

CHAPTER 4:
FOUR INTERACTIVE ELECTROACOUSTIC WORKS FOR CLARINET AND
OBSOLETE TECHNOLOGY: AN OVERVIEW

The four works I am analyzing for this study present examples of works that make musical and idiomatic use of interactive electronic technologies that were once considered “cutting edge” but are now, within twelve to thirty years of their creation, relics of technological history. I would hasten to point out the obsolescence of the technology is not the same as obsolescence of the music itself. I have undertaken this project in an effort to separate the musical concepts employed by four very different composers from the ephemeral technologies with which their works were first implemented. Each composition considered in this study presents a different use of electronic technology for sound manipulation and generation and for human-machine interaction. The following is a brief summary of the technology employed in each work and the problems involved in its performance realization.

Thea Musgrave’s *Narcissus* is notated very specifically for a now-obsolete digital delay system, a Vesta Koza DIG-411. This fact causes ambiguity when the directions in the score are applied to other equipment. Several authors have discussed the use of technology in Musgrave’s *Narcissus* and the practical issues involved in performing it. Diane Boyd presents a thorough analysis of the dramatic aspects of *Narcissus*, and the impact of the Narcissus story on the compositional process and use of digital delay.³⁸ Patricia Spencer, a co-commissioner of the work, has described the musical integration of

³⁸ Diane Boyd, “The Dramatic Aspects of Thea Musgrave’s *Narcissus* for Solo Flute and Digital Delay (1987),” DMA Dissertation, University of North Texas, Denton, TX (1996).

technology and the effect of technology on Musgrave's compositional process.³⁹ Bruce Bullock and Ron Burns describe an actual performance realization of the clarinet version of *Narcissus* using their own digital delay processor (essentially a transcription for the DigiTech DSP-256 XL, now obsolete).⁴⁰ While these articles provide helpful insights, none provides a systematic and thorough explanation of the digital delay effects or their implementation.

Bruce Pennycook's *Praescio IV* is part of a series of compositions written between 1989 and 1993 at McGill University, using his custom-designed "MIDI-Live" interactive computer music system.⁴¹ Since that time, the MIDI-Live software has fallen out of use and any new performance will require updated software. To date, no formal analysis of the processes or musical functions executed by the software has been published. Pennycook has provided invaluable assistance in understanding the interactive system and has also provided a completely new and updated version of the central parts of the interactive system software for analysis and performance.⁴² However, critical systems for live controller input (including pitch tracking) and sound output via synthesizer are still left to the performer.

Jonathan Kramer's *Renascence* (1974) originally required an extremely complex tape delay system for live processing of the clarinet. In 1977, the composer made a

³⁹ Patricia Spencer, "The Musical Shape of Technology," *The Flutist Quarterly* 19, No. 3 (Spring 1994): 47-51.

⁴⁰ Bruce Bullock and Ron Burns, "A Performance Realization of Thea Musgrave's *Narcissus* for Amplified Solo Clarinet and Digital Delay," *The Clarinet* 22, no. 4 (1995): 48-49.

⁴¹ Bruce Pennycook, "Machine Songs II: The *Praescio* Series – Composition-Driven Interactive Software," *Computer Music Journal* 15, no. 3 (1991)

⁴² Bruce Pennycook, email to the author, April 5, 2003.

simplified version for clarinet and pre-recorded tape in order to facilitate performances in the absence of the required equipment. This revision was later updated in 1985 with a better quality tape. The composer has maintained that the original 1974 version is preferred, although he admits that performance with the tape delay system was never completely satisfactory in actual practice due to the overwhelming difficulties in keeping the tape delay system synchronized and stable during performance.⁴³ At Columbia University in 1998, Kramer supervised a digital recreation of the tape delay system for a single performance by clarinetist Jean Kopperud. In my correspondence with the composer on this issue, he has indicated that the accuracy achieved in the digital version far outweighs the value of any interesting sonic side-effects of the original analog version and that digital recreations of the delay system are the preferred strategy for any future performances. The original 1974 score includes copious technical notes describing the setup and control of the analog tape delay system. Although these notes make it very clear what the electronics are supposed to achieve, some translation is necessary for reconstruction with a digital system. Furthermore, an accompanying pre-recorded tape is required for performance. Kramer created the original tape, based on recorded clarinet material (provided by Phillip Rehfeldt), in 1974 using analog equipment. Although the original 1974 pre-recorded tape is still available, my analysis includes a complete explanation of the composer's method for its realization. This is intended as a guide to performers who wish to recreate this portion of the electroacoustic system using digital technology and their own clarinet playing as sound source material.

⁴³ Jonathan Kramer, email to the author, January 4, 2004.

Cort Lippe's *Music for Clarinet and ISPW* was written for a system that is no longer in use or manufactured (NeXT-based ISPW processor and Max/FTS software). No generalized analysis of the work exists so far.⁴⁴ Published articles that mention this piece and the ISPW system for which it was developed such as those by Lippe and Miller Puckette are concerned primarily with the technical details of the signal processing software (Max and FTS) and not with the actual musical processes, events, and interactions contained in the score.⁴⁵ My analysis of this work is an attempt to systematically describe all of the synthesis and signal processing algorithms and interactive control systems in general terms that could be translated to alternate computing platforms. The composer has provided me with a current implementation of the interactive system software translated to the Max/MSP software environment. Lippe has also provided invaluable assistance in understanding and explaining the extremely complex inner workings of the performance software and the synthesis and signal processing algorithms it is designed to implement. Due to the extreme complexity of several of Lippe's signal processing modules, general descriptions are given in the text and detailed block diagrams of each signal-processing instrument are included in appendix C.

⁴⁴ Cort Lippe, email to the author, March 27, 2003.

⁴⁵ See Cort Lippe and Miller Puckette, "Musical performance using the IRCAM Workstation," in *Proceedings of the International Computer Music Conference*, (Montreal: McGill University, 1991), 533-536; Miller Puckette, "Combining event and signal processing in the Max graphical programming environment," *Computer Music Journal* 15, no. 3 (1991): 68-77; Miller Puckette, "FTS: A Realtime Monitor for Multiprocessor Music Synthesis," *Computer Music Journal* 15, no. 3 (1991): 58-67; Miller Puckette and Cort Lippe, "Score following in practice," in *Proceedings of the International Computer Music Conference*. (San Francisco: International Computer Music Association, 1992), 182-185.