the material on which attention was currently being focussed. In all three sessions, approximately three auditions were required before action was taken, with between 66 and 81 percent of these lasting for less than five seconds in duration. Just as the sculptor constantly *looks* at rather than *imagines* that which he or she

is chiseling from a block of marble, I require constant sonic reminding of the nature of the materials I am shaping.⁶ MNS functions in my compositional practices in a similar manner to Stravinsky's piano in his.

Whether or not I am a pianist...the instrument itself is the center of my life and the fulcrum of all my musical discoveries. Each note that I write is tried on it, and every relationship of notes is taken apart and heard on it again and again.⁷

6.5.2.2 Micro versus macro: maintaining control through listening

The process just described correctly implies that I work very much on a micro-level, incrementally revising or adding materials, chiefly at the point at which the music "runs out" – a point that I call the coalface. In the field of electroacoustic music, where the sounds worked with are not interpreted via musicians (notwithstanding live diffusion practices), Denis Smalley worries that the micro-level methodology is neglectful of broader concerns. He says:

many composers regard reduced listening [concentrated, repeated listening on a small time-scale] as an ultimate mode of perceptual contemplation. But it is as dangerous as it is useful for two reasons. Firstly, once one has discovered an aural interest in the more detailed spectromorphological features, it becomes very difficult to restore the extrinsic threads to their rightful place. Secondly, microscopic perceptual scanning tends to highlight less pertinent, low-level, intrinsic detail such that the composer-listener can easily focus too much on background at the expense of foreground. Therefore, while the focal changes permitted by repetition have the advantage of encouraging deeper exploration, they

⁶ Says composer John Adams of his use of Performer software: "I'm like a potter. I want to have my hands on the material while I'm working with it...I'm a very physical person, and I've always liked to have the sound right there." Jemian, Rebecca and De Zeeuw, Anne Marie, "An Interview with John Adams" in *Perspectives of New Music*, June 1996, p.92

⁷ Joseph, Charles M., *Stravinsky and the Piano*, 1983, p.240

also cause perceptual distortions. My experience of teaching composers has often revealed to me that such distortions are frequent.”⁸

While “aural interest in the more detailed spectromorphological features” is anathema to the quality of standard MNS playback (that is, when not using an expensive sample library), the extent with which I am absorbed with the music surrounding the coalface is intimate, most likely at the partial expense of consideration of the larger musical architecture. However, global understanding is illuminated by frequent auditions from the beginning of the work. In Session One, auditions running from bar one (typically lasting up until the coalface) occurred in the 1st, 2nd, 4th, 8th, 14th, 15th, 17th and 19th minutes of composition. In Session Two, the coalface had shifted to bar 85, rendering auditions from bar 1 lengthy and wasteful. As such, there were now regularly-spaced auditions from various bars preceding the coalface at some temporal distance, namely bars 79, 78, 70, 65, 73 and 76. A similar pattern is evident in Session Three, in which the coalface has now moved to bar 127.

The purpose of such frequent “from the top” auditions, or auditions taken from some distance from the coalface (the extent of such distance being context-specific) is to put the more frequent micro-auditions into a global context, measuring their musical content against the unfolding of the piece in its extant entirety. The extent of Smalley’s “perceptual distortions” would be difficult to measure as an external observer and are hence virtually impossible for me to gauge. However, it is hoped that the frequent long-audition method guarded against the worst offences of my “chipping away” approach.

6.5.2.3 The effects of repeated listening: Schoenberg and advertising

inter- is an abstractly composed work, in which the flow of sections was addressed only towards the end of the process in order to impose a fairly traditional ordering of tension building and resolution. As previously noted, the

⁸ Smalley, Denis, “Spectromorphology: explaining sound-shapes” in *Organised Sound 2*, 1997, p.111

working-at-the-coalface nature of the piece means that, during composition at least, it was primarily concerned with the complexities of the immediate and is thus relatively information-dense. Kramer proposes that audio technologies played a part in the development of the information-dense language that characterises much music in the 20th century and beyond. He argues that the introduction of 20th century audio technologies meant that “composers began drastically to reduce the redundancy in their works”⁹ and he cites *Erwartung* as an early example of this tendency.¹⁰

I feel that, in a similar manner to Schoenberg’s concern that the ability of a listener to repeatedly listen to recordings implied a composerly obligation to avoid repetition, MNS, in allowing me to listen as I write, demands that I pursue an information-rich aesthetic like that of *inter-*. While this aesthetic is one that I value and aspire to for many other reasons, I am also driven to it by the knowledge that I will listen to thousands of fragments of sound during the composition of any given work. I therefore desire a great variety of sonic ideas as a means of maintaining interest in my work.¹¹

As previously noted, repetitive listening in the MNS environment is undertaken in order to form an understanding of that which exists on the virtual manuscript. Research into the effects of the repetition of television advertising on viewers has yielded findings that are of interest presently as a means of trying to understand how repeated auditioning affected my actions. It is acknowledged that few television viewers focus as intently on advertisements as composers focus on their played-back music, but the screen-media/sight and sound similarities between television and MNS (as discussed in 2.5.17 and 4.5) suggest that the findings of advertising research may have some traction in the MNS environment.

⁹ Kramer, Jonathon D., *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*, 1988, p.69

¹⁰ Although Mark Katz refutes this, saying that Schoenberg’s contact with the phonograph was limited and that the composer held a dim view of recording technology. Katz, Mark, *Capturing Sound: How Technology Has Changed Music*, 2004, pp.29-30

¹¹ Again, Katz refutes this, arguing that repetition has the effect on composers of causing them to pursue a minimalist aesthetic - *ibid*, p.30

Studies in the 1980s¹² found that repeated screenings of television advertisements built up a certain pattern of influence on viewers. If considered by viewers to be “good”, advertisements would have an immediate interest-arousing effect. This effect would continue up to the point where familiarity with the advertisement in question was cemented and any further repetition added little or nothing to understanding. The imperative to act on advertisements (that is, to purchase or not purchase goods or services) was not found to be a subsequent outcome.

In my compositional practices, the effects of auditioning seem to follow a similar pattern, notwithstanding that I am – hopefully – far more engaged than the regular television viewer. Segments are typically auditioned then either accepted or rejected (deemed “good” or “bad”). If rejected, I either subject them to alteration (possibly with the aid of further auditioning) or delete them completely. Acceptance results in further auditioning so that I might formulate “what comes next.” This formulation is the compositional equivalent of advertising’s intended purchase-imperative, action subsequent to auditioning being intrinsic to my method of composition with MNS.

In advertising, viewer interest is said to track a simple concave curve, interest initially rising sharply during viewers’ “learning” of a given advertisement and then levelling off when familiarity has been achieved. The number of screenings needed for optimal effect on the viewing audience is considered highly problematic,¹³ but, in the case of *inter-*, the number of auditions required before I undertook compositional action (alteration, deletion, etc) is well documented. The number of pre-compositional auditions averaged approximately three, but was variable depending on the difficulty of the compositional problem requiring resolution. In Session Three, for example, I required ten auditions (from 19:38 to 21:27) to formulate a plan for reassigning existing pitches to new rhythmic

¹² Fink, Robert, *Repeating Ourselves: American Minimal Music as Cultural Practice*, 2005, pp.139-140

¹³ *ibid*, p.140

durations. This was a far more complex procedure than, for example, the alteration of a single pitch after 15:20, which required just one audition.

Overall then, repeated listening, in the composition of *inter-*, functioned as a means of building knowledge of coalface material to the point that action was stimulated.

6.5.2.4 Baudrillard and repetition

The “orders of simulacra” of Jean Baudrillard were discussed in Chapter Five as a means of positioning MNS along the reality to unreality continuum. I find that his assessment that everything is hyperreal is relevant to discussion about repeated listening while using MNS. In his *The Vital Illusion*, Baudrillard says:

Ecstasy of violence: terror. More violent than violence. Ecstasy of the body: obesity. Fatter than fat. Ecstasy of sex: porn. More sexual than sex. Ecstasy of time: real time, instantaneity. More present than the present. Ecstasy of information: simulation. Truer than true. Ecstasy of the real: hyperreal. More real than real.¹⁴

In Baudrillardian terms, repetition reinforces the “reality” of that which is repeated and divorces it from its intended context, which, in the MNS environment, is the temporary fiction of simulated playback. Given that it has been shown that it is detrimental for composers to interpret the simulated sounds of MNS as real, it follows that repeated listening in the MNS environment is undesirable. This is a very real problem for composers who write “for the software” (see 5.2.1) and I wish to demonstrate that repeated listening did not cloud my understanding of the reality that a concert performance of *inter-* by human players was the end-goal of the composition process.

¹⁴ de la Cruz, Denise, *Jean Baudrillard: Simulacra, Simulations, Cyberspace*, at <http://www.duhkneez.com/ baudrillard/>, viewed 13/10/06

As a former student of the piano, my understanding of the technical limitations of this instrument automatically curtailed any tendency to allow audition-repetition to loosen my hold on maintaining *the performance* as my chief focus. The piano part was constantly filtered through my knowledge of hand-span, fingering, leaping potential, pitch-composition in chords and many other parameters. These parameters were widened to account for the pianism of Yuji Takahashi, which *far* exceeds my abilities!

The creation of the violin part drew on a much less-developed knowledge of the instrument, informed for the most part not by practical experience, but by “on paper” knowledge. The testing of the feasibility of double-stops, for instance, was dependent on painstaking imagining of the relative positioning on two strings of the fingers of the left hand. This was often augmented by *physically* holding up my left hand and simulating the placement of fingers on an imaginary fingerboard, roughly calculating the distances the fingers would have to stretch over two strings. In the absence of violin technique learned and internalised through first-hand experience, orchestration guides were, on occasion, consulted. This approach may have led to an imbalance in the relative complexities of the parts: the piano part was much harder to perform than the violin part, the difficulty of the latter limited by a conservatism born of certain gaps in my knowledge of violin technique.

While it was unlikely that someone with my degree of composing experience would make the mistake of neglecting the technical requirements of the instruments used, in being at pains to avoid mistaking the temporary fiction of MNS for reality, any Baudrillardian fears over the effects of repetitive listening were nullified.

6.5.2.5 Planning and realisation in the MNS environment

As discussed previously, *inter-*, like most of my works, is abstract in nature, both in its conception and realisation. Planning is for me a very fluid concept that

does not include the devising of sets of procedures, rules, or over-arching schemes prior to the commencement of purely compositional work. That a certain pitch language might be employed that is similar to that used in other works, or which is a hybrid of previously-used languages, is likely to be settled on at an early stage, but this is less about planning than broad consideration for aesthetics, which also encompasses assessing the capabilities and musical interests of the intended performers. “Planning” emerges from experimentation with materials at a very localised level. It is an organic approach in which elements are tagged for repeated use or transformation/recontextualisation, as the process unfolds.

In *inter-*, the originally used, aggressive beginning was substituted at a late stage with a gentler opening, which recapitulates in a rather conventional manner (in developed form) to end the piece. That it later became apparent that the composition process did not proceed in a linear fashion was not an unusual outcome for me and this, I believe, is tightly linked with MNS.

The reader will recall, in 4.4.1, Heim’s noting that the organisational powers of the word processor negate the necessity of an “A to Z” approach to writing.¹⁵ It was also shown in 4.4.1 that a number of questionnaire respondents reported using MNS to compose in a non-linear fashion. The composition of *inter-* reflects this approach: music grows out from tiny fragments of material, that could almost be said to have been “brain-stormed” into the software with little immediate attention to their placement or development. Organisation of materials, in the early stages, is of less concern than just “getting stuff down.” The ease with which this “stuff” might then, using MNS’s “note-processing” capabilities, be subjected to alteration and relocation, is altogether different from the approach I would have taken if *inter-* had been composed using pen and manuscript. I speculate that the use of pen and manuscript would have required me to plan the chief pitch materials and dynamic and textural shape of the piece very carefully before commencing work. The relative inflexibility of the pen and manuscript

¹⁵ Heim, Michael, *Electric Language: A Philosophical Study of Word Processing*, 1987, p.207

environment renders all but low-level experimentation impractical because the time needed to prepare different musical scenarios is so much greater.

4.4.1 also discussed the effects of a non-linear approach on the traditional notion of planning, with Haas showing that planning is diminished when writers, and, by implication, composers, use computers.¹⁶ That the composition of *inter-* was undertaken at a very localised level, constantly engaging with the coalface, echoes Smalley's earlier-quoted concerns: the micro over the macro as a problematic methodology. To cast my methods in this light would be to imply that, while sonically interesting at a localised, moment-by-moment level, the overall shape and structure of *inter-* is somehow ill-conceived. I would argue that while my methods might make such an outcome possible, the regular recourse to "from the top" playback auditioning and the late-stage shaping of materials largely abrogated this.

6.5.3 From simulation to reality

The transition from composing in the MNS environment to experiencing music played for the first time by human performers is one that rarely fails to produce surprises. The many thousands of auditions heard during the course of writing, typically in the form of repetitious coalface fragments, instil a very intimate knowledge of one version of how the work might sound. While, hopefully, the end-goal of seeing and hearing live performers play the work always remains my key focus, the insistence of the playback builds in me a long-term memory that, to some degree, becomes a kind of reality. The "temporary fiction" discussed in Chapter Five is not always as temporary as I would like it to be.

Often, a phrase will be composed that MNS is quite unable to play back in the manner I know I can expect of the work's eventual performers. At such points in the process, I often make a mental note of the difference I will eventually hear in the live performance. However, after hearing such a passage on countless

¹⁶ Haas, Christina, *Writing Technology: Studies on the Materiality of Literacy*, 1996, p.73

subsequent occasions, the playback “fault” becomes absorbed (in a sense “normalised,” in Posterialian terms) to the degree that it is a surprise when I finally hear it played as originally intended. An example of this is in bar 78 of the violin part. At the time of composition, I would have expected the notation of the very soft *sul ponticello* flurry of demisemiquavers to result in a soft, quick, “fuzzy” (that is, pitch-indefinite) sound-burst, something that the performer would probably interpret as a *gesture* rather than a moment of structural importance. Although the score always implied, from this point onwards in the writing process, that this would be the sonic outcome in performance, the pitch-exact, timbrally-jarring and machine-gun regularity of MNS playback *became* my understanding of what the final performance of this fragment would sound like. MNS playback overruled visual feedback; a triumph of Ong and McLuhan’s secondary orality over literacy, Baudrillard’s hyperreality and the effects of screen consciousness (see, respectively, 3.4.1, 5.2.1 and 5.2.3).

While the inability of MNS to play back certain sounds accounts for many surprising differences between the MNS and actual performances of my works, it is the “human element” that draws the greatest differences, bringing both delight and frustration. The real-world sounds of instruments, played by accomplished musicians in good acoustic spaces, is immediately gratifying. Disturbingly, there are sometimes moments at a first rehearsal when I am surprised to find myself essentially *rediscovering* the sounds that real instruments make, the MNS-simulated sounds having almost established themselves as models, in my mind, of acoustic reality. While the sounds of the very best sound canvases can now fool the ear for brief moments,¹⁷ there is still nothing that can substitute for live experience.

The chief difficulty I have with hearing live performance of my works lies in the tempo differences between the MNS version and the interpretations of the players. This difference often produces quite negative and strong reactions. The temporal aspect of works are somehow more ingrained and “normalised” by

¹⁷ For example, some of the demonstrations of simulations of standard repertoire works at <http://www.garritan.com/GPO-mp3-Classical.html> (viewed 28/10/06) approach realism

repeated MNS listening than such parameters as texture and pitch. A few stray notes are, for me, much easier to accept than even slight tempo variations. This may be connected with recent research that found that rhythm is a more primary cognitive function than texture and pitch. Whereas rhythm appears to be hard-wired in the brain, pitch must be learned. It was found that comprehension of rhythm was less likely to be diminished in the minds of sufferers of head trauma than was pitch, which was more difficult to recover.¹⁸

The feeling of unease associated with hearing incorrect tempi in my own works is similar to the feelings of unease I experience when hearing new performances or recordings of “standard repertoire” works in which the tempi differ from that of the recording by which I have “learned” the work. That my own compositions are *mine* certainly increases the degree to which I find I must initially be insistent on accuracy of tempo, as indicated by the score.¹⁹ A certain *re-normalisation* must take place in the mind to digest the leap from MNS simulation to live performance.

6.6 The use of MNS in other Volume One works

There were many practical constraints limiting the number of works that could be captured by HyperCam for later analysis. These included the large disk space required to store HyperCam-generated digital video files, the distraction to composition of running HyperCam and the processing power required to run Sibelius, Kontakt Gold and HyperCam simultaneously. However, surface descriptions of the role of MNS in the composition of the other works in Volume One are possible, and are included in order to further draw together the two volumes of this thesis.

¹⁸ Mithen, Steven, *The Singing Neanderthals: the Origins of Music, Language, Mind and Body*, 2005, chapters 2-5

¹⁹ Comparison of tempi in the MNS playback of *inter-* with those of the live Takahashi/Suzuki performance reveals only minor differences – certainly many fewer than I would expect to hear in most comparisons of MNS playback and live performance.

6.6.1 *circuit:spiral*

orchestra

This work is the most formally conceived of any piece in my entire oeuvre. A coil structure was employed, in which sections followed the sequence 1, 2, 1a, 3, 2a, 4, 3a, 5, and so on. Each “a” section was a development/variation/recontextualisation of that number’s original appearance. These “a” sections ranged from largely intact repetition of the originals, reorchestrated or transposed in some way, to elongations/compressions, inversions/retrogrades and the like. The final section formed the work into a circuit (as in, it came full-circle), recapitulating, in developed and extended form, the first section.

MNS played an important role in realising this structure. Large text objects (“1,” “4a,” etc) were placed at intervals to mark the beginnings of sections. This plotting-out aided in the work’s non-linear unfolding: problematic areas could be left temporarily while other sections, further on, were tackled with confidence that sectional linkages could be composed-in at later stages. Copy-and-paste was used extensively as a means of moving “original section” material, or isolated elements of it (melodic fragments, rhythmic ideas, etc) into “a” sections, where it was subjected to further manipulation and reorchestration. The boundless and efficient recourse to auditioning different scenarios using MNS’s powerful note-processing tools, meant *circuit:spiral* was very much *facilitated by* the software, while, hopefully, not being *for* it, in the manner discussed in 5.2.1 and 6.5.2.4.

6.6.2 *Jangeran*

orchestra and gamelan

Jangeran was written for a semi-professional orchestra (Indonesia’s Nusantara Symphony Orchestra) and a gamelan ensemble. The repetitive patterning characteristic of gamelan music made extensive use in MNS of copying and pasting a given. This was not of the order of the highly selective copy-and-paste practices employed in *circuit:spiral*, but rather was simple, end-on-end pasting of rhythmically “square” (that is, repeated four bar phrases in common time) and

identical materials. This practice had a previously unimagined impact on the structuring of the work: because it was necessary to paste large fragments end-on-end, I could see the future shape of the work stretching out ahead of me. This was unfamiliar territory and in stark contrast to the kind of coalface working process illustrated by analysis of *inter-*.

The ability to quickly copy-and-paste played into my hands in two ways. The first was purely utilitarian: with a pressing deadline, this technique allowed for fast generation of materials. Secondly, I knew that the players were less accomplished than the players I typically write for, so repeated patterning made for music that was relatively easy to play. While extensive use of copy-and-paste was highly desirable in the context of this particular commission, it would be restrictive of the breadth of stylistic expression possible for composers writing music in which wholesale repetition of fairly basic materials was not a well-considered aesthetic choice.²⁰

Sibelius files for *Jangeran* and its parts were converted into .pdf format and e-mailed to the orchestra in Jakarta. Following its premiere, the conductor requested the addition of a revised and extended ending before the orchestra took the work to Japan (for performances in Osaka and Tokyo). That the MNS score remains, up until printing, a *virtual* entity (as discussed in 4.7.1) that may be endlessly altered with comparative physical ease²¹ meant this late addition was feasible. Furthermore, one aspect of the homogeneity of community described in 5.5 is evidenced by the mass-compatibility of the pdf file-format and manner in which such files can be instantly sent to anyone with a computer and Internet connection.

²⁰ Put another way, if *minimalism* was not the desired aesthetic goal of a work, then wholesale copy-and-pasting of simple and rhythmically “square” material might be ill-considered.

²¹ Physical ease in the sense of the power of digital information processing over that of the pen and manuscript

6.6.3 *carrick bend*

solo saxophone and large ensemble

As a concerto, the nature of the coalface in MNS is quite different from that described in *inter-*. While in *inter-* the compositional progress of the piano and violin remained roughly vertically level (that is, no one instrument leapt ahead of the other during composition), in *carrick bend*, the solo saxophone line often extended “into nothing,” only to later be surrounded by “accompaniment,” in a loose sense. The ability, with MNS, to focus on the centrally important saxophone line and then build supporting material in the ensemble parts, auditioning different options as I went, allowed for great flexibility.

Another key aspect of working with MNS in writing this work was that I was able, to some extent, to gauge the colour and texture of certain “meta-instruments,” the chief of these being the combination of piano, guitar and harp. Using the sampled sound suite Kontakt Gold gave me an idea of the nature of this melded sound, though the playback did misrepresent the strength of this trio, something that showed through when the work was performed.

6.6.4 *mandible*

solo bass clarinet

mandible employed a musical language heavy on bass clarinet extended technique, requiring much extra graphical work with MNS. As explained in Chapter Five, the “drawing” of unconventional notations with MNS is difficult and time-consuming. My MNS package had no automated means of indicating wind instrument fingerings, so these had to be painstakingly assembled using open and closed dots, aligned perfectly and positioned over the intended notes.

At several points in the music, pitch was abandoned in preference for key rattling with specific rhythms. This was best indicated by temporarily reducing the staff from five to two lines. A range of symbols (taken from MNS’s “symbols” menu or “drawn” from scratch) were employed to musically describe certain extended

techniques, such as key-clicking, or ultra-vibrato. These appear in the *Legend* to the work, prior to the score in Volume One.

mandible was written without barlines and key signatures so as to imply to the performer a sense of rhythmic freedom. MNS is unable to render works without these elements, so I had to judge the length of each system (in terms of the number of notes and rests used), generate and then “hide” the appropriate time signature and, finally, “hide” any barlines. This process resulted in a visually successful final outcome, but the compositional process was one plagued with continual frustration.

The inability of my sound sample canvas to give voice to extended techniques such as slap tongue and key-clicks meant that playback could be less relied upon for compositional guidance than it was in the composition of the other works in Volume One. Such things had to be constantly imagined and incorporated by the mind back into the MNS playback of conventional elements. The playback became, in this work, more *prosthetic* in nature (see 4.7.3), in the sense that the sound elements that I could hear served only as rough guides to the architecture of the work, rather than anything approaching actual simulation.

This is a condition that some composers have recently begun to overcome, while remaining very much in the MNS domain. One such example is New Zealander Ross Harris, who, in his flute and piano duo *Ka wawara te hau*, employed extensive flute multiphonics. Harris recorded flutist Bridget Douglas playing a range of multiphonics, which were then “loaded into a software sampler and triggered from Sibelius, slotting into the piece where the flutist would play them in performance. In this way the unique tuning and timbre of the multiphonics could be confidently integrated into the composition of the work.”²²

²² Harris, Ross, e-mail communication, 29/10/06

6.6.5 *e pari, e te tai*

wind quintet

This was another work that benefited from the ability, with MNS, to send files converted to pdf format to different parts of the world via e-mail attachment. The players of Finnish wind quintet *Idée Fixe* were the recipients on this occasion. As with *Jangeran*, it was not possible for me to attend rehearsals and performance of the work (which was premiered in a small Finnish town called Ikaalinen). While I could not guide the ensemble in its interpretation,²³ the players were able to easily communicate queries to me and request alterations to parts via e-mail.

As with *Jangeran*, the reader will recall earlier discussion about the virtual and therefore infinitely malleable nature of the MNS score (4.7.1), as well as the way in which the mass-compatibility of e-mail and the pdf file format allow for a bringing-together of participants in the music making process.

6.7 Conclusion

The three digital video clips, depicting my use of MNS in the composition of *inter-*, reveal that I am deeply engaged with the software, most especially the simulated playback that it offers. This playback is a constantly consulted touchstone, providing a frame of reference for the immediate sonic “chipping-away” at the coalface as well as a means of judging the overall emergence of the work’s architecture. The manner of my use of MNS is at least partially responsible for the information-dense nature of a work such as *inter-*: knowing that I will hear thousands of fragments of the work over the course of its composition drives me to avoid wholesale repetition and create second-by-second sonic interest through intense detail.²⁴

²³ The emergence of such Voice Over IP software as Skype in the short time since the premiere of this work point to the very real possibility that composers will soon be able to virtually “sit-in” on rehearsals, regardless of the physical locations of composer and performers.

²⁴ In this area I am also motivated by a purely personal aesthetic preference for, broadly speaking, the complex over the minimal.

That repeated listening is something to be treated with caution, as forewarned in different ways and for different reasons by Smalley and Baudrillard, is undoubtedly true. However, it is argued that the constant need to evaluate and allow for the technical limitations of the piano and violin largely mitigate any disconnection from the reality of the work environment, while frequent auditioning “from the top” maintains my hold on the overall shaping of proceedings.

Planning in the traditional, pre-compositional sense is largely discarded in my use of MNS. Instead, form emerges *in process*, through the organisation and transformation of materials which are figuratively “thrown at” the virtual page. The traditional pen and manuscript time-line of pre-formulation, followed by implementation, coupled with shaping (limited by the inflexibility of these tools) is replaced by an absence of pre-formulation, a “brainstorm” approach to “getting stuff down” and extensive moving about and transformation of musical materials.

The point at which I must finally discard the well-known simulation of MNS playback and accept the very *human* nature of live performance is a moment that I have demonstrated to be rewarding and worrisome. It is hoped that the revelations of this chapter have given me a greater understanding of my compositional processes, revealing previously unknown elements in this that will aid in easing the difficulties of the bridging from simulation to reality in future compositions.

Chapter Seven

Conclusion

7.1 Summary of research methods and findings

Music notation software first came into the collective composer conscience in the late 1980s with the appearance of Finale software. By 2004, the popularity of MNS had grown to the extent that some eighty-two percent of surveyed New Zealand composers reported its use to some extent in their work, with some composers using it exclusively. In the seeming absence of any substantial research into the effects of MNS on composer practices and outcomes, this study set out to identify a broad array of conceptual areas appropriate for use in expanding what was perceived to be a very limited discourse on the phenomenon. This discourse was constrained to such matters as the realism, or otherwise, of MNS playback, comparisons between the different software packages and the blaming of MNS for the notationally and idiomatically flawed output of some, mostly inexperienced, composers.

7.1.1 Questionnaire

The research process consisted firstly of a mail-out questionnaire, the aim of which was to paint a picture of New Zealand composers' rates of adoption, modes of usage and attitudes towards MNS. The questionnaire was returned by 106 composers, 82 percent of whom indicated use of MNS in some capacity in their work. It was found that these composers were attracted to the software because of the "clean" visual nature of the scores it rendered, for its ability to extract parts quickly and accurately and, to a lesser extent because it was able to play back simulations of their music. Respondents typically indicated that they

felt that MNS had made a positive contribution to their working practices and outcomes, but they expressed concern over the use of MNS by inexperienced composers. A small, but particularly outspoken group of typically older and more experienced composers rejected MNS altogether, citing a variety of reasons for their dislike of the technology.

7.1.2 Literature-based enquiry

The second mode of investigation was to analyse and contextualise the results of the survey through reference to an appropriate body of literature. In the absence of MNS-specific texts, writings devoted to parallel scenarios, especially the effects of the word processor on writing, were drawn upon for comparison. There was an extensive look at historical shifts in modes of knowledge transfer, specifically the ancient transition from oral culture to literacy and from writing by hand to writing in the digital realm. These shifts were compared with the invention of Guido's notation and the recent trend towards MNS use. It was found that while new technologies generally encounter resistance at their inception, they are eventually, in Mark Poster's terms, "normalised" – they become second nature, their initial "impact" forgotten, their effects largely ignored. With time, new technologies also come to be also recognised for the new and potentially revolutionary changes they bring to different art forms.

The physical and cognitive differences between MNS and the pen and manuscript paradigms were then identified. The Romantic/Hegelian model of composition and composers was shown to be at odds with the perceived sterility of the computer platform of MNS, which is regarded by many as a tool for uncreative clerical tasks or for the indulgences of video gamers.

It was also demonstrated that historic technological shifts had the tendency to imbue replaced technologies, such as the LP and CD and, indeed, the pen and manuscript, with sentimental value. It was also found that MNS use required a significantly different approach to composition than did older practices, freeing

composers from the duty of constant imagining of sound by externalising simulated playback and in doing so making it possible for composers to view their relationship with the software as quasi-collaborative. The notion of normalisation was here again applied, this time to the perception that MNS is artificial. It was shown that MNS was no more artificial than any of the writing technologies it superseded, these older tools having long been normalised and accepted.

It was established that MNS functions on a number of different levels of reality and this was later placed within the context of Baudrillard's orders of simulacra. It was argued that composers might allow MNS to be thought of as a vehicle of the third order of simulacra, in which a truth is established ("hyperreality") that hides the fact that there is no truth or "reality." This, it was argued, might partly account for MNS misuse.

The matter of MNS's influence on composer understanding of time's passing was introduced, though it was conceded that this area, perhaps more than any other in this thesis, deserves further specialised investigation. That MNS changes the time perception was considered most likely given that music itself is known to have this effect and given that MNS is an environment in which scientific time and human time collide. Two known time-related phenomena were discussed: that of time's slowing as the completion of goal-directed tasks approaches and that of the "watched pot," in which attention paid to time's passing influences durational perception. It was argued that both had the power, when brought into the MNS domain, to interfere with composers' conceptions of temporality and as a result, their judgement of tempo and duration.

The effects of MNS on the way the score is valued in society was examined. It was shown that the large number of scores now available (thanks to MNS) had two main effects. Firstly, the traditional cultural gate-keeping that was once a function of music publishing houses was bypassed, eroding the cultural elitism long associated with publishing. Secondly, there was the negative consequence of the mass availability of scores allowing music of questionable quality to proliferate. The score was both monumentalised (in an altered and somewhat

dubious manner) and dematerialised (due to the unguarded nature of its increased availability) and these conditions were shown to contribute to a redefinition of artistic and musical values. The chief result of this redefinition was the tendency that performance-impractical and otherwise poorly set scores might abound because the net status of the score was undermined.

Similarly, MNS was shown to act both as an agent of homogeneity and an agent of diversity – it both drew groups of composers into closer contact through the standardisation of tools and propagated the status quo in which no one musical aesthetic was able to gain a foothold in the manner of the pre and post-war eras. Greater homogeneity was attributed to large numbers of composers adopting the use of the same MNS packages, which could be discussed in Internet user-groups and other fora. Greater diversity was shown to be facilitated by new technologies allowing composers to achieve the previously unfeasible, resulting in an overabundance of choice and subsequent fracturing of musical styles, although the contribution of MNS to the sum of the “cultural scrapheap” that characterises postmodernism was only a minor one.

7.1.3 MNS use in the author’s own work

The third mode of investigation was empirical and personal. The piano and violin work, *inter-*, was used as an example of MNS’s effects on the author’s own compositional processes via analysis of three digital video clips selected from a pool of clips recorded during the work’s composition. It was found that the author referred constantly to MNS playback as a means of slowly developing the music at the “coalface” – that part of the score where the notes “run out.” It was argued that this approach was one contributor to the composer’s aesthetic: a musical language of non-repetition and high information density. With playback audition consulted with such frequency, the composer did not wish to be exposed to large quantities of musical repetition, thus repetition was not a key feature of the musical language.

The dangers of repeated listening were identified via Baudrillard (arguing that repetition is a hyperreal condition) and Smalley (arguing that micro listening was detrimental to consideration of the larger musical architecture). The composer's practices were defended on the grounds that constant thought was given to the technical requirements and limitations of the instruments and performers who would finally perform the work, guarding against the composition of unidiomatic music.

The approach to planning in *inter-* was identified as being radically different from the traditional pre-compositional model. This non-linear approach was shown to have merit, largely through the use of "from the top" playback audition as a guide to the shaping of overall musical architecture in the absence of a preformulated plan. The non-linear methodology was made possible by the manipulative powers of MNS in the same way that a "brainstorming" approach to writing text is natural when using word processing applications.

The movement of the score from its MNS birthing place, to the music stands of its performers and concert performance revealed small traces of loss of touch with reality during the compositional process, though not in the nature of full scale third order of simulacra consciousness. The composer's surprise at the timbre of the players' instruments and, most especially, the distinctly *human* nature of the temporal aspects of the work's interpretation, illustrated that the MNS playback "version" of the work was one that the composer had grown very attached to.

7.2 Contribution to the body of knowledge

As the first known in-depth study of MNS, it is hoped that this thesis defines one possible set of parameters for further research into the effects of the phenomenon. There has been a deliberate attempt to widen the scope of discourse beyond the limitations of such informally-discussed subjects as the relative merits of different software packages and the evils of MNS use by

inexperienced composers. This widening of scope has entailed such things as placing MNS in the context of shifts from oral to literate to secondary-oral cultures, and the comparison of the experiences of writers moving from pen and paper to word processor with those of composers leaving the pen and manuscript realm for that of MNS. It is hoped that composers who read this thesis will be encouraged to think in depth – if this is not something they have already done – about the manner in which they perceive their work environments, the physical and cognitive effects of these and the ways in which their compositional tools might alter their hold on the necessary reality of music being *for performance*.

Furthermore, it is hoped that this study will be of benefit not only to composers, but to musicologists, performers of new music, ensemble directors and music publishers. The effects of MNS, while specific only to individual composers, are of import to all of these participants in the concert music process and to any deeper understanding of contemporary music.

The relationship between composers and their tools is now, more than ever, of great significance to any enquiry into the nature of compositional practices and musical outcomes. It might be argued that it is composers, as opposed to non-composing musicologists, who are in the best position to examine the effects of MNS, as it is they who use the software not only to set or distribute music, but *to engender it*. MNS and music-making are, for a great many composers, inseparable to the point that observers external to the process are necessarily ill-resourced to proffer critical insights.

The efficacy of composers carrying out the work of examining the effects of MNS is tempered by the reflexive issues surrounding study of the self and, worse, of studying the art *of the self*. Any findings reached through self-study must be presented alongside full and honest declarations of composer/researcher prejudices. These include preformed attitudes towards digital technologies and MNS specifically, descriptions of hardware and software used and the extent and nature of the role of MNS in the compositional process. While reflexivity as a concept holds that truly objective stances can never be attained, even when

researchers investigate quite external matters, these measures ensure that the best possible practices are carried out.

In this respect, composers might be seen as being in the avant-garde, in a literal rather than aesthetic sense, in that MNS has accelerated composers along the road to secondary orality, that condition in which multimedia rather than the written/notated both transmit knowledge and art and inform their creation.

Composers are further ahead of other groups involved with the musical process who have yet to experience this shift and are therefore the forerunners in a “classical” music scene that has not yet had to face the experiences of the digital revolution that has already enveloped popular music.

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Appendix A

Covering letter

Chris Watson
83A Quebec St
Kingston
Wellington

27 October 2004

Dear _____,

Late in 2003 I commenced work on a PhD in composition at Victoria University, examining the impact that the now widespread use of music notation software has had on compositional working practices and outcomes.

The following questionnaire, being sent to numerous composers around New Zealand, is designed to gather information that will provide a 'snapshot' of the use (or non-use) of music notation software by New Zealand composers. The results it yields will provide valuable data for my PhD thesis. Even if the computer is not a tool used in your compositional life (or is used minimally), I am still very keen that you return the questionnaire to me – your opinions will be of great interest.

The spread of music notation software has had a profound effect on the craft we all share. I hope my thesis will show the extent – for better or worse – of this effect and provide significant food for thought to all in our community.

Please keep in mind that the answers you give will remain private, in the terms of the enclosed Participant Information Sheet.

A copy of a summary of my research findings will be available to you on request, hopefully in 2006.

I invite you to complete the following questionnaire either by hand, or electronically by visiting this website:

www.chriswatsoncomposer.com/questionnaire.html

Kindly return paper questionnaires to me in the enclosed stamped envelope, or electronic questionnaires by following the on-line instructions *by 25 December 2004*. Your time and carefully considered responses are greatly appreciated!

Kind regards,

Chris Watson.

Participant Information Sheet

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wānanga o te Ūpoko o te Ika a Māui



Participant Information Sheet for a Questionnaire about *Music Notation Software and Composition Practices*

Researcher: Chris Watson, School of Music, Victoria University of Wellington

I am a Doctoral student in music composition at Victoria University of Wellington. As part of my degree I am undertaking a research project leading to a thesis. The project I am undertaking is examining the effect that the use of music notation software by composers has on compositional practices and outcomes. The University requires that ethics approval be obtained for research involving human participants.

I invite you, as a New Zealand composer, to participate in my study. You are asked to complete the attached questionnaire, which is designed to gather information that will provide a “snapshot” of the use (or non-use) of music notation software by New Zealand composers. It is envisaged that the questionnaire will take around two hours to complete. Please return it to me in the stamped addressed envelope supplied by 25 December 2004.

Should you feel the need to withdraw from the project, you may do so without question at any time before the data is analysed. Just let me know. Responses collected will be put into my thesis on an anonymous basis. All material collected will be kept confidential. No other persons besides myself and my supervisors, Dr Dugal McKinnon and Associate Professor Ross Harris, will see the questionnaires. The thesis will be submitted for marking to the School of Music and deposited in the University Library. It is intended that one or more articles, based on this thesis, will be submitted for publication in scholarly journals. Thesis material will also be used in conference and seminar presentations. Questionnaires will be stored securely and destroyed two years after the end of the project.

If you have any questions about my project, please contact me at:

e-mail: C.Watson@xtra.co.nz

phone: (home) 04 389 2310 (cell) 027 421 9563

...or contact my supervisors, Dr Dugal McKinnon and Associate Professor Ross Harris, care of:

School of Music
 Victoria University of Wellington
 PO Box 600
 Wellington

Phone: 04 463 5369

My thanks in advance for your time,

Chris Watson

Consent form

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wānanga o te Ūpoko o te Ika a Māui



VICTORIA UNIVERSITY OF WELLINGTON
 CONSENT TO PARTICIPATION IN RESEARCH

Music Notation Software and Composition Practices

I have been given and have understood an explanation of this research project. I have had an opportunity to ask questions and have them answered to my satisfaction. I understand that I may withdraw myself (or any information I have provided) from this project (before data collection and analysis is complete) without having to give reasons or without penalty of any sort.

I understand that any information I provide will be kept confidential to the researcher and his supervisors, the published results will not use my name, and that no opinions will be attributed to me in any way that will identify me. I understand that the data I provide will not be used for any other purpose or released to others without my written consent.

I would like to receive a summary of the results of this research when it is completed Y N

Signed: _____

Name of participant: _____

Date: / /

Questionnaire

Music Notation Software and Composition Practices

- *a questionnaire*

If you require more space, please attach additional paper. If you would prefer to complete this survey electronically, please visit the website:

www.chriswatsoncomposer.com/questionnaire.html

...and complete the on-line forms, or download Word or Rich Text Files and e-mail to me on completion (detailed instructions are given at the website).

SECTION A

1. Name _____
2. E-mail address (for future correspondence about this survey only) _____
3. Age ____
4. You have been composing for ____ years.
5. How would you characterise your *general* practical knowledge of computers (ie, your overall expertise at using windows environment point-and-click applications)? - *please tick*
 - I have minimal or no experience with computer
 - I have some experience but need guidance to use most application
 - I am able to learn new applications with persistence but am held back by inexperience or undeveloped skills
 - I have a good practical knowledge and get by with a minimum of assistance
 - I am able to quickly and independently master most windows-based, "what-you-see-is-what-you-get" applications
6. Do you use music notation software? Yes No

(ie, Sibelius, Finale or equivalent packages – please note this does not include software for the realisation of electroacoustic music or any music where a score is not produced)

If you ticked YES, please skip to Question 7

- If you ticked *NO*, please explain why you haven't adopted the use of music notation software (you may tick more than one box):

- I am quite happy with my current method of composition

- the cost of software and/or computer equipment is prohibitive

- I am not comfortable with computers

- I feel that using computer technology will compromise my compositions

- please explain why you think this is

- other reason for not having adopted music notation software

Please describe your compositional tools with reference to the physical objects used (eg pen, manuscript, the piano etc):

Thank you – please skip to Section C, Question 6

7. Year you first started using music notation software _____

8. Software package(s) used:

Finale

Sibelius

Encore

version _____ version _____ version _____

Other - please specify and include version used _____

9. Nature of your compositional use of music notation software:

- notation software is your sole tool for realising new compositions
- you use notation software in conjunction with the piano or another instrument/tool
- you use notation software in conjunction with writing by hand on manuscript paper
- you use notation software in conjunction with the piano/other instrument/tool *and* writing by hand
- you use notation software only as a means of realising a quality typeset score at the conclusion of writing
- you use notation software for the realisation of parts only

- other, or a variation on any of the above – *please describe in detail:*

10. In reference to your response to the previous question, how, if at all, has your use of music notation software *changed* in the time you have used it? - *please describe in detail:*

11. Do you regard music notation software as

- a score setting tool?
- a creative tool (analogous to using an instrument, for example)?
- both a score setting and creative tool?

- *please discuss*

SECTION B

Please take some time to answer the following questions:

1. What led you to adopt the use of music notation software in your work?

2. What, in your opinion, are the chief *advantages* of using music notation software over traditional methods?

...and the chief *disadvantages*?

3. Do you listen to computer audio playback of your compositions? Yes No

if yes: - do you listen *as* you input notes? Yes No

- do you alternate inputting notes with listening? Yes No

- do you listen only after the composition is finished? Yes No

What influence does playback have on the compositional decisions you subsequently make? - *please circle*

1 2 3 4 5 6 7

NO INFLUENCE

A GREAT INFLUENCE

if no: - please explain why you don't listen to audio playback

4. Is the *quality* of playback (ie, the playback's proximity to realistic representation of actual instruments) important to you? - *please discuss:*

5. Do you regard your interaction with music notation software as *collaborative* in any sense? - ie, do you regard the alternation of note input and listening to playback as a dialogue where the computer plays a real or imagined intelligent role? - *please discuss:*

6. Do you ever use music notation software to plan the *form and structure* of your compositions? (eg, you might mark out a blank section of score with written indications of what might happen, etc...) - *please discuss.*

7. Compared with writing by hand, how, if at all, does music notation software influence the *process/methodology* of your compositions? - *please discuss:*

SECTION C

1. Do you, or have you ever, created tapes or CDs of computer playback for the benefit of your performers? Yes No

- if yes, what, in your experience, has been the reaction of performers?

- has this practice been useful?

Yes No

- *please discuss:*

2. Since you adopted the use of music notation software, has your *output* (ie, works completed)

increased? decreased? stayed about the same?

- *why do you think this is?*

3. Do you feel that music notation software has *limited or extended* the possibilities open to you in your composing life? – *please discuss.*

4. On the whole, has the use of music notation software impacted on your compositions positively or negatively? – *please discuss.*

5. **a.** For *Sibelius* users: how often do use the following plug-ins and features? – *please circle*

Add Drum Pattern (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Invert (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Pitch Mapping (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Retrograde (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Cresc./Dim. Playback (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Quarter-tone Playback (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Change trill speed (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

Change glissando properties (feature not supported by my version of Sibelius)

1	2	3	4	5	6	7
NEVER		OCCASIONALLY				FREQUENTLY

b. For *Finale* users: how often do you use the following plug-ins? – *please circle*

Band-in-a-Box Auto-Harmonizing (feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

Canonic Utilities (feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

Drum Groove (feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

MiBAC Jazz Rhythm Section Generator (feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

Piano Reduction (feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

TGTools (*for adjusting playback of tremolos, glissandi, crescendi/diminuendi and trills only*)
(feature not supported by my version of Finale)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

c. For users of other music notation software products:

- How often do you use features concerned with the automatic *generation* of notes, ie, arranging, inverting, retrograding (etc) features? (my software doesn't have these features)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

- How often do you use features concerned with the tweaking of the *playback* of your scores, ie the playback of trills, glissandi, crescendi/diminuendi etc?(my software doesn't have these features)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

6. What are your feelings on the use of music notation software by *fledgling composers*? ie, composers with little or no experience of composing by *any* means.

7. If you have any other thoughts about aspects of the use of music notation software not raised in the questions above, feel free to present them here:

Thank you for your time and effort. Kindly ensure that this questionnaire and a signed consent form is returned to me in the provided stamped envelope *by 25 December 2004*.

CW

Appendix B

Open-ended responses: results.

The following is a comprehensive listing of open-ended questionnaire responses, grouped in descending order of frequency of responses (ie, the responses given most often appear first). Numbers in brackets indicate the number of respondents who held the same opinion. Where no number appears, only one respondent gave this answer. Though no two respondents used the exact same words to express their opinions, responses expressing the same general idea are grouped together. Where a respondent or respondents offered a variation on a common theme, these are listed as indented points below the main idea.

Question A6

Please explain why you haven't adopted the use of music notation software.

I like the individuality and personality of hand written scores

- I enjoy viewing the idiosyncrasies of earlier NZ facsimile scores – more recent MNS-produced scores are sterile
- I am interested in a “personalised” score – I believe important information can be given by a composer's own handwriting
- I enjoy the graphic, aesthetic and musical process of writing scores in ink
- I'm comfortable with and prefer the tactile aspect of using manuscript
- The process of composing for me is inextricably linked to putting pencil to paper. It is a ritual, and one that I treasure

A person skilled with computers copies my work for me (5)

I prefer not to look at a computer screen for extended periods (3)

- I don't trust negative physiological effects

The dollar cost of MNS (2)

- I haven't gotten around to using MNS because I haven't budgeted for it

My attitude toward computers (and television) is coloured by “the evil eye”

- I am disinclined to give software and computer companies my money
- “I have long been convinced that computers are evil, that Bill Gates is the Antichrist and that they are part of the US's destruction of trains of thought inimical to its conquest and subjugation of the world and its peoples”

Because I would be tied to the computer – I like being able to work wherever and whenever I want

- writing out the final score can be done anywhere, not relying on a computer or a venue etc
- I don't have ready access to MNS – I might have come to use it if I did have ready access

Because my compositional time is limited I prefer to use that time to work in the way in which I am accustomed rather than using that valuable time learning new ways

- I enjoy the familiarity of my composing environment

Learning to use MNS would be an unreasonable hurdle

- I feel too old to start using new technologies
- I don't have the time to learn these applications

I would be less reliant on my aural imagination due to the temptation of using computer playback

- I do not wish to abdicate my God-given faculties

The further one deviates from traditional notation with MNS, the more difficult it becomes – I would be worried that I might be influenced to take an easier route if I was writing a piece using MNS

- however, this danger is diminished if a piece is pre-composed away from the computer

I no longer compose notated scores so have no need for MNS

I have lacked time to compose recently and hence haven't explored MNS but I know many colleagues benefit from and recommend MNS

It is quicker for me to notate my music by hand

It hasn't been practical to set myself up with MNS

If I did have MNS I would use it only for larger forces pieces to take advantage of the parts extraction

I have a slight case of "techno-phobia" as I did not grow up around computers

I would be tempted to cut-and-paste

I prefer the aesthetic qualities of "doodling" with pencil on paper and perhaps creating freer/less conventional musical ideas which would not suit the immediate format of the computer programme

- Pencil on manuscript gives complete freedom
- The effort and time that it takes for me to translate my intentions for the computer interrupts any flow I might have
- I am uncomfortable composing with a computer as I feel like there is a brick wall between me and my creativity

I have only recently taken to using a computer, but only for word processing

I don't understand MNS!

~ ~ ~

Please describe your compositional tools with reference to the physical objects used (eg pen, manuscript, the piano etc).

My brain, manuscript, pencil, eraser, piano (occasionally)

Guitar, piano, pen, paper, microphone, various recording applications and some electronic instruments such as synthesiser and sampler

Manuscript paper, plain paper, pencils (2B), pens of various colours, mechanical eraser, knife (to sharpen pencils), piano, metronome

Manuscript, pen, piano (and, in the future, MNS)

Pencil, manuscript and a table and chair. I don't use any musical instrument in the process

I usually compose at the piano with 2B pencils, manuscript or plain paper. I write good copies with a black pen and use whiteout. I use a ruler to rule barlines.

Pencil, pen, rubber, manuscript, piano (sometimes)

Pencil, manuscript, piano

Propelling 2B pencil with rubber on end, black fibretip pen and calligraphic felt tip for beams, MS – mainly A3 landscape format 18-stave (Panopus) or portrait format 24 stave for larger orchestral works. Piano.

Pencil, manuscript, piano

Pencil, rubber, pen, manuscript

Pencil, eraser, piano (sometimes recorder), manuscript, blank ink pen for final copy

Pen, pencil, rubber, MS workbook (draft), MS pad (fair copy)

Pencil, rubber, paper, piano or keyboard (prefer piano because of easy access to a large range)

Pencil, manuscript, piano, voice, recorder, oboe, black ink, whiteout

Ink pens, ruler, tippex, manuscript, minimal use of piano, some MNS playback provided by my typesetter

Pencil, manuscript, piano

Several dozen permanently sharpened pencils, eraser pens, automated sharpener, acoustic piano, electric piano, midi studio, manuscript (orchestral, regardless of instrumentation of work), orchestral sample library

Black ink pens, set-square, my favourite type of manuscript

Pencil, pen

Desk, piano, pen, paper, brain plus imagination

Question A9

Please describe any variation on the above (the above being six tick-box options showing tools used for composing).

The tools I use and the points at which they are introduced into the composition process vary with each new work **(5)**

I also use sequencing software **(2)**

Though I primarily use MNS to set scores, I tend to change minor details on hearing playback

Though I primarily use MNS to set scores, I do alternate hand-composition with computer entry

Question A10

In reference to the previous question, how, if at all, has your use of music notation software changed in the time you have used it? – please describe in detail:

I have become faster and more expert at using MNS **(11)**

- I have learned new shortcuts **(3)**
- I have learned how to “con” MNS into doing things against its will **(2)**
- Knowing that certain actions are easy in MNS might have some effect on compositional planning
- Over time I have learned to develop creative ways of notation
- With greater experience and knowledge I can search for ways of doing things beyond the computer defaults

The software itself has improved **(10)**

- computers have become more powerful and able to run power-hungry software synthesisers and samplers
- one can now incorporate live audio into the creative process
- MNS has become more user friendly
- certain plug-ins have been useful innovations

It hasn't **(6)**

My working methods are changeable - depends on the type of music I am writing and the instrumentation **(5)**

I now write in medium-sized chunks and then listen to it whereas before I would write a few bars at a time then check with the piano or write huge sections relying on my imagination

Increased familiarity and expertise at using the software means I use it more

I try out more things with MNS than I used to with manuscript

I have learned which playback sounds I can trust and which I need to instead use my imagination with

It's too soon to tell

I have only used the software once

I use MNS solely when orchestrating or arranging, but use a mix of pen/paper/piano when working on original compositions

I have become less reliant on the playback as I have matured as a composer

MNS use tends to increase when I write for larger ensembles

I have become aware that compositions can sound “computer composed” and I am wary of entering music directly into MNS because of this

SPECIFIC STAGE-BY-STAGE CHANGES IN WORKING METHODS:

From piano/manuscript *to* piano/MNS or just MNS (7)

From MNS as a setting tool *to* being a composing tool (4)

- And a move to use of MNS as a tool for analysis
- From MNS as a score-setting tool *to* use of playback in the creative process (2)
 - This means I am experimenting more with harmonic and rhythmic colours

Am using MNS less than before (2)

- Am moving to using MNS more than before

Went from using MNS at the start of a project *to* (mostly) only using it for score setting because I realised the MNS was limiting my creative options (2)

Gradually using MNS closer to the commencement of work than previously (2)

From input to MNS using the mouse *to* input with keyboard shortcuts

From MNS as a score-setting tool *to* inputting with MIDI keyboard *to* using playback more extensively and composing straight into MNS

I primarily use pen and manuscript but now occasionally use MNS exclusively

From planning and sketching on manuscript then creating a short score using MNS and then a full (MNS) score *to* working straight into MNS in full score supported by high levels of planning on paper but with minimal detail

From paper *to* MNS *to* half-in-half *to* paper again

From extensive MNS use *to* use of MNS only as a score-setting tool because I realized it wasn't helping my creativity and pencil was far better for this

Have worked more with the piano recently as I enjoy the direct and immediate interaction with the music

From using manuscript at the draft stage *to* using MNS (still from written sketches)

Initially used only for sketches and parts *to* creation of scores and parts too

Increased use of MIDI keyboard input

Recently it has become mostly a score-setting tool

Question A11

Do you regard music notation software as a score setting tool, a creative tool, or both a score setting tool and a creative tool? – please discuss

A SCORE-SETTING TOOL ONLY

The inflexibility of the software means I cannot use it in the creative process **(2)**

MNS is not a “creative” tool – it does not create or help you to create **(2)**

The inadequacy / inaccuracy of playback makes me view MNS as a score setting tool only

The attempted integration in MNS packages of score-setting and creative potentials is flawed: the design of MNS should focus only on graphical concerns

I trained in composition using pen and manuscript and this is what I prefer

Don't use MNS as a creative tool but am open to that possibility in the future

MNS removes the need for having musical imagination – the part that imagines sound itself, so MNS becomes like a crutch and hinders creative potential

Although their notational abilities are limited, I prefer to use dedicated sequencing packages over MNS during the creative process

MNS is partially useful as a creative tool for small ensemble works, but not at all useful as a creative tool for large ensemble works

BOTH A SCORE-SETTING TOOL AND A CREATIVE TOOL

MNS offers greater opportunities for compositional exploration and experimentation **(3)**

- A creative tool, but one must be careful not to slip into a “try it and see” approach – something easy to do with MNS
- MNS generates “happy accidents” that might not have otherwise come along

MNS is primarily a score setting tool but has secondary creative potentials **(3)**

I like being able to work dually with Western notation *and* with pure “sound” **(2)**

- MIDI playback is the reason I regard MNS as a creative tool **(2)**

MNS is definitely a creative tool but I use it alongside a variety of other physical tools **(2)**

The playback is not dissimilar (but is more limited) than that provided by electroacoustic software **(2)**

Increasingly, I am coming to regard MNS as a creative tool, having previously used it for score production

MNS's only advantages as a creative tool are the speed of its word-processor-like operations

Over time I've come to regard using MNS as a process of "carving" – I make most of the resource decisions at the beginning of the composition process and then "carve" the work out of the sonic resources I have created.

- The computer allows the composer to work directly with their musical material in the same way a visual artist can work with their visual material

With better equipment and knowledge of how to use it I might come to regard MNS as more of a creative tool

MNS's creative powers are secondary to its score setting powers

MNS is now so good at doing the basics of notation presentation that its role as a creative tool is the most relevant thing to appreciate

OTHER

It is also an educational tool **(2)**

- MNS is good for learning to read music

Maybe the terms "manipulative" or "transformative" tool are more appropriate than "creative"

Score-setting and creativity are closely linked

MNS's lack of alternative notating options, eg for notating taonga puoro, means it is not a useful creative tool in this domain

Question B1

What led you to adopt the use of music notation software in your work?

Neat score presentation **(37)**

- this motivated by expectations of performers **(9)**
- "professional" look **(4)**
- one gets a better performance if scores computer-set **(2)**

Ease (speed, neatness) of part production **(24)**

Audio playback **(8)**

- to check harmonies/pitch **(5)**
- to check rhythms **(3)**
- for trial-and-error composing **(2)**
- accuracy of
- to check for mistakes
- to check form and structure
- for film scores

Greater efficiency (speed) / practicality **(21)**

Available at school / tertiary institution **(13)**

Word-processor-like editing features **(10)**

Introduced to MNS by friend / family / colleague **(7)**

Writing by hand causes physical discomfort **(3)**

A good tool when teaching **(3)**

Scores editable / adaptable into the future **(3)**

Less expensive to produce score / parts **(3)**

Curiosity due to knowing other composers were using MNS **(3)**

Enjoyment of using the technology **(2)**

Initial use the result of working as a copyist or for a publishing house **(2)**

The entire process can be handled using MNS – total control (creation, correction, final production) **(2)**

Archiving considerations **(2)**

Ability to self-publish **(2)**

Electronic dissemination of scores **(2)**

General inclination towards use of technology **(2)**

MNS scores required by lecturers

- and playback for tutorials

The wish to have another composition tool

The similarity to composing electroacoustically, working directly with sound

Wanting to incorporate keyboard improvisation into creative process

MNS helps overcome any lack of musicianship

For the purpose of performing transcriptions

To realise audio for the purpose of accompaniment

An expectation that MNS use would soon become the “norm”

Ease of use

Unable to play the piano, so unable to physically simulate ensemble music

To make money

No time delay between completion of score and neat realisation by a copyist

Question B2 (in two parts)

What, in your opinion, are the chief advantages of using music notation software over traditional methods?

ADVANTAGES – 37 individual types of answer, with 20 bulleted answers

MNS allows for neat score presentation **(49)**

- this motivated by expectations of performers **(9)**
- the look achieved is "professional" **(5)**
- scores are consistently neat, whereas hand-set scores might suffer inconsistencies **(3)**
- one gets a better performance if scores are computer-set **(2)**
- one can show performers clean representations of work in progress, for discussion/collaboration

The ease, speed, neatness and accuracy of part production **(41)**

Greater overall efficiency and practicality **(27)**

Word-processor-like editing features, including transposing, retrograde, inversions etc **(25)**

The presence of audio playback **(24)**

- to check rhythms **(8)**
- to check harmonies/pitch **(6)**
- to check for mistakes **(4)**
- to check form and structure **(4)**
- to check pacing **(3)**
- to judge effectiveness of orchestration **(2)**
- to hear complex sound structures **(2)**
- to check timbre **(2)**
- to check tempi
- for trial-and-error composing
- so others can hear playback of scores
- playback occurs in real-time
- using playback is enjoyable

Scores are editable/adaptable into the future **(10)**

One can electronically disseminate scores and/or audio **(9)**

Archiving considerations **(4)**

Easy reproduction through printing **(4)**

- standard print sizes makes duplication easy

MNS allows for greater experimentation because actions are undoable **(3)**

The ability to self-publish **(3)**

Musical illiterates can "get away" with quite a bit because the software obeys layout rules that the illiterate composer may be unaware of (NB: this is also listed as a disadvantage) **(2)**

Copies of scores stored on disc much easier to travel with than bulky scores **(2)**

Auto-transposing (2)

“Happy accidents” often result from mistakes

Availability of archives of classical music as MIDI files for importation into MNS and use in own work

Possibility of incorporating one’s own MIDI files

Makes notation of improvisation easy

The ability to enter notes using an electric piano keyboard

Good for quickly producing arrangements of existing music

The ability to overcome formatting challenges, eg ledger lines running into staves etc

Instrument ranges are indicated

The entire compositional process can be handled using MNS

Writing by hand causes physical discomfort

MNS is more flexible and gives greater freedom than writing by hand because big decisions can be made later in the process

MNS helps overcome any lack of musicianship on the part of the composer

To realise audio for the purpose of accompaniment

One doesn't have to worry about finding good manuscript paper

Ease of use

MNS is a good tool when teaching

- Kids (students) love to use computers

There is no time delay between the completion of a score and its neat realisation by a copyist

It is less expensive to produce the score and parts

The auto-arrangement features

The generation of WAV files

MNS can be used as a jotter pad for storing ideas

By using “save as” one can compare different versions of work

The ability to move quickly around scores aids revision

DISADVANTAGES – 44 individual types of answer, with 20 bulleted answers

MNS playback misrepresents the sonic characteristics of actual instruments **(16)**

- And their relationships with one another (balance) **(7)**
- Playback engenders reliance on the computer as creative tool **(7)**
- Poor playback can be demotivational **(3)**
- Strength of sound of instruments at extreme registers especially misrepresentative
- Playback can also lead to a less thought out or less considered composition, as often the emphasis becomes focussed on the immediate reaction to the “sound of the piece”

It is difficult to realise non-standard notation **(16)**

- Non-standard notation does not play back **(4)**
- One tends to compromise on notation when the software does not provide the best (graphical) solution **(2)**
- With MNS, composers might steer away from non-measured textures or tricky-to-notate music because it is difficult to implement
- Symbolic notation easily goes awry when objects are moved around
- MNS does not deal with the notation of non-Western instruments well

MNS-produced scores mean a loss of the individuality and character of hand-rendered scores **(14)**

- In this day and age it is nice to have a product not made using a computer

MNS makes it too easy to write unplayable music **(12)**

- This leads to a decline in music literacy **(3)**
- Musical illiterates can “get away” with quite a bit because the software obeys layout rules the illiterate composer may be unaware of (NB: also listed as an advantage)
- Composers group rhythmic units incorrectly (beaming)

Having to scroll to see a whole page of score (even with a large monitor) is inconvenient, inefficient and disruptive **(9)**

- It is easy to get stuck working only on that which can be seen on a single screen - this is at the expense of the entire work

The cut-and-paste facility may be used without thought given to the aesthetic result **(6)**

MNS offers no more disadvantages than any other working method **(6)**

- If it is used with an awareness of how things really sound
- As long as the composer realises he/she is in control of the process

Using MNS is slower than writing by hand **(5)**

Playback means the loss of or non-development of the composer’s “ear” **(3)**

Computer freezes/crashes **(3)**

Takes a while to learn how to use MNS **(3)**

MNS is not very good for making compositional sketches **(3)**

It is difficult to proof scores while reading from the monitor (better proofing is achieved from printouts) **(3)**

- Small errors are easily missed with MNS

MNS limits creativity **(3)**

MNS playback is too rhythmically strict (2)

The technology is often frustrating (2)

The cut-and-paste facility leads to the composition of music made up of little blocks or which lacks fluidity (2)

Notation of improvisation might tend to become the chief method of material generation

- Composers who only enter notation using electric keyboard input might not learn how to notate correctly

One has to fight not to be channeled into thinking in a particular way due to the inherent nature of MNS

Listening to playback results in "square and computer-friendly" compositions

MNS playback makes one think of time as metronomic

MNS means composers no longer need to be competent at playing an instrument

MNS is not very flexible

Moving slurs causes computer problems

It is difficult to compose wherever you want if you only have a desktop computer

MNS limits one's thinking as to the capabilities of instruments

Looking at the computer monitor causes eye strain

The computing environment is unhealthy

Notation software is still not "up-to-the-job"

Text entries tend to move around or change

Transpositions are not always accurately realised

It is difficult having to move one's attention from the screen to manuscript to a keyboard etc

The means of controlling MIDI for sequenced playback is clumsy

The fan "hum" of the computer is distracting

Fonts sometimes look clumsy and artless

It is hard to get a score to look really beautiful

MNS generates a wasteful amount of paper

MNS is too complex (Finale)

The cost of upgrading the software is prohibitive

Composers do not learn good copying skills because of MNS

One can become lazy because the computer takes care of things such as changing the key for transposing instruments

MNS playback is never totally accurate

The possibility that the two methods necessitate different processes, for better or for worse

Question B3

Please explain why you don't listen to audio playback?

I don't like the sounds **(4)**

The sounds are not realistic **(2)**

- The MIDI playback is misleading

"If a passage of composed music is listened to repeatedly I may be less likely to modify it as the ear becomes used to it. Audio feedback could impede what I write and modifications are likely to be more mundane."

The inner ear is more useful

I prefer to use a dedicated sequencer for playback

I have no need to

My music is based on sounds that MIDI can't reproduce

The computer playback doesn't *interpret* the music

Listening would steer the composition towards existing only as a "computer performance"

I prefer listening to a "monochrome/neutral" sound such as piano

Question B4

Is the quality of playback (ie, the playback's proximity to realistic representation of actual instruments) important to you? – please discuss:

NO

No, because I know/can imagine how it should sound **(8)**

- I am aware that the playback is only vaguely indicative of how the piece will actually sound **(6)**
- It is a guide which I use to then "hear" the actual sounds in my head **(5)**

No – because it is of poor quality, the playback is only for checking notation, rhythms etc **(8)**

No, because I don't trust it **(3)**

No, but if the playback was better, then yes **(2)**

This would concern me if I could afford to buy better playback hardware and/or software **(2)**

No, the playback is so unrealistic that it is a mere novelty **(2)**

It is good that the computer sounds don't sound representative because this forces one to use one's imagination **(2)**

No, the playback gives a distorted impression of the balance of a group of instruments

My view of the playback has changed over the years so I can imagine the real result while listening to the computer

The better it is, the more likely I am to listen to it

This would concern me if I was willing to spend more time tweaking the playback of scores

No – it's too time consuming making the playback sound good

No, because the playback doesn't stimulate an emotional response in the same way that imagining the music does

No, because reliance on playback distances the composer from imagining the physical actions of human performers

No, but in the future I might make more use of playback

YES

Yes, the sound quality is important **(8)**

Important for gauging blend, balance and timbre of combinations of instruments **(4)**

Yes, and I have spent a lot of money buying hardware/software to achieve more realistic sounds

Yes, because if one cannot put in a particular sound (a ricochet, for instance), when one listens repeatedly the "instead" sound becomes the norm. This discourages experimentation with sounds that are not provided by the sound canvas available.

The playback is more useful for mechanical sounding pieces, such as solo piano works than for pieces with lyrical, free or human content with rubato or pauses etc

Yes, but it's possible to spend too much time making the playback "realistic"

Yes, important because the more realistic, the better idea the composer has of how "real" sounds exist in time

Extremely important – the same as if one was working electroacoustically

Yes, good playback helps my confidence

Yes – bad sound "drives me nuts"

It helps if the sound "isn't too ghastly"

Important mostly when conveying an impression of works to performers

YES AND NO / NEUTRAL

Accurate rhythm and pitch playback are sufficient **(3)**

Quality is only important when producing a recording for performers **(3)**

Sounds only need to be of average quality

Good playback is a secondary concern to score and part presentation

Poor quality playback is distracting

The playback creates certain expectations about how the music will sound in performance, which may not pan out

Of decreasing importance: as I develop as a composer and can imagine the real sonic outcome, the playback is less important

Playback won't sound extended techniques

Question B5

Do regard your interaction with music notation software as collaborative in any sense? – ie, do you regard the alternation of note input and listening to playback as a dialogue where the computer plays a real or imagined role? – please discuss

NO

No, it is a tool and nothing more **(14)**

- The software I have does not suggest this kind of relationship
- But it frees me to experiment more with options and choices as I work

It is not a collaborative relationship: the computer is simply "parroting" what I input

- MNS provides a "mirror" to my imagination **(3)**
- the computer's role is essentially passive

I think of collaboration as human to human, not human to machine **(2)**

No, because I don't trust it

The poor playback deadens rather than invites creation of further material

MNS is negatively collaborative in that its limitations demand a change of process on my part

YES

The playback function allows me to test what I have written in a kind of collaborative way **(2)**

I can imagine the real sounds and hear the difference between them and the computer

Yes, but only when I am experimenting with ideas, not when entering settled-upon music

I find it is collaborative when working on arrangements and orchestrations but not for original work

Yes, and this collaborative aspect somehow leads to the writing of clichéd or set-genre music

I find MNS to have an imagined intelligent role

Because MNS is designed by humans, it is to a greater or lesser degree intelligent

YES AND NO

Any collaborative aspect with the computer is the same as using a piano **(4)**

- I see MNS as a kind of player-piano because it can play back music far faster and more accurately than I ever could

The composer-computer relationship is collaborative in that it informs the creative process but doesn't replace the imagined/planned live performance

Notation in any form is a kind of collaboration with one's own imagination

Question B6

Do you ever use music notation software to plan the form and structure of your compositions? (eg, you might mark out a blank section of score with written indications of what might happen, etc...) – please discuss

NO

I do all planning with pen and manuscript/blank paper **(15)**

- MNS is not sufficiently flexible to help with planning **(3)**
- I prefer to have hand-written plans in front of me so I don't have to flick between computer documents
- MNS makes it difficult to see the entire shape of an intended piece and therefore difficult to grasp its proportions
- I arrange plans of each section of a work as a flowchart

No, I start at the beginning and through-compose **(2)**

My compositions are too small-scale to consider using MNS for planning

YES

I use MNS to plan structures with regard to mapping out durations of sections **(2)**

- I use MNS to help conceive the pacing of extant material

I often print out skeletons of pieces and use the gaps as manuscript paper to "compose out" **(2)**

I type-write descriptions of planned musical action on the blank score

I plan at a less specific level using MNS

I use MNS as an aid to hearing the continuation of material

- Occasionally I audition “chunks” of music to try and judge what kind of transitions I need to write

I use MNS to plan materials such as transpositions and inversions of a set

I use MNS as a structuring tool for certain aspects of the composition so I can focus on creative matters

I sometimes copy and paste ideas to a pre-planned structure

- I use cut and paste to throw ideas around

MNS might be used at the conclusion of writing to move ideas around

Sometimes the working process is influenced by having to make decisions that I am able to notate with MNS

NEUTRAL/NON-COMMITTAL/OFF-TOPIC

I sometimes leave areas of blank scores in between completed sections that I will later fill with transitions **(3)**

- I sometimes have saved versions of scores that are just “frames” of pieces

I might use the computer to plan form and structure if I was better at using the software

Playback helps with one’s understanding of form and structure, but only after the piece is written

Question B7

Compared with writing by hand, how, if at all, does music notation software influence the process/methodology of your compositions? – please discuss

YES

MNS saves a huge amount of time/speeds up the whole process **(11)**

- The process is changed by being able to *instantly* change things **(4)**
- One spends more time composing and less time writing (by hand) over and over
- I tend to rush more through a composition using MNS

I use cut-and-paste sometimes **(4)**

- Cut-and-paste tempts me to be sloppy

It takes me much longer to enter music into MNS than it does by hand **(2)**

I feel more confident writing for large ensembles with MNS **(2)**

Lack of facility with the software means I sometimes simplify or otherwise modify my music in order to be able to enter it into MNS **(2)**

The facility of playback influences my methodology greatly – the process would be a lot different writing by hand (2)

I wouldn't want MNS to influence or alter my process/methodology and am always on guard to make sure it doesn't

The enhanced clarity of MNS scores means there is more order/tidiness which might affect my working methods

I feel freer but less confident of the outcome using manuscript as opposed to MNS

MNS moves my checking senses from the eyes (looking at manuscript) to the ears (listening to playback)

I think less about texture and more about rhythm and pitch when working with MNS

MNS playback means I now work much less at the piano

I now try out different combinations and ideas on the computer that would not have been possible using pen and manuscript

I now alternate composition with MNS note input

I work in longer sketches with MNS because it is less physically exhausting than writing by hand, so form and purpose evolves more readily

I am more able to use "trial and error" methods as I work

- MNS allows me to hear and trial different options

MNS has been added to piano and manuscript as a tool – it has become an additional "instrument" to work with

MNS allows me to through-compose, listening to what I write bar-by-bar whereas with pen and manuscript I require detailed pre-planning

The safety of being able to make back-ups influences my thinking

MNS records the working process with its undo history – this is a self-revealing aspect for the composer

The lack of documentation of the process (when notes are erased) removes the sense of progression of the piece and makes it difficult to see how the piece has evolved

I can quickly "play in" a lot more ideas than would have been possible with pen and manuscript. While I discard many of these, I am able to work with a greater range of material

Ability to transpose lets me test ideas

Playback helps me to be more reflective on my work

Playback allows me to be more intuitive in my approach as I can base decisions on what I hear

I am more aware of the rhythmic interaction of the parts

I use the software to integrate downloaded MIDI files of "classics" as the basis for new original compositions

MNS makes writing simple music very easy so there is a temptation to adapt one's processes to pursue such music even if this isn't one's intention

My thinking is clarified by being able to see the sequence of planned events much more clearly on the screen

I can cut and paste ideas when the order of their appearance becomes clear

I use the inversion tool

Yes, but only at a very localised level

- With MNS I sometimes focus too closely on minute details and this detracts from the overall compositional process

MNS allows me to be more reckless with throwing ideas around – something I'm less inclined to be when writing by hand

NO

I have always used MNS so I have no point of comparison **(3)**

It doesn't as I only enter the score into MNS at the conclusion of composing **(2)**

Question C1 (in two parts)

Do you, or have you ever, created tapes or CDs of computer playback for the benefit of your performers? – what has been the reaction of performers?

GENERAL COMMENTS

It has helped performers get to know the mood, structure and tempi of the works **(5)**

- performers get to know where and how their part fits into the grand scheme of things

It gives them an idea only **(5)**

It helps speed up the note-learning process **(4)**

This practice has meant some technical issues have been picked up prior to the first rehearsal and these have been able to be amended prior to that first rehearsal **(3)**

By being able to hear the piece the performers were less intimidated by the score, which looked tricky **(3)**

Particularly useful for school groups and young learners **(3)**

- young performers may get a less distorted idea of the music by listening to MNS playback than they would have just struggling through the music

I haven't made such recordings for performers but I have for the benefit of university markers **(2)**

- I have made tapes for actors in productions

Amateur performers tend to like listening to MNS renditions whereas professional players prefer not to (2)

Dancers and choreographers often must work with MNS playback before the real music is available (2)

Giving performers an MNS recording is akin to performers listening to commercial recordings of repertoire works (2)

MNS recordings are useful for performers who learn music aurally (2)

- but are of dubious benefit for performers who read music

Useful in establishing whether the key is appropriate for singers

Isolating parts is especially useful for performers

Useful in carrying out a dialogue with the work's conductor

Conservative performers tend to dislike the playback whereas adventurous ones are happy to have it

Especially helpful for orchestral conductors

My particular software (Encore) has limited playback output and is hence limited as a resource for performers

I have only made tapes or CDs of MNS playback for incidental music, not for concert music

I always have to provide a disclosure about the inaccurate timbre when handing such recordings to performers

No performer has ever asked to hear MNS playback

I only create recordings of the themes of a work, not the entire work

I prefer not to give out such recordings but sometimes conductors demand them

I would never supply such recordings for small ensemble works

- I only ever supply MNS recordings for large-scale works to give a sense of shape

I would only provide performers with an MNS recording for works with high rhythmic demands, not for works that are highly timbral

I have only ever provided MNS recordings when they have been requested when entering works in competitions

MNS playback is of limited use for performers but of some use for conductors or panel adjudicators

The amount of work necessary to produce realistic sound output does not balance with the usefulness of this practice

The playback is too "perfect" and I prefer my performers to interpret the music

I haven't made such recordings but would hope to in the future as my facility with MNS improves

SPECIFIC PERFORMER REACTIONS

Performers have been generally appreciative of having playback to listen to when a “real” recording does not exist **(9)**

- The performers were exceedingly grateful for any such assistance when learning a new piece

Most performers have been annoyed (or amused) by the artificiality of the MNS sounds **(4)**

- it's much better for players to learn from the score than from playback
- some players start out insulted by the MNS playback but eventually are won over and use it as a learning reference (especially for difficult rhythmic elements)
- improvements in MNS playback means performers are increasingly appreciative of such recordings

Performers accepted the limitations of the MNS playback **(3)**

I don't think performers listen to the recordings **(3)**

This practice was more useful for me than it was for my performers **(2)**

The reaction of the performers was neutral **(2)**

I'm not sure how the performers felt about it **(2)**

Performers find MNS recordings are particularly useful to learn a work's rhythms from

Performers, particularly conductors can be drawn into collaboration more easily and have real input into works and their realisation

One performer initially copied the playback and produced nonsense

Question C2

Since you adopted the use of music notation software, has your output (ie, works completed) increased, decreased or stayed about the same?

STAYED ABOUT THE SAME

Factors such as other employment, deadlines, ease of getting works performed etc are far greater issues in my productivity than MNS **(13)**

- The opportunities for quality performances in New Zealand have not changed much over the last couple of decades

I have always used MNS and have no point of comparison **(9)**

MNS is simply a printing tool, not a facilitator for creation **(8)**

The tools I use are irrelevant to the frequency of my output **(3)**

With the exception of part preparation, hand and computer demand roughly the same amount of time **(2)**

Any increase in productivity due to the speed of MNS has been offset by time taken to audition competing musical options (made readily possible by MNS)

I have always used technologies in my work. MNS has extended but not fundamentally altered the way I work and the amount of work I produce

INCREASED

MNS has sped things up because the task of completing a score is now faster than it was when writing by hand **(15)**

- the fast parts production has sped things up
- the extra productivity provides a greater incentive to write

The ease of “throwing notes about” has increased my output

I enjoy the process of working with MNS

Once I had really gotten to grips with Sibelius’s shortcuts, working with the software felt very natural – like working with manuscript, only faster.

I learned to use MNS at the same time as I learned to compose, so it would naturally take me longer to write by hand

The playback is a more efficient way of thinking through the music than in one’s head or slowly playing it on a piano

MNS made it possible or at least easier for me to branch out into other areas of music education, hence my productivity increased

DECREASED

The decrease is unrelated to the use of MNS **(3)**

Output has decreased because of my lack of facility with the software **(2)**

Producing my type of score with MNS is particularly time-consuming **(2)**

Previously I gave scores to a copyist to make materials and this was faster

Question C6

What are your feelings on the use of music notation software by fledgling composers? ie, composers with little or no experience of composing by any means.

NEGATIVE

Young composers become reliant on playback rather than experience with live performers and real instruments **(5)**

Such composers too readily allow the default settings of the software to rule their creative decisions **(5)**

MNS becomes an insufficient substitute for traditional training in counterpoint, harmony and orchestration **(4)**

Dangerous for composers to use MNS if they have insufficient experience writing scores and parts by hand **(4)**

MNS use means one's aural imagination does not develop – undesirable in fledgling composers **(3)**

Computer illiterates might be overwhelmed by the software **(2)**

The musical “ear” is not developed through using MNS **(2)**

Must be remembered MNS is only a tool and must be accompanied by musical knowledge **(2)**

Knowledge of the technical capacities of instruments diminished by MNS use **(2)**

Fledgling composers must be aware of and guard against the software's limitations and the preconceptions of its designers **(2)**

MNS use is inadvisable in much the same way as the use of technologies to do arithmetic **(2)**

New and fledgling composers need to be musically literate before approaching MNS **(2)**

MNS makes for more notational errors than writing my hand

Notational skills are never gained through using MNS

Students won't develop a sense of connection between physical writing gestures and line, time and “architecture”

There is a limit to the number of “happy accidents” that occur using MNS

Composing simply by using MNS to “follow one's ear” will not create meaningful or substantial works

Fledgling composers should instead develop keyboard and sight-singing skills rather than use MNS

Too easy to “do illogical things” with MNS

More rewarding for fledgling composers to write away from MNS – they develop the necessary skills better this way

Fledgling composers need to be careful not to become over-reliant on MNS

MNS is misleading concerning balance and timbre

MNS stunts compositional development

It is valuable for composers to know how to write by hand for those occasions when they do not have computer access

MNS scores in a university composition environment have a tendency to start looking the same as one another

MNS makes things too easy for composers

MNS shouldn't be allowed to limit sense of adventure while composing

Most teachers think the practice of young composers using MNS is dubious

Fledgling composers must be aware that MNS is a tool, not a compositional / inspirational aid

MNS might limit fledgling composers' ideas of structure and sound possibilities

"Don't"

"Completely inadvisable"

MNS gives an illusion of an alternative to knowing how instruments work

MNS forms bad notational habits by making poor decisions about spacing and other aspects of notation

POSITIVE

The audio playback of MNS cuts out the guess-work of composition **(2)**

If MNS gets young composers started, then it's a positive thing **(2)**

The audio playback of MNS allows composers to hone their skills more easily and quickly

I'm all for it

MNS is a major innovation for composers of lower/middle ability due to the audio feedback

MNS assists with learning notational skills

A positive tool to use but users should have a "mentor" to guide them on MNS use

- Correct guidance in MNS use should be taught as a paper at universities

Computer-literate composers might be stimulated by the software

OK for getting an aural sense of harmonies, etc

MNS might be a stimulating tool to use for such composers

The playback of MNS opens up composition to non-pianists (ie, they can hear harmonies that can't be trialed on monophonic instruments)

A superb tool in wise hands

It is beneficial for students to be computer literate in all areas, including music

MNS is beneficial in school settings, where composing is made easier by its presence

NEUTRAL/OFF-TOPIC

Fledgling composers should experiment with different compositional approaches and tools **(3)**

Best for fledgling composers to develop skills with both human and electronic means **(3)**

Fledgling composers should go with whatever approach they feel most comfortable with **(2)**

No feelings

MNS gives students the chance to hear their ideas realised

For those who don't play an instrument, MNS becomes their "instrument"

Fledgling composers will feel pressure to have MNS-typeset scores because this is becoming the expectation of performers and performing organisations

With experience, drawbacks such as a possible tendency to assume the computer automatically produces good notation, would fade away

Use Encore – it's user-friendly

Composers who have learned to compose by traditional means might look down on MNS composers who they consider haven't "paid their dues" – due to this, the music should be judged on its own merits, not by how the tools used to create it

Scores produced with MNS in an academic environment must be judged using real instruments

Question C7

If you have any other thoughts about aspects of the use of music notation software not raised in the questions above, feel free to present them here:

As a performer, I often find that parts realised with MNS stretch over many more pages than hand-written ones and require many music stands to accommodate them

"The use of compositional and for notational assistance from computers and associated software can rarely make up for lack of compositional craft and initiative – although can certainly stimulate, encourage and facilitate the expression of these."

Composition is a minor part of my use of MNS – I use it mainly in my role as a copyist

"It is a source of frustration that the software I have used is directed for commercial reasons at a way of thinking about music which falls short of my needs as a composer. Over time I've become quite adept at working around the software's limitations, but it represents a lot of time lost, which would have been better spent on creative work."

I am curious to explore MNS more in the future

- I feel I must embrace MNS sooner or later to be taken seriously
- But the time to learn MNS and the money to buy it are too great

Keep a tight rein on anyone who might be editing your score or preparing parts for you

"It is unfortunate that so much emphasis has been placed on playback – it has led to an impoverished understanding of composing as "putting in notes", and a corresponding ignorance of real sound and the physicality of instruments."

"I think it's really nice to have a professional-looking score – but I think such a thing confuses many into thinking that because a score looks like a printed edition it is therefore a good piece of music. Also...there are too many people who write music who cannot hear the final product in

their heads. No amount of notational software will help people who do not want to invest the time and effort into developing essential music skills. And you can always hear when a composer doesn't know how to use instruments effectively or can hear music inside their head. Finally, I would say that I believe it is ill-advised to give performers cassettes of what a piece of music "sounds" like. Indeed, this is because only the score can tell a musician what a piece of music is supposed to sound like. In this respect, it is my opinion that such application, while a lot of fun, are reducing young musicians' musical abilities attempting to bypass the acquisition of essential musical skills."

"The only advantage that I can see is that notation software produces a neater, cleaner score – on the other hand we are gradually losing precious, personal handwritten manuscript scores in favour of these computed copies. A similar loss occurs with the prevalence of e-mail over handwritten letters. But the most pernicious aspect of this technology-obsessed culture is the way some music is insidiously 'blanding out', as composers rely on computer playback – with its limited expression, risible instrumental approximations, lack of dynamic and articulatory range, and compression of sound into characterless state, producing pieces which, in live performance, sound like their MIDI playback version!"

I'm concerned that composers will forget the skill of "hearing" their piece in their heads – ie sitting in front of their score and just hearing it without any electronic aids

"Notation software still suffers from a lack of flexibility as notation software, despite and increase in the sophistication of its playback aspects."

"Discussion/education in the function and purpose of notation as well as a knowledge of the norms of western music notation is sorely lacking both at secondary and tertiary levels."

"I believe it may be helpful to know more about the kind of music each participant writes as this will radically affect their experiences. Using microtones immediately multiplies the process by several times, as does using "figurative" rhythms. My music uses both these things which is why I find computer processing and editing very slow. I think it would also be interesting to know how much composers use the styles and templates the software gives them. Once you start caring about the details of presentation this also adds a time factor. I can think of a number of composers for whom none of these issues would apply and can imagine computer processing saves them a lot of time and labour"

"In my experience as a performer I am dismayed by the preponderance of computer set parts which are awful – publishers seem to rely on the software without any working knowledge of correct music notation. This is a matter of general musical education, and not of the software, but the availability of the software has given rise to it."

"In my teaching I noticed two things: 1) Students tended to rely too much on sampled acoustic sounds for playback and composition and unless constantly reminded of range etc issues were mislead into unidiomatic composing. 2) A separate course in notation standards was needed before they started using notation software, which, unfortunately, we couldn't offer."

It is important to realise that effective sequencing software has been around since the 1980s and that notation software lagged behind in development because of its graphical demands and the greater demand for software to realise pop music as opposed to notation-dependent "classical" music

It would be useful, even after years of using MNS, to read the manual!

MNS has allowed me to become an expert music typesetter, working for top music publishers while still being able to work from home in New Zealand while looking after the kids!

"As a conductor I have studied and performed a vast number of contemporary compositions...In the last 6-8 years or so it has become increasingly obvious that composers use the software as a

compositional tool as well as a score setting device. I am confident in relating that this in turn has had a detrimental effect on the overall standard of composition.

There are traps which I'm afraid even our most well known composers fall into such as poor orchestration, sequenced padding, technical impossibilities, scarcity of contrapuntal interest or linear development and rhythmic torpidity. These same composers will seek my advice before and after I have performed their works during which time I will have wasted a great deal of study and rehearsal time correcting textural, dynamic and technical considerations that would have been easy pickings for the average composition and/or orchestration student 20 or 30 years ago and beyond. Sorry to come across as reactionary but there you are.

There are no shortcuts for producing an accomplished composition and unfortunately the lack of disciplined technique forged from practice, plus the study and assimilation of the scores of past masters is more often than not sacrificed to dabbling on a sequencer.

Knowledge is freedom. Being able to call on a sound technique to truly express what you want to say has got to be better than "ooohh that sounds cool, I'll use that, even if I don't have any real idea on how to achieve it practically on paper."

I have in my library dozens and dozens of scores I could give you examples from with regard to all of the above; sufficed to say...that I despair at the paucity of knowledge illustrated by the average composition student at our institutions and am in no doubt that a compositional reliance on the computer will make our already 'lazy' composers falsely encourage the generations to come".

Appendix C

Data DVD: three video clips of the composition of *inter-*

DVD is attached to the inside front cover of this volume. To view the video clips, open the .avi files on the attached DVD using a media player.

Appendix D

Video capture results

The following tables are a second-by-second documentation of three digital video clips, captured using HyperCam software during the composition of the work *inter-*, the subject of Chapter Six. These clips are viewable by opening files on the Appendix C data DVD using a computer media player.

Understanding the tables

A code was developed to describe different types of actions within the MNS environment. These appear in the “ACTION” column.

Playback Review (PR): any period spent listening to playback

Post-Playback Editing (PPE): composition carried out directly after and as a result of having undertaken Playback Review

Note Processing Action (NPA): the use of word-processing type actions such as copy, cut, paste, permanent deletion or automatic transposition

Cosmetic Action (CA): any action not related to further note generation but to the shaping and placement of elements in order to make the score more presentable

Playback Tweaking (PT): inserting MIDI controller instructions for dynamics, instrument sound assignment or tempo control, or adjusting mixer levels

Bars numbers are also listed in the “ACTION” column. These refer to bar numberings that are current during composition but which, in many cases, have changed by the time the final score is realised. Bar numbers followed by decimal points and a further digit denote specific beats of bars as playback starting-points (for example, “b.10.3” means the third beat of bar 10). The reader is reminded that the term “coalface” denotes the point at which I was currently working, that is, the point at which the extant music “runs out.”

Session One

Composed 12 February 2004, starting 10:47pm. Duration: 19:38. Coalface: b.10.

TIME	TOTAL (SECONDS)	ACTION	COMMENTS
00:06 – 00:17	11	PR, bb.1-6	
		PPE	Piano: unwanted crotchet rests removed
00:32 – 00:42	10	PR, bb.6-10	
		PPE	Piano: fifth moved down octave
00:50 – 00:52	02	PR, b.10	
		PPE	Violin: sextuplet added
01:59 – 02:13	14	PR, bb.1-8	
		PT	<i>ff</i> added to sextuplet so that it may be clearly heard

02:24 – 02:27	03	PR, bb.10-11	
02:28 – 02:30	02	Repeat	
02:31 – 02:37	06	Repeat	Playback tempo slowed so pitches of violin sextuplet can be heard more clearly
02:44 – 02:45	01	PR, b.10.3	Sextuplet isolated for audition
		PPE	Pitch content of sextuplet altered
02:53 – 02:54	01	PR, b.10.3	
02:55 – 02:56	01	Repeat	
		PPE	Pitch content of sextuplet altered
03:14 – 03:16	02	PR, b.10.3	
		PPE	Entire sextuplet moved down an octave
03:30 – 03:32	02	PR, b.10.3	
03:34 – 03:39	05	PR, b.9.4	A greater lead-in to the area being worked on. Playback still at a slower tempo.
03:42 – 03:57	15	PR, b.1	Playback <i>a tempo</i>
03:57 – 05:28	--		(Session interrupted)
05:28 – 05:44	16	Repeat	A full audition of all material needed after interruption of thought-train
05:49 – 05:51	02	PR, b.10	
05:52 – 05:54	02	PR, b.10	Violin isolated for playback
		PPE	New sextuplet added
06:19 – 06:22	03	PR, b.10.3	
06:22 – 06:24	02	Repeat	
06:30 – 06:31	01	PR, b.11	
06:33 – 06:34	01	Repeat	
		PPE	Piano, right hand: notes added
06:55 – 06:56	01	PR, b.11	
		PPE	Piano, left hand: pentuplet added. Pitches from previous material click-auditioned to guide note-addition
07:57 – 08:14	17	PR, b.1	
08:17 – 08:20	03	PR, b.10	Coalface material again focussed on
08:30 – 08:30	01	PR, b.11	
08:31 – 08:32	01	Repeat	
		PPE	Piano, right hand: single note added to dyad
08:37 – 08:39	02	PR, b.11	
		PPE	Piano, left hand: new pentuplet added
09:06 – 09:07	01	PR, b.11.2	
09:07 – 09:09	02	Repeat	
09:12 – 09:14	02	PR, B.11	
09:15 – 09:17	02	Repeat	
		PPE	Violin: new pentuplet added
09:47 – 09:49	02	PR, b.11.3	
		PPE	Violin: two triplets added
10:40 – 10:41	01	PR, b.12	
		PPE	Violin: new pentuplet added
11:07 – 11:16	09	PR, b.6	Review sought not from the beginning, but from closer to the coalface
11:16 – 11:24	08	Repeat	
11:27 – 11:29	02	PR, b.11	...closer still to the coalface
11:42 – 11:44	02	Repeat	
		PPE	Piano, right hand: triad altered
12:36 – 12:38	02	PR, b.11	
12:38 – 12:41	03	Repeat	
		PPE	Piano, right hand: dyad made into a triad

12:49 – 12:50	01	PR, b.11.4	
12:50 – 12:51	01	Repeat	
12:55 – 12:59	04	PR, b.11	
12:59 – 13:02	03	Repeat	
		PPE	Said triad altered
13:11 – 13:12	01	PR, b.11.4	
13:14 – 13:32	18	PR, b.1	
13:35 – 13:37	02	PR, b.11	
13:41 – 13:41	01	PR, b.11.3	
		PPE	Piano, left hand: new pentuplet added
14:18 – 14:31	13	PR, b.3	
14:38 – 14:39	01	PR, b.11.4	
14:42 – 14:45	03	PR, b.11	
		PPE	Violin pitches altered, b.11
14:59 – 15:18	19	PR, b.1	
15:19 – 15:22	03	PR, b.11	
15:25 – 15:27	02	Repeat	
		PPE	Violin pentuplet removed, replaced by triplet. A different triplet removed, replaced by two quavers,
16:05 – 16:22	17	PR, b.1	
16:25 – 16:28	03	PR, b.11	
16:30 – 16:32	02	PR, b.11.3	
16:33 – 16:36	03	PR, b.11	
16:40 – 16:40	01	PR, b.11.4	
16:41 – 16:42	01	Repeat	
16:43 – 16:46	03	PR, b.11	
		PPE	Piano, left hand: pentuplet removed, replaced by two semiquavers
17:07 – 17:08	01	PR, b.11.4	
		PPE	Pitch content of piano, right hand, triad altered
17:33 – 17:36	03	PR, b.11	
17:37 – 17:39	02	Repeat	
		PPE	Piano, left hand: dyad added
18:12 – 18:13	01	PR, b.11.4	
		PPE	Piano, right hand: chord tied over to next bar
18:17 – 18:36	19	PR, b.1	
18:41 – 18:44	03	PR, b.11	
18:46 – 18:47	01	PR, b.11.4	
18:47 – 18:48	01	Repeat	
18:48 – 18:50	02	Repeat	
		PPE	Piano, left hand: D-flats converted to C-sharps
19:02 – 19:06	04	PR, b.11	
19:06 – 19:07	01	Repeat	
19:07 – 19:10	03	Repeat	
		PPE	Violin: a few pitches altered
19:22 – 19:26	04	PR, b.10.3	
19:37			Session ends

Session Two

Composed 20 February 2004, starting 12:47pm. Duration: 25.33. Coalface: b.85.

TIME	TOTAL (SECONDS)	ACTION	COMMENTS
00:05 – 00:25	20	PR, b.73	
00:30 – 00:32	02	PR, b.85.2	
00:32 – 00:33	01	Repeat	
00:34 – 00:36	02	PR, b.85	
00:36 – 00:37	01	Repeat	
		PPE	Piano, right hand: material added in two voices
02:14 – 02:16	02	PR, b.85	
02:16 – 02:18	02	Repeat	
02:18 – 02:20	02	Repeat	
02:22 – 02:24	02	Repeat	Piano, right hand: isolated for audition
02:27 – 02:29	02	Repeat	Tutti
		NPA	Piano, left hand: fragment from b.84 copied and pasted into b.86
03:05 – 03:08	03	PR, b.85	
03:08 – 03:11	03	Repeat	
03:17 – 03:18	01	Repeat	
		PPE	Violin: semiquavers added
		NPA	Piano, left hand: previously pasted fragment auto-transposed down major 2 nd
04:04 – 04:07	03	PR, b.85	
04:08 – 04:10	02	Repeat	
		PPE	Piano, right hand: dyad semiquavers added
04:45 – 04:46	01	PR, b.86	
04:47 – 04:48	01	Repeat	
05:00 – 05:09	09	PR, b.81.2	A longer lead-up to the coalface sought
05:10 – 05:11	01	Repeat	(Abandoned)
05:12 – 05:22	10	PR, b.81	
05:24 – 05:25	01	PR, b.86	
05:33 – 05:34	01	PR, b.86.2	
		PPE	Piano, left hand: pitches altered, semiquavers added
06:21 – 06:24	03	PR, b.80	(Abandoned)
06:24 – 06:35	11	Repeat	
06:37 – 06:49	12	Repeat	
		PPE	Several bars converted from 3-4 to 4-4 time.
		CA	Staves moved horizontally apart to fix poor spacing left by time signature change
07:22 – 07:24	02	PR, b.73	(Abandoned)
07:26 – 07:47	21	Repeat	Taking in new 4-4 section
		CA	Unnecessary second voice rests removed
08:24 – 08:26	02	PR, b.84	(Abandoned)
08:26 – 08:31	05	Repeat	
08:31 – 08:36	05	Repeat	
08:37 – 08:42	05	Repeat	
08:46 – 08:46	01	PR, b.86	
09:14 – 09:20	06	PR, b.83	
09:39 – 09:45	06	PR, b.84	
		PPE	Piano: left hand fragment extended into right hand

10:23 – 10:28	05	PR, b.84.2	
10:33 – 10:39	06	PR, b.84	
10:40 – 10:45	05	Repeat	
		PPE	Violin: semiquavers added
11:04 – 11:12	08	PR, b.82.2	
		PPE	Violin: further small additions
11:58 – 12:05	07	PR, b.83	
		PPE	Violin: pitches of latest additions altered
12:19 – 12:20	01	PR, b.86	
12:20 – 12:21	01	Repeat	
		PPE	Piano, right hand: dyad added
12:30 – 12:35	05	PR, b.84	
		PPE	Piano, right hand: a further dyad added
12:54 – 13:07	13	PR, b.79	
13:10 – 13:13	03	PR, b.85	
13:14 – 13:18	04	Repeat	
		NPA	Violin: two-note fragment copied and pasted again immediately after coalface material
		PPE	Violin: sextuplet added
14:25 – 14:31	06	PR, b.84	
		CA	Piano, right hand staff moved downwards
		PPE	Violin: pitches of sextuplet altered
15:05 – 15:21	16	PR, b.78	
15:23 – 15:25	02	PR, b.86	
		PPE	Piano, left hand: duration of one note extended
15:29 – 15:31	02	PR, b.86	
15:31 – 15:33	02	Repeat	
		PPE	Piano, left hand: semiquavers added
16:21 – 16:49	28	PR, b.70	
16:51 – 16:53	02	PR, b.86	
		PPE	Violin: sextuplet deleted, replaced by sustained dyad
17:10 – 17:18	08	PR, b.84	
17:18 – 17:25	07	Repeat	
		PPE	Violin: pitches of dyad altered
17:56 – 18:04	08	PR, b.83	
18:10 – 18:10	01	PR, b.86.3	
18:11 – 18:11	01	Repeat	
18:12 – 18:12	01	Repeat	
18:13 – 18:14	01	Repeat	
18:16 – 18:18	02	PR, b.86	
18:19 – 18:21	02	Repeat	
		PPE	Piano, right hand: semiquavers added
19:07 – 19:14	07	PR, b.84	
		PPE	Piano, right hand: pitches of latest semiquavers altered
19:28 – 19:31	03	PR, b.86	
19:31 – 19:33	02	Repeat	
		PPE	Piano, right hand: semiquavers added, into b.87 for the first time
20:00 – 20:08	08	PR, b.84	
20:19 – 20:57	38	PR, b.65	
21:01 – 21:04	01	PR, b.86	
21:04 – 21:06	02	Repeat	
21:38 – 21:48	10	PR, b.82.2	

21:50 – 21:51	01	PR, b.86.3	
		PPE	Piano, left hand: small adjustments to pitch
21:59 – 22:02	03	PR, b.86	
22:02 – 22:04	02	Repeat	
22:09 – 22:09	01	PR, b.86.4	
		PPE	Piano, left hand: single semiquaver added
22:47 – 22:57	10	PR, b.83	
		PPE	Piano, left hand: single semiquaver added
23:10 – 23:33	23	PR, b.73	
23:37 – 23:39	02	PR, b.86	
		PPE	Violin: crescendo added under dyad, first violin note in b.87 added
24:05 – 24:05	01	PR, b.87	
24:06 – 24:06	01	Repeat	
		PPE	Violin: single note made into a dyad
24:12 – 24:12	01	PR, b.87	
24:17 – 24:33	16	PR, b.79	
24:34 – 24:48	14	Repeat	
		CA	Tuplet line at b.79 straightened
25:18 – 24:31	13	PR, b.76	
25:33			Session ends

Session Three

Composed 3 March 2004, starting 11:16pm. Duration: 30:52. Coalface: b.127.

TIME	TOTAL (SECONDS)	ACTION	COMMENTS
00:08 – 02:22	134	PR, b.77	
02:28 – 02:44	16	PR, b.121	
		CA	Barlines split so they do not continue through from piano to violin parts
02:52 – 02:57	05	PR, b.124	
02:58 – 03:00	02	Repeat	
03:14 – 03:17	03	PR, b.126	
		CA	Tuplet line at b.126 straightened
		PPE	Piano, right hand: single note in chord moved up one octave
03:29 – 03:32	03	PR, b.126	
		CA	Tuplet line at b.126 further straightened and moved for spacing considerations
03:44 – 03:50	06	PR, b.125.2	
03:54 – 03:58	02	PR, b.126	
		CA	Tuplet line at b.126 further straightened and moved for spacing considerations
04:17 – 04:20	03	PR, b.126	The purpose of these auditions was to locate material suitable for use at the coalface
04:39 – 04:42	03	PR, b.34	
04:45 – 04:51	06	PR, b.32	
04:52 – 05:15	23	PR, b.36	
05:20 – 05:23	03	PR, b.42.3	
		NPA	b.45 copied then pasted at the coalface
		CA	Redundant staves, created by pasting into an area with hidden staves, are hidden once more

06:25 – 06:29	04	PR, b.124	
06:31 – 07:03	32	PR, b.121	
		PPE	All actions in this session to date are undone
07:45 – 08:07	22	PR, b.122	
08:14 – 08:18	04	PR, b.126	
		PPE	Violin: first note in sextuplet deleted, b.127
08:21 – 08:23	02	PR, b.127	
08:23 – 08:28	05	Repeat	
08:31 – 08:35	04	PR, b.126	
08:35 – 08:39	04	Repeat	
08:43 – 08:44	01	PR, b.127	
		PPE	Piano, left hand: chord deleted and replaced by tied-over dyad from previous bar
		CA	Piano, left hand: material moved from redundant staff to active staff
		CA	Piano: empty staves hidden
09:27 – 09:32	05	PR, b.126	
09:32 – 09:37	05	Repeat	
09:42 – 09:48	06	Repeat	Piano isolated
09:48 – 09:52	04	Repeat	
		PPE	Piano, right hand: single note added
10:19 – 10:49	30	PR, b.126	
		PPE	Piano, right hand: one pitch in dyad changed
11:03 – 11:11	08	PR, b.133	
		CA	Systems dragged closed together
11:20 – 11:22	02	PR, b.129	A lesser coalface is nearby and subsequent action aims to fill this and link up with existing material
11:23 – 11:36	13	PR, b.125	
11:40 – 11:46	06	Repeat	
		PPE	Piano, left hand: pitches altered, b.127
		CA	Tuplet lines straightened and shifted
12:15 – 12:45	30	PR, b.126	
		PPE	Violin: <i>p</i> realigned. Crescendi, <i>fffs</i> and <i>ps</i> added to all parts
13:28 – 13:30	02	PR, b.87	
		CPA	Second half of b.87 copied and pasted at bar 129
13:43 – 14:13	30	PR, b.126	
14:17 – 14:24	07	PR, b.128	
14:27 – 14:30	03	PR, b.129	
14:31 – 14:33	02	Repeat	
		CPA	Just copied-and-pasted fragment transposed up major second
14:51 – 14:55	04	PR, b.129	Checking that pasted-in fragment is appropriate to fill the gap
14:55 – 14:59	04	Repeat	
14:59 – 15:03	04	Repeat	
15:03 – 15:06	03	Repeat	
		PPE	Violin: pitches in dyad in pasted-in fragment altered
15:18 – 15:20	02	PR, b.129.3	
		PPE	Violin: pitch of first note in link-to bar altered – trying to facilitate a smooth transition
15:28 – 15:29	01	PR, b.130	
		PPE	Same violin note moved again
15:38 – 15:40	02	PR, b.129.3	
15:40 – 15:42	02	Repeat	
		PPE	Piano, left hand: semiquavers replaced by pentuplet

			in pasted-in fragment
15:57 – 15:59	02	PR, b.129.3	
15:59 – 16:01	02	Repeat	
		PPE	Piano, left hand: further changes to fragment
16:13 – 16:15	02	PR, b.129.3	
16:15 – 16:18	03	Repeat	
		PPE	Piano, left hand: pitches in link-up bar altered to facilitate a smooth transition
16:22 – 16:24	02	PR, b.130	
16:32 – 17:08	36	PR, b.125	Transition work reviewed in context with material before and after the now-filled “gap”
17:13 – 17:46	36	Repeat	
17:46 – 18:01	15	Repeat	
18:03 – 18:05	02	PR, b.129	
		NPA	Pasted-in material further transposed, up a minor 2nd
18:22 – 18:26	04	PR, b.129	Success of latest transposition assessed
18:26 – 18:31	05	Repeat	
		PPE	Piano, left hand: pitches of pasted-in material altered
18:36 – 18:42	06	PR, b.129.3	
18:42 – 18:45	03	Repeat	
18:45 – 19:06	21	Repeat	
19:09 – 19:17	08	PR, b.134	This material previously questioned in this session
		PPE	Piano, right hand, existing pitches altered
19:23 – 19:28	05	PR, b.135	
		PT	Invisible added to Voice 2 of dyad, for balanced playback (without this measure, the Voice 2 note of the dyad would sound louder than the Voice 1 note)
19:38 – 20:06	28	PR, b.134	These reviews are to gain a clear idea of rhythm/pacing changes that are thought to be necessary
20:06 – 20:07	01	Repeat	
20:11 – 20:43	32	PR, b.124	
20:44 – 20:56	12	PR, b.132	
21:03 – 21:05	02	Repeat	
21:07 – 21:13	06	Repeat	
21:13 – 21:16	03	Repeat	
21:19 – 21:21	02	Repeat	
21:22 – 21:25	03	PR, b.132.2	
21:25 – 21:27	02	Repeat	
		PPE	Single empty bar inserted at climax point, b.133 and existing climax material copied and pasted in. This acts as a record of pitch material that I wanted to retain. The pitches (starting with the violin) are then copied over to the new rhythmic scheme of the existing climax material.
23:12 – 23:16	04	PR, b.132	Review of new, slowing down, rhythms
23:17 – 23:19	02	Repeat	Violin isolated
		PPE	Material rhythmically shunted to the right
23:50 – 23:52	02	PR, b.132	Violin still isolated
23:52 – 23:55	03	Repeat	
		PPE	Rhythmic scheme made to not slow down as much as originally intended. Pitches copied over to both instruments from temporarily pasted materials (with some register-switching).
		PPE	b.132 converted to 5-4 time signature. Temporarily pasted reference material deleted (along with the

			bar created to accommodate it).
		PPE	Piano: extra dyad added to fill out extra beat in new 5-4 bar
28:34 – 28:51	17	PR, b.131	Review of newly altered climax
28:51 – 29:00	09	Repeat	
29:01 – 29:06	05	PR, b.132	
29:07 – 29:15	08	PR, b.133	
29:22 – 29:24	02	Repeat	
29:26 – 29:29	03	PR, b.132	
29:31 – 29:34	03	Repeat	Piano isolated
29:35 – 29:38	03	Repeat	
		PPE	Piano, right hand: one note removed
29:42 – 29:51	09	PR, b.132	Piano still isolated
29:51 – 29:56	05	Repeat	Tutti
29:56 – 30:12	16	Repeat	
30:12 – 30:15	03	Repeat	
30:15 – 30:20	05	Repeat	
30:20 – 30:36	16	Repeat	
30:36 – 30:48	12	PR, b.129	
30:52			Session ends

Appendix E

Transcript of interview with Michael Avery

This interview with Michael Avery of Sibelius Software was conducted on 16 December 2005 at Sibelius Software Ltd, Finsbury Park, London

Chris Watson: Michael. The first thing is, this is a very popular phenomenon, Sibelius and music notation software in general with the composition community. An outside observer would observe that the adoption of the software has been...mad, really – quite universal. I've encountered people who have initially been completely opposed to the idea of using computers to compose and now they're completely converted and want every little bit of technology to get that advantage

Michael Avery: Is that a wide age-range of people, the people who are opposed to using computers?

CW: Generally the more established older composers who have written music their entire lives are the difficult ones to get into computers but a lot of them have really flourished [since their adoption of computers], I think.

MA: I think with the adoption of any new technological tool there's going to be some period when it seems new and untrustworthy – eventually, things can change somewhat. I do remember however, back in the early days when I was studying composition, that people would say the one thing computers can't do for you is to have this kind of mental awareness from the point of view where you can hear something in your head as being the very most powerful thing you can do – a computer's never going to be able to help you do that – the computer is not inside of your head so I think one danger is that using computers makes it so easy for people to visualise and realise their goals that the opportunity to have an "inner ear" could be missed for some people.

But then there's the argument to say, well, if you have an inner ear, then you have an inner ear – the computer's not going to help you get that – are you afraid [that using a computer will mean] that you're not going to use your inner ear? – and that's a question that someone who works in an office every day [might ask him or herself]: are they afraid they're not going to exercise? – it's their own responsibility to do that.

From my point of view when I was learning, I think that computers helped me a great deal to be able to discover my inner ear because it meant that, without being a proficient performer (which many composers used to be) I was able to put my mind through the paces of understanding music, working with music and hearing music in a way that it would've been beyond my feeble physical skills in that area. So, in that way, by being able to go through the processes of visualisation, crafting and construction and being able to hear something as a result after a while my inner ear started to develop a little – so it probably goes both ways, I think

CW: I agree. The process of sitting down every day to write...it seems to me that the composer who doesn't have the computer has to almost relearn the previous day's work to get it current as music in the head, whereas the notation software user sits down,

presses play – maybe – and hears it and is instantly back in that “world.” That’s quite a fundamental shift and on the one hand it possibly increases efficiency (instantly you’re back into it, you’re not wasting time) and maybe your level of familiarity with the music isn’t so good, do you think? – or that the artificialness of the playback is an issue.

MA: I think you’re talking about two separate issues there: the intimacy or awareness of the music and the other one to do with reality and playback. I can’t deal with both issues at the same time, but the first one, I think that depends on the composer actually. I think somebody needs to be reading the score or possibly playing something to get to the level of intimacy at which they can actually write more [music] – that will be a condition that the composer experiences over time. If at other times the composer can be writing and listen [via computer playback] to something they have done and that’s enough to put them back in that mind-space that they need to be in then that’s also fine. I think it’s also the responsibility of the composer to use their tool in a responsible manner that they know is conducive to their creation. So if they choose to be lazy and think ah, well, I can’t be bothered playing this or maybe they can’t play it because they simply don’t have the skills, and that effects what they compose then that’s their responsibility.

But then you might say, but what about people who never had the opportunity to do that [learn an instrument] in the first place?...that’s an interesting one. Although I think, even when I read something or listen to it there are different degrees of awareness or different states of concentration and that’s going to change. So we certainly have this tool that accelerates the ability to review, to revise, to drill down on things that you’re doing. But...[recording stopped momentarily]. So even though we have these tools to allow us to work this way, there’s still a human factor which actually influences whether the tools have been effectively used or not.

CW: There’s quite a startling similarity between using Sibelius and watching television, in a way, in that you have this visual representation, sound feedback and we’re told that when people watch television that they maybe start generating certain brainwaves...

MA: I totally disagree with that. Television’s a passive medium and using the computer where user input is invited and immediate it’s completely different: you don’t have the opportunity to feedback to television yet. When television changes so that you can feedback to it, you can make your own input, then it becomes different, so I disagree – I don’t think the brain activity that you go through watching television and the brain activity you go through using any kind of application, even if it’s a game is related at all.

CW: I see your point. I sometimes find myself, though – and this is possibly just an exposay of my personal weaknesses – after a long day of composition when maybe I’m not so fresh that the P and O buttons [the buttons that activate “play” and “stop”] become like some kind of remote control and large tracts of music get listened to over and over again until I realise I’m not engaged with this at all: it’s just like watching TV...

MA: Maybe it’s because computers are giving you the ability to work for longer periods and you actually experience fatigue – I mean, what would happen to a composer writing by hand? – they wouldn’t be able to do it any more and they would go off and do something else. This is the same phenomenon that exists with people working in offices with computers: the work is constantly in front of us and the work is still “live,” so to speak but whether we’re actually doing anything useful or not after the eighth hour or after the sixth hour or the fourth hour...is debatable.

- CW:** So this is more a general issue of computer technology in any work-sphere at all.
- MA:** Yes: it can lengthen the mental span, but once again the human factor falls into it: if the span's too great for the mind to work with you could get composers ending up working in a state that perhaps they shouldn't be, where their minds have been numbed, they're too tired and then you could relate it to television watching when people's minds are generally switched off – then maybe the output result is not good. (Or maybe it is good, but it's just by chance).
- CW:** I've been reading a lot about technological determinism and the degree to which humans are aware of the relationship they have with technology. On the one hand, people might think that technology is transparent and that whether we use computers or not the task we're doing is essentially the same as if we weren't using computers so, in the case of composition, the music we write is going to be exactly the same whether we use computers or not. On the other hand, there's the cultural belief that technology is the way ahead, we should embrace it, we shouldn't think too much about it or its impact on us and just accept the direction it takes us in. So clearly neither of those situations are good or healthy. To what extent do you think that users of Sibelius are aware of this situation [arguments about technological determinism] and the need to maybe question the direction the software takes them in and constantly be vigilant about its effect on them.
- MA:** I've been lucky enough to have talked to, worked with and asked people what sort of tools they want in music software all over the world and I think that what you just said is actually being reflected in kaleidoscopic fashion amongst all sorts of people...I don't think many people have actually taken the trouble to look at it from the perspective you're looking at it from – from a theoretical or abstracted point of view where you're looking at the whole picture. I think most people, probably, if they stopped to asked themselves "what am I doing?", they'd probably realise they're representing a small piece of that at any stage of their working method.
- I think that as far as technology, whether it should be embraced or not in music, well...it always has. Music itself...[recording halted briefly]. The very first music was the result of a technology. Every technological invention throughout history – not every one, but – so many significant inventions have had an impact on music, and different parts of music. Do people question it, at the time? When the piano was invented, did people question it and its relevance to musical composition? Or did people just embrace it, compose and look back and say, "oh, look what we've done!"?
- CW:** ...probably...
- MA:** ...so I think that music software itself is as significant a technological entity as that [the piano] was at the time.
- CW:** Oh, I agree completely.
- MA:** They've definitely embraced it because it makes their life, what they want to do easier. So when people are doing things in a way that they find easier the question is do they do more – do they output more rubbish or is it of higher quality?...
- CW:** And how do we gauge that? [the quality of output with computers]

MA: Exactly...

CW: *I'm not sure!*

MA: Well, that's a deep philosophical question. You could argue that, OK, there's all this great stuff out there – music of high quality that's being produced more often, but I don't think that's necessarily the case, because you have to work at a very high level to be able to do that and when you work at that level you're actually beyond the level of your tools anyway. I don't think that Sibelius itself, or any music software programme, actually has lifted the standard of what's possible because I think, one way or another, composers and musicians have been brilliant enough over the years to be able to succeed against the technological odds they going to have to produce [great] things. So we have standards which are already beyond...[beyond benefiting from the help of music notation software].

CW: Do you think Sibelius helps the more *average* kind of composer to maybe excel beyond their abilities?

MA: I think it [music notation software] does, I think it invites more people to learn, to become aware about what composers are trying to do – I think that's good. But I think it's a mistake to say that that it's going to result in, say [by way of analogy] athletes who are going to jump over higher poles...

CW: As a Sibelius developer...or, the company as a whole, are you, in making the software, conscious of the need not to, maybe, *influence* the way people compose by giving them certain tools that might be *suggestive* as to what they should do?

MA: My perspective is that the basic function of the programme is to have an easy to use environment in which to notate, to input music into an electronic environment where you can listen to it, edit it, and play it back and print it out – these are the fundamental things. And then when you get past that, the reason it's been successful is that it's the way that that whole architecture is designed – that it's transparent enough that people who are wanting to do those basic tasks can do so without feeling that they're having to wrap their heads around someone else's *system*.

And when you look at other programmes out there, especially notation, that hasn't always been the case because music notation software has been a reasonably long time in coming – I was using music notation software 16, 17 years ago and I spent more of my time worrying about trying to understand this tool that was designed to move a whole bunch of things some place – were my computer settings such that it would slow the whole thing down? - why wasn't this thing drawing [as it should]? - ...and when that [difficulties with the interface] happens you forget about being creative, you forget about composing and all of that, because that's when the technology, unfortunately, makes you lose. And so, Sibelius itself was successful in overcoming those barriers to a point where people who wanted to compose could look at a manuscript on screen and feel as if they were engaging with it in [the same] way as if they were engaging with a piece of paper.

So essentially [what was happening was that one was] synchronising the electronic world to the physical world. So that's one aspect of it [and one which] *didn't* influence composers: if your technology is undeveloped or not mature enough you're going to

influence people using the technology in a negative way where they find it's a struggle to do the normal things and therefore [they will] do less and have a bad experience. Then they're better off not using the tool.

In the early days I think you'll find that people who are older now are very averse to it [MNS]. Their opinions are very justified because those sorts of people have been at the forefront of things for a long time and they were embracing new things, they were embracing new technology – the whole avant garde movement that they went through - they embraced all those things. But then you come to this computer technology that's going to help us out with notation it doesn't really work yet, it's really hard, it's going to take twenty years before it becomes useable and I can't blame those people at all for thinking that way. So, what's happened over the last 15, 20 years is that it [MNS] has matured – it's gotten to the point where you can just use the programme or some other programmes without slowing down your creative thinking.

I think sequencing programmes are still, even though they've evolved to a very high level, they are still probably more guilty of influencing people's composing decisions than notation software. Notation software by the very nature of its abstraction through notes rather than working with graphical shapes which you immediately manipulate to make sounds – you actually have to engage at a higher intellectual level with it for it to be able to work.

CW: ...you have to have prior knowledge [notated music literacy]

MA: Although there are probably lots and lots of people who use sequencers (and I myself am a big sequencer user – I use sequencers more often than anything else) who will probably really hate me for saying that...But, I just think that working with notation and even with a limited amount of musical space on view means you've got to do a bit more planning.

The other level that we haven't discussed about this is that now the baselines [the usability of the software is sufficiently developed] have been established, then you get to the point about rhythmic compositional aids. If you look at some of the plug-ins that have been developed, most of those came from the users and we want those things. They became popular and widely used and wanted enough that eventually they found their way into the programme. In the future, if you look at some of the other programmes developed here that are very popular in schools, there's Compass: one of the core things inside that is compositional algorithms so people can work with a motif and then retrograde and invert it and drop other objects on the motif and make musical morphs and all that sort of stuff. This is where technology has a direct influence on actually what the output...

CW: ...actually *generating* material.

MA: ...whereas sequencers have both that benefit and that disadvantage as well. You could say OK, let's take a programme like...one of these loop-based sequencing programmes. Fantastic – you can achieve an awful lot with it but then, you could be stuck in the problem of, oh, but I'm also limited to the wallpaper that I've been provided with. Does that help?

CW: Yes

- MA:** I hope people don't shoot me down for...I'm not trying to be averse to...
- CW:** Oh, I think that's quite clear. And we both know there are people out there who use sequencers to incredible creative ends. John Psathas for instance – what he does is quite mind-boggling really.
- MA:** Yes and he uses Logic. I tried to suggest to him to use Logic for about eight years before he actually adopted it and he would probably say that it's so transparent to his thinking and working that he doesn't even regard it as being able to influence his composing in any way.
- CW:** He probably would say that, yeah.
- MA:** Then Logic's a different kind of programme. It offers a large structural view and it has powerful enough notation to be able to work with – it's great. But, there are a lot of people out there who can't deal with the other abstract layer that is the container the sequencer uses – we talk about the ... and the graphical structuring of music - not using notation – some people just find that as being a sort of ... film between them and the music. Some people find it no problem, I mean, I grew up with it and it's just fine. But especially people from the performing world, of which a large number are composers and more and more so these days they find that abstract layer harder to break through because their whole experience of music has been from the point of view of the instrumentalist: reading music, playing music and then perhaps making notes from bits of music so that's part of the reason why they find using a notation programme so immediate because it's, "oh! – that's just what I was doing before."
- CW:** What sort of feedback from more the "art" music community (whatever that is) – I'm talking about people writing new music for old instruments, pushing the boundaries for the concert stage, generally. I'm assuming these people aren't the core customers of Sibelius?
- MA:** No – sometimes we'll come up with an idea – our team here – which might be some fantastic new notative possibility for those kinds of people. Often those things don't have any real general-purpose application. And because we're a company, our team is here because enough people want to use and own the programme that it makes it impossible for us to [unintelligible]. So we have to make some very difficult choices sometimes. Most people here are music graduates – just about all the developers are from various backgrounds – there are some doctors in music here, there are people from different countries who come from different academic backgrounds. Most of those people are sympathetic or engaged with the art music movement. So there is no shortage of wishes internally for us to be able to have these extra features, or more powerful features...
- CW:** ...but the commercial reality is...
- MA:** ...as well as the academic part of it or the art music part of it there's also the engraving role and the kinds of demands those people [engravers] have. But the commercial reality is...interestingly enough the largest number of people who use Sibelius in the United States are band leaders. So they use it for composing and arranging and printing out their band scores. But the largest segment of people, probably the largest chunk of people on the planet who....so, very different needs...and in England there isn't such a

culture (and in lots of other countries there isn't such a culture) [of band music] and England is the largest world market for Sibelius because of the number of schools here.. But the band culture is not the same. So we find ourselves at constant odds trying to work out ways we can help those people to do their thing,

Nonetheless, as the programme advances forward – 4.1 has just been released, Sibelius 5 will come out some day and so on, as all these programmes do, more and more of these things are slowly happening.

CW: I don't think that people in *my* kind of immediate circle...with Sibelius and also with Pro Tools for the electroacoustic composers, Pro Tools not having been developed for them specifically but for pop music... But there are ways around any perceived limitation and people make good anyway...

MA: ...they're just frustrated, that's all. For example, composers always used to say, "I want to be able to notate two meters at once" and there is no programme that I can think of that lets you do that yet

CW: But if you can imagine it, you can fake it

MA: Yes, but wouldn't it be great to *really* be able to work with it?

CW: If that's your cup of tea, I guess then yes...

MA: Well, these are the kinds of requests that people have, or have had.

CW: Yes, I've heard that one myself. In recent years you've established www.sibeliusmusic.com where people can send the score they've made on Sibelius to be, kind of, *virtually* published and they can have their own pages where their scores are listed, where people can download them and listen to MIDI playback of them. It's quite a groundbreaking method of disseminating one's music and I think to an extent maybe the music is becoming less of something that live people play and to an extent is becoming [*about*] MIDI playback and that [situation] is approaching some level of acceptability [acceptance] as [being] *the music*. How do you view that as a cultural shift?

MA: It's ironic that if you think about the number of composers there are now – and the fact music had to be [at one time] something to be performed – and now people can write a piece for orchestra and never have it performed by an orchestra but still have a fairly good idea of what it will sound like [through listening to MIDI playback]. I suppose it's a good thing and also a strangely existential thing to me because...to think you'd spend half your life composing in a room and the only rendition of your work would be something that you'd hear using computer generated sounds...[it] could be a bit disappointing. From my experiences when I was a composing student, the most enjoyable experiences were always when I went from that stage of taking the music from the score to working through the performance and discovering more about the music than I could have imagined by working with the performers. But then again there are people who get pleasure and meaning out of life by being able to compose and who might not necessarily have the ability or connections or contacts to be able to get their music performed by real performers. I think in that case it's a wonderful thing.

So you can look at it from two directions: from the top down, or the bottom up. People who don't have the opportunities but still want to be engaged in music – that's great: technology gives people the ability to have another life that they might not have had otherwise. I've also seen huge numbers of people involved with music who are disabled. Handicapped people, sometimes mentally handicapped people as well and technology has offered them really great life experiences – I'm a great supporter of that.

And from the top down, well, you could be negative and say, well that's an excuse for real music, which is terrible, or you could say, well, it might help people to be able to have a version of their work which they can play to performers or to prospective musical groups who would play the music and they might make choices based on that. It might be easier to receive a file by e-mail and listen to it using their iTunes than it is for somebody to sit down and find the time to read a score. So, there are plusses and minuses.

CW: Sibelius is more and more coming out with software packages that are kind of add-ons to the main notation that provide increasingly realistic playback experiences...

MA: ...I've heard some recently and I'm pretty impressed myself! – and it's gotten to the point now that, with my knowledge of, [for instance] orchestral music I think that yes, that's telling me enough to know whether this piece is worthy or not of going further and perhaps having a live performance.

CW: It's inevitable that, some time in the very near future, composers will have the ability to create something that is pretty much indistinguishable from the real thing and this opens up...

MA: ...I don't think so.

CW: You don't?

MA: If that happens, it's going to be several years away and with huge amounts of work still involved...

CW: ...there are infinite parameters that need to be tweaked by the composer to...

MA: ...well something that we've talked about is that no matter how many sounds you have, it's not just the sounds, it's *how* they're played.

CW: Yes

MA: So, that's an area that needs to be addressed more before the playback can get to a realistic [level] and if you think about what computers can do now and the infinite possible ways a performer can approach playing a sound then there's still going to be an incredible gap. Arguably you could say, well yeah, what about the people out there who used to rave on about hi-fidelity and now everybody listens to iTunes and iTunes' audio quality is relatively low compared to what people were until recently more accustomed to. I mean, we listen to music through computer speakers much more often than we used to and it just seems that hi-fidelity equipment isn't as readily available or wanted anymore.

You go down to the places that sell this sort of stuff and you'll find everyone buying these bookshelf-sized stereo systems which don't reproduce sound accurately at all, but that's just become the norm. So...it's a challenge...

CW: Now, this is something that's quite close to your heart: you recently came out with Sibelius Instruments, which is kind of an encyclopedia in a way which details the instruments of the orchestra and many others besides, their technical limitations and what they sound like...

MA: ...I started working on it in 1998

CW: Really?!

MA: So, for about 5 or 6 years I was into that.

CW: Obviously, there are many educational benefits to it... There's a perception in the composition community that anyone can just pick up Sibelius and they don't have to have any prior knowledge of the technical limitations of instruments and the players. Was the creation of Instruments partly a response to that kind of perception?

MA: My first motivation for that was to be able to give student composers any easy way of understanding what they were actually writing. In 1998 we didn't have Instruments built into Sibelius and that sort of thing and people were writing things, often with little knowledge of the articulations and various instrumentative techniques...[and their] effect in the music. And I thought, well, the best way to do it is just to hear it and to see it – I mean, you can make choices in a more educated fashion about it so that's why I set about doing it. It turned out to be a problem that many people were experiencing, especially in teaching so it became popular for that reason. Nowadays it's becoming possible to...not quite possible yet, but hopefully in the future it will be – to actually start to use those techniques and to write for instruments directly – that was always the nirvana and hope in Instruments, OK, - it achieved a very clear goal in being able to be something that people could use as a reference tool to find out and therefore to be able to compose better music.

The next step is to be able to use that information dynamically so we can write and hear immediately, but that involves massive sample libraries and also special types of performance information to be generated by the programme you're using – Sibelius for example – to be able to talk to that sample library. That's going to take a lot longer, but in the meantime, Instruments certainly fills the mental gap in many areas, for example, showing bowing techniques and what the effect's actually going to be, which is going to be useful for a very long time because string samples and actually performing them on the computer still remains very elusive...

CW: ...strings especially!

MA: Yeah – what does marcato really sound like? – oh, it sounds like this. Oh OK, maybe I shouldn't be using it, maybe I should be using jeté instead – you see? I don't know of any programme at the moment which lets you define [the difference between] marcato and jeté, so...a human being still needs to be involved. The intention of Instruments was

to make a living encyclopedia, in a way, of musical instruments. We'd love to go much further...

CW: So the effect is really quite humanising.

MA: Yes, and it's been quite popular as a teaching resource because you see, for instance, the note notated and you hear real people play it – that's one of the really important qualities of it. So it was a really fun project to work on, that one.

CW: And has a long way to go, potentially.

MA: You could go on a long way with that project, yes

CW: And this kind of brings me to the last question, which you may not be that keen to answer [in deference to commercial sensitivities], but what do you see as the nth degree of music notation software?

MA: Well, I think we've talked about many of those things already: the issue we were just dealing with now and it's going to take time – it takes armies of people to be able to build engines that can talk to sample banks and which can play back in even more accurate fashion than what's already been done. When you think about what was there three years ago and you think about what's there now, it's quite a jump.

CW: Yeah, it's huge!

MA: But, the amount of time and effort and money that's gone into developing those things is pretty significant and...it keeps happening and it's going to be great: people will have more useful tools. I think, going forward, more tools that let people experiment with compositional *ideas* in an intellectual sense, is going to be something that will appear more and more. Because nowadays, as I've said, the baseline's been established and there's this ability in the programmes and it's more a matter of OK, now we can do this, now let's try out some of these things that we've always wanted to be able to do in the software.

If you go way back into the dim dark depths of the past when composers first started using computers, those were the sorts of things they were doing, but the graphical and audio representations of those things were very very basic, but they were realising those ideas...mentally, at least by seeing the computer spurt out a couple of numbers which said, "here is your motif that's had this done to it" and so on. But...the graphical power of these programmes, the environments and development environments has increased so much. We were talking about features used today...which we visualise where you [unintelligible] work with a note motif and you apply different techniques to it and you see the notes move in real time - it's kind of fluid. Or, an engraving tool where you can set up properties of a note that don't have any symbols – it might be attached as you move through the score and other things actually move out of the way...These are things that are becoming feasible and possible. But they wouldn't be possible...and they are graphically possible and have been for a long time, but these things have to have a real musical intelligence built into them, which is what makes it so challenging. And that's the work that's happened over the last decade to make that platform available. I mean, we wouldn't have so many different software applications available now if we didn't have

operating systems and work on the top of and those, they're the most complex things of all.

CW: So the ideas are there, it's just a matter of waiting for everything to catch up...

MA: The other thing is, the web...is at a phase where people are using [it] more than ever...especially in education, where it's very very powerful and it offers the opportunity to be able to use a tool, match it to some kind of content in a much more dynamic fashion than what was possible before.

So, to sum it up: increasing accuracy of playback, more powerful composing tools...tools that are available for people if they're in a mental state to use them! – and a deeper connection or stronger connection to both learning and resourcing.

CW: Great....and I will look forward to using that software!

MA: Is that the end?

CW: Well, yes – thank you.