1993

The International Computer Music Association 1992 compact disc and HyperCard stack

Edward Russell Tincher
San Jose State University

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**The International Computer Music Association 1992 compact
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Tincher, Edward Russell, M.A.

San Jose State University, 1993

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THE INTERNATIONAL COMPUTER MUSIC ASSOCIATION 1992 COMPACT
DISC AND *HYPERCARD* STACK

A Project Report
Presented to
The Faculty of the Department of Music
San Jose State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Edward Russell Tincher
December, 1993

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APPROVED FOR THE DEPARTMENT OF MUSIC

Professor Allen Strange

Profesor Daniel Wyman

Professor Dwight Cannon

APPROVED FOR THE UNIVERSITY

M. Lou Lewandowski

ABSTRACT

THE INTERNATIONAL COMPUTER MUSIC ASSOCIATION 1992 COMPACT DISC AND *HYPERCARD* STACK

by Edward Russell Tincher

The author coordinated the production of *ICMC '92*, a compact disc for the International Computer Music Association 1992 Conference. Following the conference, a computer application, entitled *ICMC '92 CD Stack*, was developed using the Macintosh *HyperCard* authoring language. The application uses the compact disc as part of an interactive environment that displays text, graphics, printed music, and other information while the audio program is playing.

This project description includes a copy of the compact disc as well as the computer application on floppy disc media. It also includes a description of the production of the compact disc and a printout of the computer application with annotations.

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CHAPTER 1

Introduction

This project is the product of a year's work in two endeavors, both of which involve the production of a compact disc commemorating the 1992 conference of the International Computer Music Association at San Jose State University.

First, a selection of recorded compositions was compiled for mastering the CD. Artwork was created and printed and the final product, *ICMC '92*, was manufactured and distributed to over 500 conferees in San Jose during the conference in October 1992.

Second, an interactive computer application was developed with the *ICMC '92* CD as its subject matter. This computer application gives the listener more information about the CD than what is available from just the written material included with the disc. Furthermore, the computer application was developed to demonstrate that production of such an interactive application is not necessarily prohibitive from a cost or technical standpoint, and could become a useful tool in music education. This application, the *ICMC '92 CD Stack*, was presented as a paper with Allen Strange as a co-author to the 1993 International Computer Music Association conference in Tokyo, Japan, and has been widely distributed among members of the International Computer Music Association.

The purpose of this paper is twofold: 1) to describe the production process of the *ICMC '92* CD; and 2) to replicate the *ICMC '92 Stack* in print with annota-

tions. The best way to experience both the CD and the accompanying application is, of course, within their original media. This paper will not do complete justice to the project unless the reader also listens to the CD and uses the accompanying application on a computer. The author can transcribe only a limited quantity of the interactive application into a traditional written format, therefore it is highly recommended that one takes advantage of the accompanying materials for a complete perspective.

CHAPTER 2

Production of the *ICMC '92* Compact Disc

In October 1992, the annual conference of the International Computer Music Association (ICMA) was held at San Jose State University. The ICMA, an organization for performance and research in computer-based and assisted music, holds a week-long conference at a different international location each year. Intense schedules of meetings, seminars, and concerts succeed in bringing together a truly diverse group from academic and performance communities in contemporary music.

As the hosting institution for the 1992 conference, San Jose State University provided planning and coordination of the conference and, along with the published proceedings, this commemorative disc. *ICMC '92* is an anthology of works submitted to the ICMA by composers and selected by a panel of ICMA board members as outstanding and representative of contemporary computer music.

More than 350 compositions were submitted to the ICMA in 1992 for consideration by an international jury appointed by the board of the ICMA. Members of the jury, an international group of recognized computer music composers, reviewed thirty-two 90-minute cassettes during one month and rated the pieces on a scale of one to seven in order to establish a working list of potential pieces for inclusion on the CD. The jury then met in San Jose for a weekend in April 1992, and following extensive discussion, developed a final selection of seven compositions. The jury created the final list of selections on the basis of quality

of the compositions, availability of the digital master, and, in an effort to reflect the international demographics of the ICMA, the composer's country of residence. Following the jury process, the author was given the task of compiling and mastering the selections for manufacturing, as well as coordinating and overseeing the creation of accompanying artwork for inclusion with the CD.

There were three phases in the production of the CD:

- 1) Determination of the elements to be included in the product and the general production format.
- 2) Pre-manufacturing production work.
- 3) Manufacturing and delivery.

Determination of Elements To Be Included in the Product

The most obvious element for inclusion was the music itself, which came to the ICMA in the form of digital audio tapes (DAT) from around the world. Although the same basic format was used by all composers, some critical technical differences existed between the individual tapes, the significance of which will be discussed below.

A secondary element to the CD was the accompanying booklet. The author began working with ICMC 1992 staff artist Stacey Sawczuk on ideas. Ms. Sawczuk, a graphic artist and recent graduate of San Jose State University, designed the poster and conference booklet for the ICMA, thus she was able to lend important continuity to the CD.

The budget allotted for the project was relatively minimal for such a production. After checking prices for various "alternative" formats for artwork, such as a poster fold-out of the inner booklet, or even a CD-Rom interactive format, the decision was made to produce a sixteen-page booklet with limited colors. This booklet would consist of program notes regarding each composition as well as biographical information on each composer. Several ideas for the CD cover and art for the CD itself were developed and prepared for submission to the ICMC 92 committee for final approval.

One of the most challenging aspects of this part of the project was working within the parameters of a budget of \$3500.00 for 800 CDs. Provided by a grant from the CAERE foundation, these funds were sufficient to carry out the project, but not without careful consideration of all costs. Thus it was important to have an idea what the total manufacturing costs for the product would be before production. After research with vendors nationwide, the following budget was developed:

CD Manufacturing including final mastering (800 copies)	\$2000.00
Booklet Printing (2500 copies - the minimum order)	\$1200.00
Art Work Separations, etc.	\$ 300.00
	\$3500.00

Pre-Manufacturing Production

The ICMA 92 Conference took place in October 1992. All materials necessary for preparation for manufacturing of the ICMC 92 CD were available by May 15, 1992. On the basis of the information received from manufacturers, it

was determined that manufacturing of the final product would require about four weeks. Thus, to allow for a margin of safety, the following production schedule was established:

- May 22 - All biographical/informational copy complete.
- May 29 - Finalize printer/CD manufacturer.
- June 1 - All master DATs delivered.
- June 15 - Artwork concept and form decided
- June 22 - Artwork conceptualization/1st draft complete - ready for submission to ICMA Board.
- June 29 - Artwork/separations completed and ready for press. CD master tape complete approved by ICMA.
- July 1 - Artwork goes to press.
- July 22 - Artwork/CD go to manufacturer.
- August 12 - Delivery of product.

CD manufacturers will not begin production until all artwork is complete and at their factory. This way they can manufacture the CDs and collate the final package while avoiding potential confusion regarding packaging the CD with the proper packaging.

The next step in preparation was the mastering process. Mastering, the last audio aspect in CD manufacturing, includes sequencing the selections in the order desired for the final product, balancing levels between selections to assure that they all have the same basic dynamic range, and generally completing any broad audio “touch-up” work that might be required before manufacturing.

Until the late 1980's, audio mastering was the domain of mastering engi-

neers, who were among a small, elite, group of audio technicians with experience in cutting master lacquers for record manufacturing. Their profession involves a highly discriminating ear along with advanced technical skills in final preparation in the product. Before the advent of the compact disc, lacquer preparation for long-playing records was done on a lathe and the technical tolerances were very narrow. If a mastering engineer allowed music that was too loud for normal specifications to be cut into a groove of a record, for instance, the final product could skip on a consumer phonograph player. Although much of the mastering engineer's work is subjective, the mastering process is the last step in audio production, and can have a major impact on the final product.

Digital audio production brings enormous changes to not only the process of manufacturing, but to the mastering and preparation phases of production. The personal computer, especially the Macintosh, puts desktop audio production, like desktop publishing, into the hands of anyone willing to learn the process, as the resources needed are significantly less than previous modes of audio production. A danger in this democratization of technology, of course, is that the product can suffer without the trained expertise of someone who has been involved in audio production for many years. Just making tools available does not guarantee high quality results.

For the *ICMC 92* project, the Digidesign *ProTools* hardware system was used on a Macintosh platform with Digidesign's *Sound Designer* and *MasterList* software. The process involves the digital transfer of the DAT tapes into the hard disk of the computer, editing of the sound files for length and any signal processing necessary, sequencing the sound files, and the final transfer of the files back to DAT tape for delivery to the manufacturer, who prepares the glass CD master for manufacturing.

Most of the DAT tapes submitted by the composers for the *ICMC '92* CD were recorded at 48,000 samples per second, and an important step in the mastering process was converting the musical product to 44,100 samples per second, the sample rate for consumer CDs, without discernible loss in fidelity. These composers recorded their compositions on semi-pro DAT machines, which, because of manufacturers' fears concerning digital copying, only record at 48,000 samples per second. Since digital copying between machines can only be made when sample rates correspond, a DAT tape made at 48,000 samples per second cannot be digitally transferred into CD format without some form of conversion. The goal of CD manufacturing, and digital audio in general, is to preserve the digital format of the product for as much of the production process as possible. Analog transfers of audio information have the potential of distortion and breakdown of the original frequency structure of the music, thus it is avoided whenever possible.

There are algorithms available within the software for digital sample rate conversion, however, they are by no means perfect, and often unpleasant scratching noises, known as "artifacts," remain, leaving an unsatisfactory product. A few very expensive digital conversion units exist, but access to them is limited, and they were outside the budget of this project.

The only other method of sample rate conversion available was to play the tapes through the digital-to-audio converters on the best DAT machine available, and then bring the material into the computer via the Digidesign analog-to-digital converters at a sample rate of 44,100 samples per second. The Digidesign's *ProTools* system has an audio-to-digital signal path that offers high quality conversion but, through a fortunate set of circumstances, some of the best convert-

ers available were found for production of this project.

During production of the *ICMC '92* project, the author was also involved in the production of a CD for a client in Los Angeles. While working at Capitol Recording Studios, one of the best recording facilities in the world, two Mitsubishi X-86 open reel digital tape recorders were made available to the author during off-hours. The X-86, an expensive machine, features some of the best analog-to-digital converters available, and performs analog sampling at twice the normal rate (88,200 per second) before internal conversion to 44,100 per second format. The X-86 was used as a sample-rate converter only for transfer into the Macintosh. Thus, a DAT tape was played through the digital-to-analog path of the DAT machine directly into the 88,200 per second analog-to-digital converters of the X-86. Then, the digital outputs of the X-86 were used to make a direct digital transfer at 44,100 samples per second into the *ProTools* system. During the transfer process, direct audio comparisons were made of the pre- and post-converted product, and there was no discernible difference.

In most production circumstances, this type of analog-to-digital conversion would have been financially prohibitive. The management at Capitol was unusually flexible in allowing use of their machine for this project and the sample-rate conversion was accomplished in a satisfactory manner. Of course, had the original DAT tapes been recorded at 44,100 samples per second, the entire conversion process could have been avoided.

Another problem encountered in the transfer was the difference in relative volume levels between the tapes. Professional digital recording techniques call for full usage of the sixteen-bit architecture of DAT by establishing peak volume levels at the highest levels possible and the standardization of those levels for

other engineers to work with by means of reference tones before the audio material. Through this method, the engineer can determine the nominal audio level of the selection and calibrate recording equipment accordingly. Again, due to relative inexperience among the artists involved, the DAT tapes received by the ICMA did not have reference tones and were, in fact, of very different nominal levels. In order to achieve the highest resolution possible in the 20-bit architecture of the X-86, the material was recorded into *ProTools* at the highest levels possible, although sometimes it took a few attempts to find out where the dynamic peaks in the performances were and adjust the overall recording level accordingly.

Once the audio information was in the Macintosh in the form of audio files, final editing took place, which involved going through each selection and clipping the beginnings and endings to their exact lengths, so no other extraneous noises would be extant, and listening for unintended audio problems or artifacts from the recording process. Since, at this stage, the audio is in stereo format, there is really not much that can be done to change the sound except for very basic equalization or volume changes. Generally, the program material was left alone out of respect for the production values of the individual artists. However, in one case, Jean-Claude Risset's *Echo (for John Pierce)*, some digital equalization within the *Sound Designer* software was utilized in order to eliminate some analog tape hiss that was apparent from the original recording process. Similarly, in Roberto Morales' *Nahual II*, the level of some specific passages that were in danger of being too soft for the surrounding noise on the tape was raised to within acceptable parameters. Digital audio production provides a crystal-clear trail of any imperfections in the recording process, and noisy consoles or analog tape recording systems that do not have the best noise-reduction systems available leave traces of hiss and noise that become quite apparent in the final stages

of digital production.

Finally, Mari Kimura's "*U*" (*The Cormorant*) had a brief moment of loud digital noise, probably caused by a drop-out, or bad section, of DAT tape. The noise, which was less than one millisecond in length, was isolated in *Sound Designer* and digitally excised from the program material. Then, a very short cross-fade between the two sections was applied with the result that the program now sounds continuous with no audible gap in content. The following screen shots from *Sound Designer* (Figures 1 and 2) illustrate the drop-out and the subsequent repair:

Figure 1. Kimura Waveform Screenshots Without Glitch

The top window displays a wide view of the area where digital noise was heard. The bottom window is a highly magnified view of a noise-free portion of the soundfile.

Figure 2. Kimura Waveform Screenshots With Digital Noise.

These windows display a high-resolution view of digital noise. Spikes in the wave-form correspond to noise. These spikes were edited out and program material previous to and immediately following the spikes was pasted together with cross-fading for a smooth transition. Following this procedure, there were no perceived audible artifacts or losses in the program material.

The individual compositions, now transferred to Digidesign's *Sound Designer* format, was sequenced using Digidesign's *MasterList* software, which allows for the playback of multiple audio files in a specific sequence with user-chosen gaps between each selection. The *MasterList* file (Figure 3) allows placement of the files (selections) in any order desired, adjustment of the start times and even attenuation the levels if necessary.

No.	Start Time	Name	Length	Stop Time	Atten.
1	0:-1:00:00	1kHz Sine	0:00:02:00	0:00:-58:00	0 dB
2	0:00:02:00	Degazio - On Growth and Form	0:11:41:04	0:11:43:04	0 dB
3	0:11:47:04	Kimura - "U" The Comorant	0:06:44:17	0:18:31:21	0 dB
4	0:18:34:21	Chasalow - This Way Out	0:04:25:16	0:22:59:37	0 dB
5	0:23:02:38	Morales - Nahual II	0:10:19:37	0:33:22:00	0 dB
6	0:33:25:00	Settel - Hok Pwah	0:08:10:17	0:41:35:18	0 dB
7	0:41:39:18	Risset - Echo for... (EQ)	0:05:10:61	0:46:50:04	0 dB
8	0:46:54:04	Harrison - et ainsi de suite	0:19:45:29	1:06:39:34	0 dB
9	1:06:40:33	1kHz Sine	0:00:02:00	1:06:42:33	0 dB

Figure 3. *MasterList* File

The above sequence of compositions was decided upon based on subjective opinions regarding the program material. Generally, an effort was made to separate the purely electronically oriented pieces from one another, and divide

them with the mixed-media pieces that featured acoustic and electronic instruments. Jonty Harrison's composition, ... *et ainsi de suite* ..., is such a compelling and lengthy selection that it was placed at the end, as an appropriate final statement to the CD.

After repeated review of the material and careful scrutiny of the product by means of the *MasterList* format, the entire sequence was digitally transferred to a DAT master, with the added 1kHz sine wave on either side of the program material required by the selected manufacturer, Optical Media International.

With the audio portion of the pre-manufacturing phase complete, compilation of graphic and written materials became the next priority. Ms. Sawczuk developed a layout that incorporated many of the graphic elements of the ICMC posters and brochures, along with a large amount of information. In most cases, the complete biographical and program note information submitted by the individual composers was included, edited for grammar and syntax. Compiling and proofing the copy was a two-week process, with continual interaction regarding methods of fitting all the information tastefully onto the space allotted and generally presenting a unified concept to the copy. This procedure was a challenge in itself due to the fact that it was written by eight different authors of widely varying writing styles and facilities in the English language. Once the paste-up of the booklet was complete, color separations were produced in San Jose and shipped to the Queens Group in Kentucky for printing.

Manufacturing and Delivery

Following assurance that the artwork would be completed on time, the DAT master was taken to Optical Media International (OMI) in Los Gatos, California where they prepared the final master for manufacturing. The DAT was

delivered to OMI accompanied by the *MasterList* file on floppy disk from which they extracted exact timings for the time-code encoding onto the final master. This process, one unique to OMI, saves a step in the mastering process where the manufacturer usually has to determine exact times for encoding onto the CD. The mastering software at OMI accesses the *MasterList* document for exact timings, and masters the CD without any human supervision. The 1kHz sine tones at either end of the program material are signals to the master encoding-device regarding the start and end times of the CD.

Upon receipt of the booklets and disc art, Optical Media collated and packaged the product, and the final CD was received in the first week of September, a bit later than originally scheduled but still well within the time-frame of the October conference. Finally, the total costs for production of the CD came to \$3450.00, well within the limits of the allotted budget.

CHAPTER 3

Production of the *ICMC '92 CD Stack*

The *ICMC '92 CD Stack* is a Macintosh computer application developed on Claris' *HyperCard 2.1* software. The *HyperCard* format is well known by contemporary computer users as a platform on which a multitude of applications, called *stacks*, can and have been built. The software includes its own relatively intuitive programming language, *HyperTalk*, and allows the user and developer to create programs with a wide range of uses, from address books to check-book programs, and educational displays of scientific material or tutorial programs. In addition, a large number of external command programming modules, called XCMDs, have been developed to allow the application to do tasks not originally envisioned in the *HyperCard* format.

A set of XCMDs developed by the Voyager Corporation allows *HyperCard* programmers to write programs that control audio CDs in CD-Rom drives connected to the Macintosh. The second aspect of this project, the *ICMC '92 CD Stack*, was created using the graphic and intuitive interactive capabilities of *HyperCard* along with the Voyager XCMDs to form an auditory and visual medium for explanation and description of the *ICMC '92 CD*.

The stack was created by soliciting as much material as possible from the composers regarding their compositions. The material was then compiled and organized into various modules or sections of the stack. These modules allow the user of the stack to study the compositions via such interactive activities as watching the musical score scroll on the computer while the music is playing, or reading about inspirational sources for the composition, among many others.

CHAPTER 4

Conclusions

Production of the *ICMC '92* CD, along with development of the *ICMC '92 CD Stack*, provides an example of how desktop computer-assisted audio production, along with simplified computer programming tools, allow musicians and educators to develop new methods of explaining and presenting their work. The recent abundance of commercial multimedia packages to appear on the market attests to the fact that there is strong interest in mixed media. However, many of the packages are strong on impressive graphics and attention-grabbing sounds while they are weak in content. Commercial publishers of this sort of product realize that what sells the product at this point is technological novelty, rather than qualitative content. The long-term hope for multimedia is the integration of the benefits of the technology with serious academic study.

The availability of authoring tools such as *HyperCard*, combined with methods for accessing off-the-shelf compact discs from the computer allowed by the Voyager programming modules allows artists to be their own interpreters and guides to their music, rather than just critics or musicologists. Furthermore, instructors in music history, theory, and orchestration should be able to use this methodology to present personalized versions of their subject matter without having to rely on commercial publishers. This system especially lends itself to the study of music as it integrates sound and text or graphics into one platform, with the added benefits of interactivity and self-paced instruction.

In the next several years, high quality audio production will be available

and familiar to any personal computer user in the same way that desktop publishing is now at hand. The few stumbling blocks that were encountered in production of the *ICMC '92* CD were based on the relative unfamiliarity with the requirements of compact disc production on the part of the artists. As artists become more comfortable with self-production techniques, they will be able to better utilize the tools. Furthermore, *HyperCard*-type languages and presentation software will become more sophisticated while maintaining their relative simplicity of use. The only other quantity that needs to be added to this combination is serious academic acceptance of the technology as a valid instructional tool. Hopefully, this project serves as a prototype for further development.

Appendix A

The ICMC '92 CD Stack Printout

HyperTalk, the *HyperCard* scripting language, allows stack authors to incorporate multiple navigation tools into every card of the stack. The user is then able to browse the stack at his or her own pace following specific interests. Most navigation is achieved by *buttons*, areas on the screen where the user click the mouse to command the stack to perform an action of movement to another location in the stack or even to another application.

The *ICMC '92 CD Stack* was developed with the goal of providing an intuitive environment for the user where little or no previous instruction would be necessary in order to use the stack immediately. The user is encouraged to "click" anywhere at will on the cards to see what may happen. Usually, clicking on a title of a selection or a heading will cause the stack to move to a specific card. Clicking on icons such as arrows will also allow the user to "flip" through the cards. Furthermore, a group of controls are at the bottom of almost every card that facilitate control of the audio program of the CD in the CD-Rom drive. Other buttons are fairly self-explanatory, allowing "pop-up" pictures or text to appear or playing specific passages of the CD.

This appendix includes printouts of almost every card in the stack, presented here in linear order. It should be noted that it would be unusual for a user of this stack to proceed in this fashion. The stack was designed specifically for non-linear usage, with the aforementioned buttons allowing one to move about easily.

The first card of the stack appears below with button areas identified. Text that appears in the stack as scrolling text is displayed immediately below each card in conventional quoted format. In most cases, such text was provided by the composer.

Figure 4. Card 1. Table of Contents.

Figure 5. Cards2/3. About This Stack and Technical Requirements.

THE ICMC 92 CD STACK

About This Stack-How To Use This Stack

It is our hope that, with the proper equipment, this stack will be easy to use and as intuitive as possible. Feel free to click the mouse wherever you wish and see what happens! Remember, Hypercard mouse commands only require a single mouse click, instead of double-clicking.

Navigation around the stack is straightforward. Click on a selection title on the Table of Contents card (the first card) to play the piece and to go to the title card for that piece. Other elements of the piece are listed on the title card. To return to the title card, click on the name of the piece. To return to the Table of Contents card, click either on "Table of Contents" button or the "ICMC 92 Stack" logo at the top left corner of almost every card.

A set of standard CD-type controls are at the bottom of each card. These control the entire CD, not just the card you are looking at.

Table of Contents

Play Track Number 1 2 3 4 5 6 7

Figure 6. Card 4. How To Use This Stack.

This button allows the user to read the paper that was presented to the International Computer Music Association in 1993.

THE ICMC 92 CD STACK

[Read The ICMC 92 Paper](#)

About This Stack--About The Development of the Stack

This stack was created for presentation to the International Computer Music Association conference in Tokyo, Japan in September, 1993. Following production of the CD in 1992, we solicited all of the composers for whatever information they might have regarding the compositions. We then planned the project and wrote a paper about the development of the stack (see "The ICMC 92 Stack Paper"). The idea in creating the stack was to 1) expand on the information available about the CD; and 2) demonstrate "grass-roots" multi-media. Although this presentation is not in color and isn't as cute as some of the commercial products available, it still presents a lot of information in a low-cost package.

We would like to extend our thanks to the composers for their cooperation. Their musical contributions as well as scores, narratives, and other information made this stack possible.

Table of Contents

Play Track Number 1 2 3 4 5 6 7

Navigation icons: Previous, Play/Pause, Next, Stop, First, Last, Previous, Play/Pause, Next, Stop, First, Last.

Figure 7. Card 5. About The Development of the Stack.

In the stack, the user may click on the arrow on the bottom of the above text box to continue reading through the paper that was presented to the ICMA in 1993. The ICMA 1993 paper was co-authored by Edward Russell Tinch and Allen Strange. For the purposes of this written version of the stack, the ICMA paper is replicated in Appendix B.

In the stack, the user may click on the arrow on the bottom of the above text box to continue reading through the paper that was presented to the ICMA in 1993. The ICMA 1993 paper was co-authored by Edward Russell Tinchler and Allen Strange. For the purposes of this written version of the stack, the ICMA paper is replicated in Appendix B.

THE ICMC 92 CD STACK

About This Stack

Student Interaction and Evaluation - An Example

The Voyager *Audio Events Maker* stack was originally designed to make buttons for CD playback in multi-media stacks, but its potential for user feedback and evaluation are exciting.

For example, an evaluation section of a stack could include a series of questions regarding a selection on the CD, requiring the student to identify a particular passage by means of the *Audio Events Maker*. The student would then write a short narrative about the passage in an accompanying field. The student would then paste their card into a main stack (even on network) for the teacher to grade.

Go to the next card for an example of an evaluation card. ➡

Table of Contents

Play Track Number 1 2 3 4 5 6 7 ⏮ ⏭ ⏸ ⏹ ⏪ ⏩ ⏮ ⏭ ⏸ ⏹ ⏪ ⏩

Figure 9. Card 20. Student Interaction and Evaluation.

Clicking on the circled buttons below yields the attached text boxes as "pop-up" fields.

Navigation Palette

- Question 1 Navigation
- DO NOT close this palette until you are done with Question 1 or you'll get hopelessly lost!!!!!!
- Question 1 Card
- Audio Event Maker
- Degazio Performance Notes
- Degazio Scrolling Notation

THE ICMC 92 CD STACK

About This Stack

Student Interaction and Evaluation - An Example

Name:

Click here for Question 1

Click here to write description of first example.

Click here to write description of second example.

Click here to write description of third example.

(to close description fields, click on the accompanying button)

Paste Passage Buttons here:

First Example

Second Example

Third Example

First example description:

Second example description:

Third example description:

Click on highlighted button to close this field

Table of Contents

Play Track Number 1 2 3 4 5 6 7

Bruno Degazio discusses the concept of heterophony in the performance notes for *On Growth and Form*. Using the Audio Events Maker, find three examples of heterophonic performance in the piece and create accompanying buttons. Paste the buttons on this card and write a short explanation of why you think the example is heterophonic.

The Navigation Palette will assist you in locating the Audio Events maker and other cards.

Click on highlighted button to close this field.

Figure 10. Card 21. Student Interaction and Evaluation Example.

Clicking on the circled buttons on the card below yields these pictures.

THE ICMC 92 CD STACK

About This Stack-About the Authors

Russ Tincher is a musician from Palo Alto, CA. He teaches part-time at De Anza College (Cupertino, CA), and is completing his MA in music at San Jose State University. Russ is active in digital post-production for audio and video, and keeps busy playing drums in jazz and commercial venues. He has performed on and produced a wide variety of LPs and CDs. Russ was production coordinator for the ICMC 92 CD.

Allen Strange has been involved with music technology since the middle 1960's, and has remained active as a composer, performer, author and music educator. Strange's music has been recorded and performed in Europe, Canada, Japan, South Africa, South America and throughout the United States. He is currently Professor of Music at San Jose State University where he is the director of the Electro-Acoustic Music Program and the Center for Research in Electro-Acoustic Music (CREAM). Allen was the director of the ICMC 92 conference in San Jose, CA.

All comments and suggestions are welcome - please send them to:

Russ Tincher, 3885 Mumford Place, Palo Alto, CA 94306, e-mail: rtincher@MCIMAIL.com.
 *****This stack is copyrighted by Russ Tincher, 1993, all rights reserved. Users are expressly prohibited from copying this stack except for personal archiving and installation.*****
 Copies are available if you send an HD disk and self-addressed stamped mailer to the above address.

Table of Contents

Play Track Number 1 2 3 4 5 6 7

Navigation icons: back, forward, stop, play, pause, first, last.

Figure 11. Card 22. About the Authors.

Figure 12. Card 23. *On Growth and Form* Title Card.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

1 On Growth and Form **Bruno Degazio**

Bruno Degazio is a composer and sound designer for film and television. His recent film work includes the design of the all-digital, six-channel sound tracks for the 3-D IMAX films *Hikari - Echoes of the Sun* and *The Last Buffalo* at the 1990 World's Fair in Osaka, Japan, as well as the soundtrack for *Blue Planet*, an IMAX documentary film on the environment.

Degazio is the composer of many concert works for traditional, electronic and mixed media which have been performed in North American and Europe. His most recent work, *TESLA*, a multi-media "opera" based on the career of the great inventor, was presented at the Ars Electronica Festival in Austria.

As a researcher in the field of algorithmic composition he has presented papers and musical works at leading national and international conferences.

Table of Contents **About the Composer**

Play Track Number 1 2 3 4 5 6 7

Figure 13. Card 24. *On Growth and Form* - About the Composer.

Complete text from the above text box :

Bruno Degazio is a composer and sound designer for film and television. His recent film work includes the design of the all-digital, six-channel sound tracks for the 3-D IMAX films *Hikari - Echoes of the Sun* and *The Last Buffalo* at the 1990 World's Fair in Osaka, Japan, as well as the soundtrack for *Blue Planet*, an IMAX documentary film on the environment.

Degazio is the composer of many concert works for traditional, electronic and mixed media which have been performed in North American and Europe. His most recent work, *TESLA*, a multi-media "opera" based on the career of the great inventor, was presented at the Ars Electronica Festival in Austria.

As a researcher in the field of algorithmic composition he has presented papers and musical works at leading national and international conferences. He is a founding member of the Toronto new music ensemble SOUND PRESSURE and of the Canadian Electroacoustic Community.

Figure 14. Card 25. *On Growth and Form* - Program Notes.

Complete text from the above text box :

Drawing on the chaotic energy of fractal processes, *On Growth and Form* is a sort of ritual dance of life, the by-product of a recursive explosion of musical events.

The musical development of *On Growth and Form* is akin to the growth of a living organism, hence the reference to Darcy Thompson's classic text. First, the great mystery - sound appears from silence, life appears from matter. A sort of musical 'cellular fission' occurs, drawing the 'organism' step by step up to higher levels of existence. The pace increases dramatically as vital elements accrue until at the climax, self-aware, stands a living soul.

Thompson was one of the first biologists to document the many ways in which Fibonacci relationships govern the growth rates and formal structures of living organisms. The recursive process employed in this piece is based on such a relationship between phrases, which finds its way eventually into the smallest details, such as the musical 'spirals' that

take over in the middle section. The piece can be performed by any number of performers on any instruments. *On Growth and Form* was commissioned by the Canadian Electronic Ensemble in 1988, and is dedicated to my daughter, Rachel.

THE ICMC 92 CD STACK

1 On Growth and Form

From Thompson's *On Growth and Form*, Chapter VI - "The Equiangular Spiral:"

Page 172:

"The very numerous examples of spiral conformation which we meet with in our studies of organic form are peculiarly adapted to mathematical methods of investigation. But ere we begin to study them we must take care to define our terms, and we had better

The shell of *Nautilus pompilius*

[Table of Contents](#) [More Information About Thompson's On Growth and Form](#)

Play Track Number 1 2 3 4 5 6 7

Figure 15. Card 26. *On Growth and Form* - About Thompson's Book.

Complete text from the above text box :

From Thompson's *On Growth and Form*, Chapter VI - "The Equiangular Spiral:"

Page 172:

"The very numerous examples of spiral conformation which we meet with in our studies of organic form are peculiarly adapted to mathematical methods of investigation. But ere we begin to study them we must take care to define our terms, and we had better also attempt some rough preliminary classification of the objects with which we shall have to deal.

In general terms, a Spiral is a curve which, starting from a point of origin, continually diminishes in curvature as it recedes from that point; or in other words, whose radius of curvature continually increases....

Of true organic spirals we have no lack. We think at once of horns of ruminants, and of still more exquisitely beautiful molluscan shells - in

which (as Pliny says) magna ludentis Naturae varietas . Closely related spirals may be traced in the florets of a sunflower; a true spiral, though not, by the way, so easy of investigation, is seen in the outline of a cordiform leaf; and yet again, we can recognise typical though transitory spirals in a lock of hair, in a staple of wood, in the coil of an elephant's trunk, in the 'circling spires' of a snake, in the coils of a cuttle-fish's tale it: inasmuch as the spiral shells of these latter are composite structures, combined out of successive and separate chambers, while the molluscan shell, though it may (as in Nautilus) become secondarily subdivided, has grown as one continuous tube...."

Figure 16. Card 31. *On Growth and Form* - About Thompson's Book.

Complete text from the above text box :

From Thompson's *On Growth and Form*, Chapter VI - "The Equiangular Spiral:"

Page 176:

"... In the equiangular spiral of the *Nautilus* or the snail-shell or *Globigerina* , the whorls continually increase in breadth, and do so in a steady and unchanging ratio....As the spiral of Archimedes, in our example of the coiled rope might be looked upon as a coiled cylinder, so (but equally roughly) may the equiangular spiral, in the case of the shell, be pictured as a cone coiled upon itself; and it is the conical shape of the elephant's trunk or the chameleon's tail which makes them coil into a rough simulacrum of an equiangular spiral."

THE ICMC 92 CD STACK

Play This Selection Resume

1 On Growth and Form

From Thompson's *On Growth and Form*, Chapter VI - "The Equiangular Spiral:"

Page 193:

"...It is characteristic and even diagnostic of the Foraminifera (1) that development proceeds by a well-marked alternation of rest and of activity - of activity during which the protoplasm increases, and or rest during which the shell is formed; (2) that the shell is formed

Large β

Small

Various gastropods showing the effect of the alteration of different angles. These two shells have large and small enveloping angles of the conical ends.

Table of Contents More Information About Thompson's *On Growth and Form*

Play Track Number 1 2 3 4 5 6 7

Figure 17. Card 33. *On Growth and Form* - About Thompson's Book.

Complete text from the above text box :

From Thompson's *On Growth and Form*, Chapter VI - "The Equiangular Spiral:"

Page 193:

"...It is characteristic and even diagnostic of the Foraminifera (1) that development proceeds by a well-marked alternation of rest and of activity - of activity during which the protoplasm increases, and or rest during which the shell is formed; (2) that the shell is formed at the outer surface of the protoplasmic organism, and tends to constitute a continuous or all but continuous covering; and it follows (3) from these two factors taken together that each successive increment is added on outside of and distinct from its predecessors, that the successive parts or chambers of the shell are of different and successive ages, so that one part of the shell is always relatively new, and the rest old in various grades of seniority."

THE ICMC 92 CD STACK

1 On Growth and Form **Bruno Pegazio**

Any number of musicians, from one to dozens, may perform *On Growth and Form*. The general form of the piece is a sort of expanded heterophony where musicians play along ad lib with the constantly growing melody.

TO PLAY HETEROPHONICALLY in this piece means that the principal line may be used as a 'skeleton' for a limited form of improvisation on the part of the player. Notes may be left out or sustained at the discretion of the performer but new notes may not be added. For example, interesting resultant melodies can be formed by playing only every other note, or only every fourth note, sustaining each through until the next.

For the purpose of the score and parts instruments are divided into only two types: low and high. This score is in Bb; parts are available for both low and high instruments in C, B-flat and E-flat.

Table of Contents **Performance Notes**

Play Track Number 1 2 3 4 5 6 7

Figure 18. Card 35. *On Growth and Form* - Performance Notes

Complete text from the above text box :

Any number of musicians, from one to dozens, may perform *On Growth and Form*. The general form of the piece is a sort of expanded heterophony where musicians play along ad lib with the constantly growing melody.

TO PLAY HETEROPHONICALLY in this piece means that the principal line may be used as a 'skeleton' for a limited form of improvisation on the part of the player. Notes may be left out or sustained at the discretion of the performer but new notes may not be added. For example, interesting resultant melodies can be formed by playing only every other note, or only every fourth note, sustaining each through until the next.

For the purpose of the score and parts instruments are divided into only two types: low and high. This score is in Bb; parts are available for both low and high instruments in C, B-flat and E-flat.

On Growth and Form requires playing along with a two-channel

PCM VHS digital tape. The PCM tracks carry the audio material that the live musicians perform with, and the regular (analog) audio tracks carry a special click track. At least one person in the performing group must listen to this click track with a pair of headphones and conduct the others at important points. A DAT version of the tape is available, but does not include a click track, which limits performance opportunities severely.

To play the piece with notation, click on the right arrow, then click on Play Through.

When the user clicks on the right arrow described above, the first card with the scrolling score appears. This card is shown below.

Look for this button and click on it any time to read composer's performance notes:

On Growth & Form

Table of Contents Title Card Play This Card Play Through 1

Figure 19. Card 36. *On Growth and Form* - Scrolling Notation.

This is the first card of the scrolling notation section. This series of cards display the highlighted portions of the score while the music is playing. The user may stop at any time and see and hear just one card, or he or she may observe and listen to the entire performance.

Boxes with the "note" icon circled above appear periodically throughout the scrolling notation section. When the user clicks on the box, a "pop-up" text field appears with performance notes written by the composer. The entire score and performance notes appear in Appendix C of this paper.

Figure 20. Card 92. "U" (The Cormorant) Title Card.

THE ICMC 92 CD STACK Play This Selection Resume

2 "U" (The Cormorant) Mari Kimura

At age 16, violinist Mari Kimura was a semi-finalist at the Mainichi Music competition in Japan. After graduation from Toho School of Music with honors, she came to the U.S. where she participated in the Tanglewood Music Center as a fellow and earned her Master's degree as a scholarship student at Boston University. Kimura has been a soloist with the

[Table of Contents](#) [About the Composer](#)

Play Track Number 1 2 3 4 5 6 7 ⏮ ⏭ ⏸ ⏹ ⏪ ⏩

Figure 21. Card 93. "U" (The Cormorant) - About the Composer

Complete text from the above text box :

At age 16, violinist Mari Kimura was a semi-finalist at the Mainichi Music competition in Japan. After graduation from Toho School of Music with honors, she came to the U.S. where she participated in the Tanglewood Music Center as a fellow and earned her Master's degree as a scholarship student at Boston University. Kimura has been a soloist with the Juilliard Orchestra in the "FOCUS" Festival at Lincoln Center, and with the Vermont Symphony.

Kimura has appeared in many concerts, including a benefit for Kneisel Hall with pianist Murray Perahia. She has also organized and performed in collaboration with Japanese scientists in Experimental Concerts of Violin and Electro-Acoustic Technology in Tokyo. She currently is a doctoral student in performance at Juilliard, and is studying composition with Mario Davidovsky. Kimura performed "U" (The Cormorant) written by herself for violin, computer and quadrophonic sound at CCRMA's annual concert at Stanford University. It was described as skillful and impressive and an "achievement . . . [that] deserves major attention" (San José Mer-

cury News). In February, she gave a debut recital in Casals Hall in Tokyo, featuring American contemporary music. It was acclaimed as "demonstrating astonishing vitality...her activity represents that of a contemporary artist...rarely heard program in Tokyo...Japan may be too small for her"(Sankei News Paper). In March 1992, she gave the American premier of "*Maritime*" by Robert Rowe for MIDI violin and computer, which was written for her.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

Z "U" (The Cormorant) **Mari Kimura**

"U (The Cormorant) was composed between February and May of 1991. In January of that year, like everyone else, I saw pictures of cormorants in the Persian Gulf trying to shake the oil off their bodies. A constant feeling of urgency about the global environment, and probably my reflections on the subject effected the piece. The form of this piece is quasi-palindromic, imitating the shape of the letter U. The core materials are simple, but they evolve and transform as the piece develops. I always have a vision of my violin and I stepping out from the usual boundaries, extending the aural experience into an unknown dimension. I imagine kinds of sounds that I usually do not identify myself playing the violin. These sounds seem to me as transformations of my violin sounds. I try to merge the timbre and the movement of the sounds of my violin with the electronic sounds very carefully. Electronic sounds were created using Yamaha TG77 synthesizer."

Table of Contents **Program Notes**

Play Track Number 1 2 3 4 5 6 7

Figure 22. Card 94. *U" (The Cormorant)* - Program Notes.

Figure 23. Card 95. *U" (The Cormorant)* - Production Note.

Complete text from the above text box :

In the course of post-production, one of our tasks was to assemble the various DAT tapes submitted by the composers into a final compilation for CD mastering and manufacturing. While most of this phase was routine, Mari Kimura's tape, through no fault of her own, presented an interesting challenge.

Upon listening to her DAT tape for final transfer to SoundTools, we discovered a digital "glitch", probably a drop-out or piece of bad tape, about 1'29" into the piece. The DAT format, though widely used, is not completely flawless, and brief drop-outs can occur in the same manner as video tape, as a manufacturing flaw in the media.

The attached sample, while of questionable quality and limited frequency response due to the Macintosh limitations on internal sound playback, demonstrates the glitch. The glitch sounds like a scratch on a record.

The picture (Glitch Picture) shows a SoundTools screen shot of the waveform where the glitch appeared. We fixed the glitch by taking out a very small piece of program material (less than one millisecond), and applying a short cross-fade between the two remaining sections. Play the button "Repaired Glitch" to hear the result.

Figure 24. Card 95. *U*" (*The Cormorant*) Waveform Screenshot.

Figure 25. Card 96. *This Way Out* Title Card.

Figure 26. Card 97. This Way Out - About the Composer.

Complete text from the above text box :

Eric Chasalow is Assistant Professor of Composition at Brandeis University and Director of the Brandeis Electro-Acoustic Music Studio (BEAMS). He was formerly Executive Director of the Guild of Composers, for whom he produced several seasons of concerts in New York City and a nationally distributed radio series called "Composers in Concert." He also has served as Executive Director of Music Alliance, an organization dedicated to improving the climate for the art of music in America through education programs.

Chasalow received the DMA from Columbia University where his principal teacher was Mario Davidovsky and where he studied flute with Harvey Sollberger. He pursued his undergraduate studies at Bates College and New England Conservatory. Chasalow has been awarded prizes and fellowships by, among others, the John Simon Guggenheim Memorial Foundation, the American Academy and Institute of Arts and Letters, the National Endowment for the Arts, and the New York Foundation for the Arts, with particular recognition for his works that combine live soloists with electronic sounds.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

3 This Way Out **Eric Chasalow**

"My compositions of the last several years have all tried, in some way, to reconcile elements of the different musics that I find attractive. In particular, I often start with material that is suggestive of jazz to build a piece that has a classical phrase and formal structure. In This Way Out I have started with some gestures that remind me of rock and roll in that they are loud and repetitive. I have also chosen sounds, especially drums, that support this impression. The structure of the piece is another matter. It consists of a short improvisatory introduction, two fast sections flanking a slower middle one, and a soft coda, all lasting about four minutes."

Table of Contents **Program Notes**

Play Track Number 1 2 3 4 5 6 7

Figure 27. Card 98. *This Way Out* - Program Notes.

Figure 28. Card 99. *This Way Out* - Technical Information.

Complete text from the above text box :

It is my feeling that the specific equipment used to make an electro-acoustic piece of music is much less important than the composition itself. Often, the details of production get confused with the process of composing — the two are related but different in critical ways, just as orchestration and composition, while "co-dependent", are separate considerations for a composer. I add this statement as a caveat. If I have composed a successful piece, it could have been realized using very different techniques and/or equipment.

This Way Out was produced in the Brandeis Electro-Acoustic Music Studio (BEAMS) using an array of MIDI equipment:

Yamaha TX81Z synthesizer
Roland D-110 synthesizer
Ensoniq SQR synthesizer
Ensoniq ESQ-M synthesizer
Yamaha DMP7 mixer
Yamaha WX7 wind controller
XOR Universal Patch Editor (Dr. T)
Voyetra Sequencer Plus Gold

Most of the sounds in *This Way Out* are composites made by layering between four and sixteen different patches, each with different envelopes and spectra, on the various synthesizers. This technique allows me to make sounds which have envelopes that are always changing in subtle ways and keeps them from sounding too mechanical. When designing patches for the synths, therefore, I was not trying to make big, rich, complex sounds, but instead to create "subsounds" that would work well when layered with one another. This approach also keeps the sound of one type of synthesizer from popping out of the textures too much.

As you can see from the score, much of this piece was composed quite conventionally, and the studio was used to create a "funny little band" of instruments rather than any unusual or strikingly complex sounds. The ideas of the piece are in the notes and their relationships in the usual sense. As the score evolved, I moved back and forth between the studio and the composing desk, realizing the piece a little at a time and entering data to the sequencer from the computer keyboard. The WX7 was used in the final stages to create convincing pitchbends and microdynamics where needed.

The card shown below is the first of a series of cards displayed during a "scrolling narration" portion of the stack. When the user clicks on "Play This Card," a short segment of the composition is played that corresponds to the narrative material. When the user clicks on "Play Through," the following cards scroll while the music is playing on the CD.

THE ICMC 92 CD STACK

3 This Way Out *Eric Chasalow*

This Way Out unfolds much like a piece in Sonata Form. Its four main sections correspond in dramatic function to the Exposition, Development, Recapitulation, and Coda of tonal Sonatas. While *This Way Out* is not a tonal piece, and there is a justifiable position that without tonal functions we really do not have a piece in Sonata Form, it is useful to invoke this historical model as a background against which to understand the dramatic structure of the piece.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 29. Card 100. *This Way Out* - Scrolling Narrative 1.

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The opening music of the piece has an introductory character. It consists of a pedal Ab accented by means of lengthening and accelerating upbeat sixteenth-note figures. Rhythmically, this music is improvisatory in character, without a strong sense of pulse. This passage seems like an introduction both because of the lack of pulse and a lack of harmonic motion. It functions as a big upbeat to the music that begins at the quarter-note=120 marking in the score.

Play This Card

Play Through

2

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The passage that begins at the quarter=120 does have a strong pulse, with its regular, repeated sixteenth-notes and syncopated drum accompaniment. In fact, it does something that we often hear happen in rock and roll pieces -- it only "pretends" to move. This "theme" is harmonically static, only arpeggiating one seventh-chord. Only at the end of the phrase, when the sixteenth-notes stop and triplet chords force a cadence, is there any kind of harmonic motion.

Play This Card

Play Through

3

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 30. Cards 101/102. *This Way Out* - Scrolling Narrative 2/3.

THE ICMC 92 CD STACK

3 *This Way Out*

Erie Chasalow

The material of *This Way Out* is laid out paradoxically -- introduction that (we find out later) is not simply introduction but thematic, and first theme which seems like fast music, but doesn't really move. As the piece unfolds, activity gets intensified in a number of ways.

Play This Card

Play Through

4

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

3 *This Way Out*

Erie Chasalow

The close of the Exposition, for example, intensifies the pulse with an accelerando at the same point that the harmonic speed has increased (phrase endings have all of the harmonic action).

Play This Card

Play Through

5

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 31. Cards 103/104. *This Way Out* - Scrolling Narrative 4 /5.

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The middle section of the piece ("Development") suspends the sense of pulse again and works out the material that opened the piece. As the section unfolds, the first theme (with its reiterated sixteenth-notes) is brought back in and the relationship of the two ideas is reinterpreted.

Play This Card

Play Through

6

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

As this section closes, we begin to have a sense that a pulsed music will begin again, following the unpulsed music just as in the Exposition.

This does, in fact, happen in that the return ("Recapitulation") that is about to occur dwells primarily on the pulsed material. But because of the interaction of the two ideas in the middle section of the piece, neither can come back again in its original state.

Play This Card

Play Through

7

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 32. Cards 105/106. *This Way Out* - Scrolling Narrative 6 / 7.

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The moment of the arrival at the recapitulation seems clear. The opening bass Ab returns, transposed up a semitone to A. But a literal restatement would be inappropriate in such a short piece. The move from Ab to A is itself not enough for us to feel we have achieved much of anything in our journey. The recap. seems at first to deal with this by truncating each of the two ideas. Only the characteristic beginning of each is given. After two bars of the introductory idea, the sixteenth note music begins, again at quarter note=120.

Play This Card

Play Through

8

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

Even this is not enough of a transformation, and the phrase is abruptly truncated, the pulse that has just returned is frustrated. When the next phrase begins, we realize that the preceding phrase was a false beginning.

The real beginning of the final section brings back the sixteenth-note theme in two subsections. The first is at a tempo of quarter=132. This faster tempo helps give the impression of closing music. The subsection consists of a reordering of the music from the exposition.

Play This Card

Play Through

9

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 33. Cards 107/108. *This Way Out* - Scrolling Narrative 8 /9.

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The second subsection looks in the score as if it returns tempo to quarter=120, but it is actually a further intensification. Because of the quintuplets and sextuplets, and accents that defy the quarter note, a faster tempo is projected. The texture is also the densest of the piece, being made up of imitative counterpoint.

Play This Card

Play Through

10

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

3 This Way Out

Eric Chasalow

The Coda section which follows simplifies and summarizes. The sixteenth note theme is restated homophonically, but now with the flexible rhythm it acquired from the introductory idea when the two collided in the middle section. Even the loud drums have been toned down, becoming delicate hand percussion.

Play This Card

Play Through

11

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 34. Cards 109/110. This Way Out - Scrolling Narrative 10 /11.

Figure 35. Card 111. *Nuhual II* Title Card.

Figure 36. Card 112. *Nuhual II* - About the Composer.

Complete text from the above text box :

Roberto Morales was born in Mexico City in 1958. When he was 16, he became interested in national folkloric music and learned how to play different harps, guitars and flutes of several regions of Mexico. In 1977, he went to Escuela Superior de Musica, where he finished his professional studies in flute, piano, and composition. In 1981, he created an inter-disciplinary workshop of music, painting, dancing and literature directed by him. As a composer, he has written music for theater, dance, movies, TV and radio, and during the last 12 years has participated in different international festivals.

As a performer, Morales has participated on his own and with other composers in forums of jazz, popular and new music. In 1988, he was co-founder of the First Computer Music Studio in Mexico belonging to Escuela Superior de Musica. At the present, he is organizing the courses of music by computer and digital synthesis, as well as C, C++, Prolog languages, and coordinating a jazz ensemble at the Escuela Superior de Musica. In 1990 he received a grant from the government to compose a piece for orchestra and computer.

THE ICMC 92 CD STACK

Play This Selection: Resume

4 Nahual II

Roberto Morales

"Nahual II is a piece for Chamula harp, computer and Yamaha SY77 synthesizer. The Chamula harp is an instrument from southeast Mexico used by the Chamula Indian community for religious ceremonies. The instrument, as well as the tuning keys, are made of very light wood and is tuned by hand. The strings are made of steel. Its light wood allows the performer to make glissandos by pressing the resonant top and the tuning is not stable which makes it very particular. This piece is inspired by the Mexican sorcerers; they use the "NAHUAL" as a way of experimenting with new realities or to hex someone."

Click on these buttons to see SY77 patch editor screen shots

Patch 1

Patch 2

Patch 3

Patch 4

Table of Contents

Program Notes

Play Track Number 1 2 3 4 5 6 7

When the user clicks on these buttons, the corresponding pictures shown below are displayed as full screen windows.

Figure 37. Card 113. *Nahual II* - Program Notes.

Figure 38. Card 114. *Hok Pwah* Title Card.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

5 Hok Pwah (excerpts) **Zack Settel**

Zack Settel was born in 1957 and raised in the Greater New York area. He received a BFA in Music Composition at the California Institute of the Arts (CalArts), where he continued in the MFA program. As an undergraduate he studied composition with Leonard Stein and Morton Subotnick, and then as a graduate, with Mel Powell. For several years he has been quite involved in electro-acoustic music having pursued studies at MIT and elsewhere, in mathematics, computer science, digital signal processing and computer music workshops.

Since the fall of 1986 he has been living in Paris. He came on a Fulbright grant (Music Composition) to the Institute for Research and the Coordination of Acoustics and Music (IRCAM), headed by Pierre Boulez, where he continued the following year with a grant for music composition from the French Government.

Table of Contents **About the Composer**

Play Track Number 1 2 3 4 5 6 7

Figure 39. Card 115. Hok Pwah - About the Composer.

Complete text from the above text box :

Zack Settel was born in 1957 and raised in the Greater New York area. He received a BFA in Music Composition at the California Institute of the Arts (CalArts), where he continued in the MFA program. As an undergraduate he studied composition with Leonard Stein and Morton Subotnick, and then as a graduate, with Mel Powell. For several years he has been quite involved in electro-acoustic music having pursued studies at MIT and elsewhere, in mathematics, computer science, digital signal processing and computer music workshops.

Since the fall of 1986 he has been living in Paris. He came on a Fulbright grant (Music Composition) to the institute for Research and the Coordination of Acoustics and Music (IRCAM), headed by Pierre Boulez, where he continued the following year with a grant for music composition from the French Government.

In addition to composing, Settel works full time as a musical assistant and lecturer at IRCAM, and does freelance computer music consulting for the Yamaha Corporation Japan, Vinko Globokar and Tempo Reale

(Luciano Berio). His compositions include chamber works, electronic music studio works, film scores and live electro-acoustic pieces (chamber works with live electronics). His work is main focused on the latter and is performed in North America and in Europe.

Figure 40. Card 116. Hok Pwah - Program Notes.

Complete text from the above text box :

Hok Pwah is a 10 minute piece intended for live performance. These excerpts were recorded live in 1991 at the Banff Center, Alberta, Canada. It is for 2 soloists (voice and percussion) with live electronics.

The two main ideas behind the piece are: 1) to extend the role of the duet, giving the two soloists a large instrumental and timbral range nonetheless based on (or controlled by) their instrumental technique, 2) to explore the possibilities of working with electronically (live) processed text. The computer runs software which coordinates the following: 1) real-time audio signal analysis, 2) signal processing of the soloists, 3) "complementary" synthesis, which is meant to mix with the instruments' natural timbres, and 4) realtime sampling.

Interfaces incorporating envelope/pitch and spectrum followers are linked to audio signal processors, samplers and highly controllable sound generators, thus providing the players with direct control over the electronics based on their "natural" playing technique. In the case of the singer, spoken and sung text or articulations such as trills, staccato, accents, slurs, etc... are analyzed and recognized by the computer. From this

analysis, various control signals are derived, which control the synthesizers, samplers and signal processors. In this way, the text serves not only as a text in the usual sense, but in addition, the text serves to control the electronic treatment of itself.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

5 Hok Pwah (excerpts) **Zack Settel**

"Hok Pwah" is a 20 minute piece intended for live performance. It is for 2 soloists (voice and percussion) with live electronics. The two main ideas behind the piece are: 1) to extend the role of the duet giving the two soloists an extremely large instrumental and timbral range nonetheless based on (or controlled by) their instrumental technique, 2) to explore the possibilities of working with electronically (live) processed text.

Expanding the timbral range involves combining the instruments' acoustic sounds with similarly behaved electronic sounds, which tend to fuse with the former. The computer runs software which coordinates the following: 1) real-time audio signal analysis, 2) signal processing of the soloists, 3) complementary" synthesis, which is meant to mix with the instruments' natural timbres, and 4) realtime sampling (recording and playback). Specialized interfaces incorporating envelope/pitch and spectrum followers

Table of Contents **Score: ... about this piece**

Play Track Number 1 2 3 4 5 6 7 **⏮ ⏪ ⏩ ⏭ ⏮ ⏪ ⏩ ⏭**

Figure 41. Card 117. *Hok Pwah* - Score: ...About This Piece.

Complete text from the above text box :

Hok Pwah is a 20 minute piece intended for live performance. It is for 2 soloists (voice and percussion) with live electronics. The two main ideas behind the piece are: 1) to extend the role of the duet giving the two soloists an extremely large instrumental and timbral range nonetheless based on (or controlled by) their instrumental technique, 2) to explore the possibilities of working with electronically (live) processed text.

Expanding the timbral range involves combining the instruments' acoustic sounds with similarly behaved electronic sounds, which tend to fuse with the former. The computer runs software which coordinates the following: 1) real-time audio signal analysis, 2) signal processing of the soloists, 3) complementary" synthesis, which is meant to mix with the instruments' natural timbres, and 4) realtime sampling (recording and playback). Specialized interfaces incorporating envelope/pitch and spectrum followers are linked to audio signal processors, samplers and highly controllable sound generators, thus providing the players with direct control over the electronics based on their "natural" playing technique. In the

case of the singer, spoken and sung text or articulations such as trills, staccato, accents, slurs, etc. are analyzed and recognized by the computer. From this analysis, various control signals are derived, which control the synthesizers, samplers and signal processors. Outside of their normal musical role, these articulations, sung by the soloist, make up the interface, through which the singer may control the electronics. Thus the singer, through what and how she sings, can have subtle (expressive) control of the electronics based on her instrumental technique. The electronics include sound generation and processing gear which is "patched" or programmed to be extremely sensitive to continuous control. These patches are built and tuned around the particular kinds of control signals coming from the players. This approach compares in certain ways to instrument building, and is a vital part of the piece.

The text in the piece (the singer's voice) is modified with the aid of special analysis and signal treatment software written in MAX, a music programming language. Using articulation recognition and rich signal processing/synthesis configurations, various elements of the text (syllables, inflection etc..) can be treated or "colored" in specific ways. In this way, the text serves not only as a text in the usual sense, but in addition, the text serves to control the electronic treatment of itself (for example, the first syllable "Vic" of the word "Victor" could be used to trigger the addition of some reverb to the singer's voice-text while the second syllable 'tor' could trigger the attenuation the reverb etc.). The texts for the piece are chosen based on their structural (phonetic) properties and onomatopoetic tendencies, both of which can be accentuated or brought out by the singer and electronics. Imbedded in the text are many elements which are brought to the surface during performance.

The main technical components of the piece are briefly outlined below:

1) interface for soloists:

- °high level signal analysis (articulation recognition etc..) for the voice
- °contact microphone->MIDI for acoustic percussion instruments
- °MIDI sustain pedal for each player

2) a software environment (written in MAX) running on the IRCAM Musical Workstation supporting in real-time:

- °sampling (recording and playback)
- °signal processing (harmonization, reverb etc.)
- °signal analysis (Pitch and envelope following) for the voice
- °real-time automated mixing and signal routing

Zack Settel composer February 1993

Figure 42. Card 118. *Hok Pwah* - Score: Technical Layout.

THE ICMC 92 CD STACK
Play This Selection
Resume

5 Hok Pwah (excerpts)
Zack Settel

The piece is written for a mezzo-soprano however, the singer's pitch material may be transposed to suit the range of any singer if need be.

The pronunciation of the text may be interpreted freely. For example, "i" sound in the word shoo•wis•tem could be pronounced as in "whisper" or as in "Pisa."

The durations in the score for the improvised section need not be strictly applied.

Symbols:

= half sung

= spoken (sprechstimme)

more

Table of Contents
Score-Performance Notes

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK
Play This Selection
Resume

5 Hok Pwah (excerpts)
Zack Settel

Percussion Instruments:
1 30" tamtam with hard/medium/soft beaters
5 temple blocks (wood blocks from big to small can be used)
3 wood blocks (from big to small) with hard/medium/soft mallets
2 bongos (7 and 10 inch)
3 Japanese temple bowls from big to small (fire alarm bells can be substituted)
1 large bass drum with soft beater
2 bells (or crotales) with metal mallets
1 darabuka (optional)
1 clay vase (with hole) instrument [optional]
1 shaker

Table of Contents
Score-Performance Notes

Play Track Number 1 2 3 4 5 6 7

Figure 43. Cards 119/120. Hok Pwah - Score: Performance Notes.

This is the first card of the scrolling notation section. This series of cards display the highlighted portions of the score while the music is playing. The user may stop at any time and see and hear just one card, or he or she may observe and listen to the entire performance.

See Appendix D for the entire score.

Hok Pwah - Scrolling Notation

VOICE

$\text{♩} = 60$

mp *half-sung* *mf*

Spark- shoo- wis -tem Glerng

PERCUSSION

TEMPLE BLOCKS **TB**

1 2 3 4 5

mp *led.* *release transposing*

Title Card

Table of Contents

Track Elapsed

Play Through

Play This Card

Figure 44. Card 121. *Hok Pwah - Scrolling Notation 1.*

Figure 45. Card 159. *Echo (for John Pierce)* Title Card.

THE ICMC 92 CD STACK Play This Selection Resume

6 Echo (for John Pierce) Jean-Claude Risset

Jean-Claude Risset was born in France in 1938. He studied piano, composition with Andre Joliret, math and physics at the Ecole Normale Supérieure. Between 1964 and 1969, he worked at Bell Laboratories with Max Mathews to develop the resources of computer sound synthesis-imitation of instruments, pitch paradoxes, processes of sonic development, and compilation of a catalogue of computer synthesized sounds. He directed the Computer Department at IRCAM from 1975 to 1979.

Risset now heads the Epeipe d'Informatique Musicale in LMA (NRS, Marseille). In addition to articles, he realized a number of musical works associating instruments with computers. In 1990, he was awarded the Grand Prix National de la Musique. His works appear on several compact discs, including two monographic CDs published by Wergo and INA.

Table of Contents About the Composer ← →

Play Track Number 1 2 3 4 5 6 7 ⏮ ⏭ ⏸ ⏪ ⏩

THE ICMC 92 CD STACK Play This Selection Resume

6 Echo (for John Pierce) Jean-Claude Risset

"ECHO is dedicated to John Pierce. The title alludes to the first communication satellite which was due to John Pierce's vision, as well as to the various forms of echoing in the piece.

ECHO was realized in LMA, Marseille, in 1990. It uses three kinds of material: clarinet motives, recorded by Michel Portal; Celtic harp motives, recorded by Denije Migerand; and sounds synthesized by computer. Sounds were processed either with MUSIC V-resonant filtering, time stretching with Gabor and wavelet transforms, or with the real-time digital audio processor SYTER. The composer acknowledges Pierre Dutilleux, Daniel Arfib and Richard Kronland-Martinet, who developed the tools for sound processing in Marseille."

Table of Contents Program Notes ← →

Play Track Number 1 2 3 4 5 6 7 ⏮ ⏭ ⏸ ⏪ ⏩

Figure 46. Cards 160/161. *Echo (for John Pierce)* - About the Composer and Program Notes.

This is the first card of the scrolling frequency analysis section. This series of cards displays the frequencies of the stereo program in twelve second increments for the first 96 seconds of the performance. The user may stop at any time and see and hear just one card, or he or she may observe and listen to the entire performance.

Figure 47. Card 162. *Echo (for John Pierce)* - Time-Based Frequency Analysis 1.

Figure 48. Card 163. *Echo (for John Pierce)* - Time-Based Frequency Analysis 2.

Figure 49. Cards 163/164. *Echo (for John Pierce)* - Time-Based Frequency Analysis 3/4.

Figure 50. Cards 165/166. Echo (for John Pierce) - Time-Based Frequency Analysis 5/6.

Figure 51. Cards 167/168. *Echo (for John Pierce)* - Time-Based Frequency Analysis 7/8.

Figure 52. Card 169. ... et ainsi de suite ... Title Card.

THE ICMC 92 CD STACK **Play This Selection** **Resume**

7 ... et ainsi de suite ... **Jonty Harrison**

Jonty Harrison studied composition with Bernard Rands at the University of York, England. After periods of work at the National Theatre and the City University, London, he was appointed Lecturer in Music at The University of Birmingham, where he is Director of BEAST (Birmingham Electro-Acoustic Sound Theatre), which provided the concert system for the 1990 ICMC in Glasgow, the Electro-Acoustic Music Studios and the Barber Festival of Contemporary Music.

Harrison has been a Committee member of Sonic Arts Network (formerly EMAS, the Electro-Acoustic Music Association of Great Britain) for many years, holding the positions of Chairman, Secretary and Journal Editor at different times. He is a member of the Music Advisory Panel of the Arts Council of Great Britain and is on the Council and Executive Committee of the Society for the Promotion of New Music. Harrison has received

Table of Contents **About the Composer**

Play Track Number 1 2 3 4 5 6 7

Figure 53. Card 170. ... et ainsi de suite ... - About the Composer.

Complete text from the above text box :

Jonty Harrison studied composition with Bernard Rands at the University of York, England. After periods of work at the National Theatre and the City University, London, he was appointed Lecturer in Music at The University of Birmingham, where he is Director of BEAST (Birmingham Electro-Acoustic Sound Theatre), which provided the concert system for the 1990 ICMC in Glasgow, the Electro-Acoustic Music Studios and the Barber Festival of Contemporary Music.

Harrison has been a Committee member of Sonic Arts Network (formerly EMAS, the Electro-Acoustic Music Association of Great Britain) for many years, holding the positions of Chairman, Secretary and Journal Editor at different times. He is a member of the Music Advisory Panel of the Arts Council of Great Britain and is on the Council and Executive Committee of the Society for the Promotion of New Music. Harrison has received numerous composition prizes and honors (Bourges) Electro-Acoustic Awards, Lloyds Bank National Composers' Award, PRS Prize,

Arts Council Composition bursary, Leverhulme Research Grant, and has worked in many centers abroad (IRCAM, GRM Bourges, Hungarian Radio). His music is performed and broadcast widely, with three works available on record.

Figure 54. Card 171. ... et ainsi de suite ... - Program Notes.

Complete text from the above text box :

...et ainsi de suite... (Birmingham Version 1992) Jonty Harrison

I had wanted for some time to compose a 'French suite', rather in the manner of the *musique concrète* tradition. Sounds from some rough textured wine glasses which had been transformed in the Studio Numérique of the Groupe de Recherches Musicales, using predominantly time-domain manipulation (ETIR), brassage (BRAGE and BRAGGE) and spatialisation programs, provided a promising starting point. These individual sounds were onwardly transformed in the Electroacoustic Music Studios of The University of Birmingham, using a variety to digital signal processors (Publison, Yamaha, AKG), combined with a number of other sound sources, further transformed, recombined ... and so on.

I ventured into this pool of material from time to time in order to compose short, but essentially self-contained movements. The reassembling of new, specific musical utterances from the same source material led to the idea that, by analogy, complete movements (which would inevitably contain a plethora of cross-references) could be as-

sembled in various ways to create pieces of different lengths and paces for different occasions, spaces ... and so on.

Over a dozen movements have been composed to date. Their different functions are characterised, to continue the link with the *musique concrète* suite, by French titles; *à propos* and *résumé* are, respectively, expository and recapitulatory statements of the basic array of sound-types found in the work, and the longest and most elaborate musical movements are designated *commentaire*; the first version of the work (Version Bourges 1990) contained only these movement categories. From 1991, with access to a Sound Tools system, I was able to achieve the seamless continuity of material needed for the family of gentler, more reflective and static movements which offset them. These interspersed movements are grouped under the general heading of (*parenthèse*), though some carry additional, descriptive titles such as *réflexion*, *résonance* and *soufflé d'insectes*.

The Birmingham Version 1992 has eleven movements, whose durations range from 40 seconds to nearly 4 minutes:

1. <i>à propos</i>	1'48"
2. (<i>parenthèse</i> 1)	0'55"
3. <i>commentaire</i>	3'23"
4. (<i>parenthèse</i> 2)	1'29"
5. <i>réflexion</i>	0'54"
6. <i>commentaire</i> 2	2'45"
7. <i>soufflé d'insectes</i> (<i>parenthèse</i> 3)	0'55"
8. <i>résonance</i> (<i>parenthèse</i> 4)	0'46"
9. <i>résumé</i>	1'49"
10. (<i>parenthèse</i> 5)	0'40"
11. <i>commentaire</i> 3	3'42"

(total duration: 19'45")

A characteristic of this version is the overlapping of movements (movements 6 to 9 form a continuous whole, as do the final two movements), emphasising the more dramatic potential of the material. Overall, however, the work is not a vehicle for a dynamic or dramatic musical argument; I am more concerned to create a network of connections within a sound world more conducive to dalliance than discourse.

JH

The card shown below is the first of a series of cards displayed during a "scrolling narration" portion of the stack. When the user clicks on "Play This Card," a short segment of the composition is played that corresponds to the narrative material. When the user clicks on "Play Through," the cards scroll while the music is playing on the CD.

Figure 55. Card 173. ... et ainsi de suite ... Scrolling Narrative Description 1.

Figure 56. Cards 174/175. ... et ainsi de suite ... Scrolling Narrative Description 2/3.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ... *Jonty Harrison*

2 - (parenthese 1)

The (parenthese) movements constitute a contrasting 'family group', characterised by a gentler and more reflective use of material.

Play This Card Play Through 4

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ... *Jonty Harrison*

3 - commentaire 1

Attack/resonance sounds are the predominant material type of the work, with the attacks modified via ring modulation and a variety of other processes, and the resonances artificially extended by the introduction of related sounds (such as the glass harmonica at 3'04") or by the use of time-stretching programs (most usually ETIR from the Studio Numérique of the Groupe de Recherches Musicales in Paris).

Play This Card Play Through 5

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 57. Cards 176/177. ... et ainsi de suite ... Scrolling Narrative Description 4/5.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

3 - commentaire 1

At 3'24" the time stretch is progressive, the sound slowing down almost to the point of suspension.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

3 - commentaire 1

A reminder of the opening appears at 4'29".

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 58. Cards 178/179. ... et ainsi de suite ... Scrolling Narrative Description 6/7.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

4 - parentheses 2

A vocoded articulation clears to reveal another 'freezing of time, this time achieved with the 'latch' facility on a Publison DHM 889.

Play This Card Play Through

[Table of Contents](#)
[Scrolling Narrative Description](#)

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

5 - reflexion

The Publison's latch facility is further exploited, creating a kind of rotational motion. Each latch or loop was captured separately, the fragments being moulded into a seamless continuity via Digidesign's Sound Tools system.

Play This Card Play Through

[Table of Contents](#)
[Scrolling Narrative Description](#)

Play Track Number 1 2 3 4 5 6 7

Figure 59. Cards 180/181. ... et ainsi de suite ... Scrolling Narrative Description 8/9.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

6 - commentaire 2:

The opening (ETIR) leads to a section of intercut glass and flexitone sounds, achieved via the GRM's BRAGGE (brassage of two sound files) program.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

6 - commentaire 2:

This recedes into the distance, meeting a related version of itself with the event at 9'35".

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 60. Cards 182/183. ... et ainsi de suite ... Scrolling Narrative Description 10/11.

Figure 61. Cards 184/85. ... et ainsi de suite ... Scrolling Narrative Description 12/13.

Figure 62. Cards 186/187. ... et ainsi de suite ... Scrolling Narrative Description 14/15.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Sonty Harrison

8 - resonance (parenthese 4)

This movement is built around a 'glass bounce' sound, processed via the GRM's 'Aeolian harp' resonant filter program.

16

[Table of Contents](#)
[Scrolling Narrative Description](#)

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Sonty Harrison

8 - resonance (parenthese 4)

The foreground articulations eventually lead to the descent at the end, signalling the overlap with the following movement.

17

[Table of Contents](#)
[Scrolling Narrative Description](#)

Play Track Number 1 2 3 4 5 6 7

Figure 63. Cards 188/189. ... et ainsi de suite ... Scrolling Narrative Description 16/17.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

9 - resume

This movement is similar in character to *à propos* : more statement than development.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

⏮ ⏪ ⏩ ⏭ ⏮ ⏪ ⏩ ⏭

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

9 - resume

This section marks the start of two extended *ralentandi* of sounds to a virtual standstill...

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

⏮ ⏪ ⏩ ⏭ ⏮ ⏪ ⏩ ⏭

Figure 64. Cards 190/191. ... et ainsi de suite ... Scrolling Narrative Description 18/19.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ... Jonty Harrison

9 - resume

... with foreground events.

Play This Card Play Through 20

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ... Jonty Harrison

10 - (parenthese 5)

Unusually for this piece, this movement starts with a fade-in!

Play This Card Play Through 21

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 65. Cards 192/193. ... et ainsi de suite ... Scrolling Narrative Description 20/21.

Figure 66. Cards 194/195. ... et ainsi de suite ... Scrolling Narrative Description 22/23.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

... from the rather frantic and brutal articulations ...

Play This Card

Play Through

24

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

... to the more relaxed spins, latches and time-stretches.

Play This Card

Play Through

25

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 67. Cards 196/197. ... et ainsi de suite ... Scrolling Narrative Description 24/25.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

The familiar piano resonance precedes a 'clearing' of the material to reveal a single glass harmonica sound ...

Play This Card

Play Through

26

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

The familiar piano resonance precedes a 'clearing' of the material to reveal a single glass harmonica sound ...

Play This Card

Play Through

27

Table of Contents

Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

Figure 68. Cards 198/199. ... et ainsi de suite ... Scrolling Narrative Description 26/27.

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

... which builds to a climax.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

⏮ ⏭ ⏸ ⏪ ⏩ ⏹ ⏮ ⏭ ⏸ ⏪ ⏩ ⏹

THE ICMC 92 CD STACK

7 ... et ainsi de suite ...

Jonty Harrison

II - commentaire 3

The resulting disintegration of material gradually
recedes into the distance at the end of the work.

Play This Card Play Through

Table of Contents Scrolling Narrative Description

Play Track Number 1 2 3 4 5 6 7

⏮ ⏭ ⏸ ⏪ ⏩ ⏹ ⏮ ⏭ ⏸ ⏪ ⏩ ⏹

Figure 69. Cards 200/201. ... et ainsi de suite ... Scrolling Narrative Description 28/29.

Appendix B

Paper Presented to the International Computer Music Association

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The ICMC 92 CD Stack

Russell Tincher

Allen Strange

Graduate Student
Electro-Acoustic Music Program
San Jose State University
rtincher@mcimail.com

Professor of Music
Electro-Acoustic Music Program
San Jose State University
strange@sjsum1.bitnet

Abstract

Following production of a commemorative compact disc for the ICMC 92 Proceedings, the authors developed a *HyperCard*-based stack which acts as a remote controller for playback of the *ICMC 92* CD when using a CD-ROM drive. The stack contains a wide variety of information regarding the compositions on the CD and also serves as an example of the flexibility of the *HyperCard* format both in development and use for music education applications.

1 Introduction

One of the products of the 1992 International Computer Music Association Conference in San Jose, California is a commemorative compact disc of compositions and performances by established composers. This sixty-four minute CD, *ICMC 92*, consists of seven selections, ranging from four minutes to almost twenty minutes in length. There are a wide variety of performance and compositional techniques, with some compositions consisting of combinations of traditional acoustic instruments and electronics, and others completely electronic. The computer-based applications document work in software synthesis, real-time DSP, digital concrete, MIDI technology and algorithmic composition.

The diversity of style and performance methods encompassed in *ICMC 92* motivated the authors to develop a means for further study of the collection for purposes of investigation and analysis in a pedagogic environment. Hypermedia is already being explored as a viable real-time performance media. Consequently, it would be fitting if the method of access and presentation was in the realm of modern information methodology.

In the past two or three years the focus on multi-media has developed into one of the strongest marketing efforts in the history of the personal computer. The appeal to the consumer of using a computer interactively to listen to music, watch movies, and play games, coupled with the industry's glee at the prospect of selling billions of dollars worth of new hardware and software, have formed the perfect match for the prosperous, technologically aware public. In Silicon Valley, as in many places around the world, a stroll through any one of the many computer super-stores will quickly prove that multi-media is the product of the year.

The authors, with an appreciation for the value of multi-media to education, developed a plan to produce a CD-ROM including, along with the audio information, scores, sound and MIDI files, technical information, and graphics for each of the compositions on the *ICMC 92* CD. The advantages of limited run CD-ROMs custom tailored to individual teaching environments are obvious. Since the costs involved in production of CD-ROM are prohibitive, the authors researched the use of Claris' *HyperCard* software for the same product using the consumer standard CD (Red Book format) already in production.

2 Development

Voyager's *AudioStack* software [Riggins, *et al.*, 1992], a utility stack for the creation of CD-controlling *HyperCard* scripts, allowed the authors to identify specific parts of the CD with a very fine resolution down to the block (or 74th of a second). The *Audio-Event Maker* module of the *AudioStack* is intuitive and flexible in creating buttons and controllers for specific audio portions of the CD. These buttons and controllers can be linked to scrolling text and graphics, and are immediately available for manipulation by the listener/user. (See Figure 1)

The technical knowledge required to develop such a stack is, at least initially, relatively minimal. A basic understanding of the authoring environment of *HyperCard* (scripting is rarely necessary) and a careful preliminary concept of the product is important. Changes are easily made in the development process and after the fact.

After contacting all of the composers for any material that they might find pertinent to the project, the

Figure 1: Voyager's AudioEvent Maker

authors developed a plan for the presentation that included many methods of interpretation and analysis of the material. In addition to scanned images of scores and photos, as well as computer-generated scores, the authors utilized other methods of study into the stack. These methods include frequency analysis in real-time, conversion of scores into MIDI-files for the listener/user to manipulate and/or study, synthesizer patches that can be loaded directly into particular instrument or studied in an editor/librarian format, and text- and graphic-based information that is displayed in real time with the audio and allows the listener/user to stop and start the audio and attendant displayed information at will.

The first edition of *The ICMC 92 CD Stack* includes, along with indices, production information, and sample student testing cards, the following information for corresponding compositions:

Bruno Degazio - *On Growth and Form*

Score (scrolling in real time), MIDI file generated from the score, text narrative and graphics regarding inspirational sources for composition.

Mari Kimura - *"U" The Cormorant*

Text narrative information, technical production information with pre- and post-production comparisons of original tape submission

Eric Chasalow - *This Way Out*

Scanned handwritten score (scrolling in real time), text description of piece in real time.

Roberto Morales - *Nahual II*

MIDI file, score generated from MIDI file, synthesizer patches in sysex format as well as graphic reproduction.

Zack Settler - *Hok Pwah*

Scanned score (scrolling in real time), technical information regarding instrument configuration and performance.

Jean-Claude Risset - *Echo (for John Pierce)*

Text narrative information, graphic representation of frequency analysis in real time.

Jonty Harrison - ... *et ainsi de suite* ...

Text description of piece in real time, technical information regarding production.

3 Further Implementation for Education

If the prospect of a computer in every home and classroom becomes a reality, then multi-media projects such as *The ICMC 92 CD Stack* should become a common part of the music curriculum. The multitude of uses can be easily perceived, not just as a teaching tool, but as a process of evaluation. Students can easily learn how to create their own stacks and use such methods to explore other composers' works and demonstrate their own work to instructors. Just as many upper-level educational institutions are considering the acceptance of written student work on disc and even networks, the development of CD-controlling stacks such as these by instructors and students alike would have immediate benefit to all concerned.

A pilot curriculum in any music program could utilize equipment that exists in most departments, or is easily attainable at reasonable prices. Most music departments or their affiliated colleges or universities have computer labs, and CD-ROM drives are commonly available under \$500. Students and staff in such a program would be taught methods of authoring such stacks in a initial course that could be complete in ten hours of instruction. Mainstream music courses could then include "off the shelf" CDs (not CD-ROMs, but CDs that play in any consumer CD player), as part of the required materials, along with books, etc. Assignments could then be made for students to analyze music by creating accompanying cards with text information regarding particular audio sections. Creative instructors, given time to work with such a technology, could develop innovative uses for such stacks. The Voyager company includes a section in their utility stack with a list of easily attainable ideas for this methodology including:

1. Creating a new stack that controls audio CDs
2. Scripting buttons that play an audio passage
3. Playing more than one passage from the same button
4. Pausing an audio passage
5. Highlighting the button for a passage that is playing
6. Checking whether there is a CD in the drive
7. Checking whether a specific CD is in the drive
8. Playing an audio passage on openCard or closeCard

9. Making an active list of passages
10. Playing a sequence of passages
11. Clicking on musical notation to play a passage
12. Measure-by-measure highlighting of musical notation
13. Real-time display of disc information
14. Creating a sliding scale for a CD
15. Sequence controller 1: Pop-up controller
16. Sequence controller 2: Multi-function button
17. Making messages appear while a passage is playing
18. Playing a passage with a running commentary
19. Changing cards during audio passages
20. Linking cards to CD passages
21. Playing a passage in a loop
22. Controlling multiple players from the same stack
23. Combining *HyperCard* sounds with CD passages
24. Listing track titles
25. Ensuring that user-entered CD times are valid

[Riggins, *et al.*, 1992]

These ideas do not include the possibilities for MIDI implementation within the *HyperCard* format that are fairly easy to include through Opcode's *MIDIplay* stack and other related products.

If an instructor wishes to utilize audio that is not available on a commercially attainable CD, single "one-offs" and small runs of CDs can be easily produced using Sound Designer-type software and any of the manufacturers who will master DATS to CDs. The advantages of such a medium are obvious, and the usefulness of a minimal amount of extra hardware to control inexpensive and widely available compact discs

should be attractive to anyone involved in music education. Creating a CD-ROM, with accompanying files and more memory-intensive aspects, such as *Quicktime* movies and color graphics is not an unattainable goal. At this point, however, this task is more in the realm of writing a book, requiring more extensive technical expertise and a larger budget than the proposed *HyperCard* format.

The authors have also included a few sample cards in the stack that could serve as a template for student use in analysis of recorded works. These cards are easy to develop, and any instructor should be able to personalize them to his or her needs with a minimal degree of effort.

4 Conclusions

Obviously, the axiom of "garbage in, garbage out" is most obvious in computer assisted work of any kind. Educational uses of these sort of *HyperCard* stacks will only be as good as the quality of the hard content included in the stacks, not just the flashy multi-media aspects. But common knowledge of methods for development of this type of media can only lead to more aids for effective teaching and a greater depth of understanding of music for the student.

Note: Copies of the *ICMC 92* CD are available from the ICMA. If you are interested in a copy of *The ICMC 92 CD Stack*, please contact the authors.

References

- [Riggins, *et al.*, 1992] Steve Riggins, Steven Whalen, and Simeon Leifer. *Voyager CD AudioStack*, Version 1.2. Voyager, 1992.

Appendix C

Score for *On Growth and Form* by Bruno Degazio

PLEASE NOTE

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

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Appendix C

115-119,
Appendix D

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Appendix D**Score for *Hok Pwah* by Zack Settel**

Bibliography

- Apple Computer Inc. *HyperCard Script Language Guide*. Santa Clara: Claris Corporation, 1990.
- Apple Computer Inc. *HyperCard Reference*. Santa Clara: Claris Corporation, 1990.
- Goodman, Danny. *The Complete HyperCard 2.0 Handbook*. New York: Bantam, 1990.
- Riggins, Steve, with Steven Whalen, Simeon Leifer. *Voyager CD AudioStack, Version 1.2*. Los Angeles: Voyager, 1992.
- Tincher, Edward Russell, and Allen Strange. "The ICMC '92 Stack." In *Proceedings of the 1993 International Computer Music Conference*. Ed., International Computer Music Association.