

FINAL PROJECT REPORT

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"COMPOSITION USING PR2"

INTRODUCTION

It has been said that there are two kinds of intellectual knowledge: scientific and philosophical. This seems to be much too simple a statement of categories; but, be that as it may, it has often been said that scientists often lack the benefits of critical reflection and evaluation concerning their work while philosophers are deprived of the technical competence needed to communicate conditions of knowledge. Since I am neither a scientist or a philosopher; but an artist, I hope that this report will be read simply as a progress report on artistic activity. The fact that some of these activities involve the use of modern technology does not qualify me as a scientist. The espousing of aesthetic beliefs does not qualify me as a philosopher.

PROJECT OVERVIEW

This report represents an accumulation of ideas resulting from approximately seven months of work with the compositional program PR2. The first three months of this project were spent in familiarizing myself with the mechanisms of PR2. This period of work was didactic in nature. I presented a mid-project report (18-8-82)(see appendix I) which gave an overview of my work up to that point and my projected plan for future work with PR2; as well as presenting, on a rhetorical level, some thoughts and observations about working with a compositional program and PR2 specifically.

This present report is a final project report on my work with PR2 at the Institute. But this is not the "final" report of my project work. As stated in the mid-project report, the next step of my work was the creation of a musical composition. This has proceeded in two phases: (1) use of the computer at the Institute in conjunction with PR2 to create data in the form of printouts, and (2) production of a composition via interpretation of the aforementioned data. Since the second phase of this work does not require further use of PR2 or a computer, continuation of work under the auspices of the Institute is not necessary. Yet, I plan to present the Institute with a final report concerning my composition- including a score, documentation, and analysis of input and its relation to the final output (the composition)- when the last phase of work is complete. Since a final composition does not exist yet, this present report will avoid any attempt at discussing a composition; but rather, will focus on the use of composing programs, and in particular, PR2.

THE COMPUTER AS TOOL

David Joravsky, in a review concerning artificial intelligence and neuro-psychology stated:

"So far, computers have revealed the human essence in the way that hammers and saws and all our other tools reveal it. They are invented to do the job the mind-brain-hand finds incongenial or difficult or impossible; yet nevertheless strives to do. Computers and other machines may therefore be able to show us not what the mind is but rather what it is not, the endless number of other things it aspires to create in spite of itself."(1)

One of the activities of the mind is the creation of music. I am not sure if the computer can show us what music is- this is not even an interesting question for me- (nor is a model of 'human compositional processes'); but computers certainly allow us to explore various aspects of music in a unique

manner because "they...do the job our mind-brain-hand finds incongenial or difficult or impossible".

PROGRAMMED MUSIC: KOENIG AND PR2

For Koenig, PR2 is an important tool for setting up the boundaries of a form scheme by specifying general parametric possibilities, general ranges, which when realized with the aid of controlled random decision-making by the computer will display various aspects (or dimensions) of prescribed input data. *"The purpose of PR2 is to calculate musical structure variants".* (2). In PR2 numerous variants can be calculated from one set of input data. The variants all exist on the same hierarchical level and can be compared with each other on a one-to-one basis. (See figure 1.) PR2 was designed with this idea in mind. This is a rather simplified explanation of Koenig's approach to programmed music in PR2, but sufficient as a model from which to compare my approach to using PR2. (For a more in-depth explanation see 'ELECTRONIC MUSIC REPORTS 3, PR2', the introduction.)

METHODOLOGY

My work of a didactic nature which took place during the first three months of this project was somewhat in the spirit of Koenig's approach to programmed music in PR2. This was done purposefully to explore PR2 within the framework of its author's aesthetic approach. (The author's aesthetics cannot be completely disengaged from a compositional program- no matter how general the intention.) Later, upon beginning compositional work, my approach would not have differed too greatly except for one important factor: the present version of PR2 has the possibility for rapid sound playback of results. Output data can be represented as sound or as printed tables. Instead of receiving a stack of printouts which must be interpreted and converted into some sort of musical score (a time-consuming process) one just can push a button and hear the results of PR2. (Since I am of the first 'television generation' the ease with which results can be obtained is welcome.) The output can be listened to, changed (via the input), and listened to again and again virtually in a 'real-time' environment. (Since there are such widely varying definitions of the phrase 'real-time environment' in the computer music world which seem pointless to argue over, suffice it to say that my estimation of 'real-time' extends loosely to waiting for sounding results for about as long as it takes to drink a cup of coffee.) Anyway, this is a luxurious situation compared with the user environment of PR2 for the last 10 to 15 years. (It seems unnecessary to detail the obvious dangers of this luxury for the user because of the ease with which 'instant' music can be produced.)

This type of real-time interaction with a composing program can be very valuable. In fact, it has shaped my entire working procedure in certain ways. My basic approach to PR2 began to resemble my approach to a real-time interactive environment as described in the final project report for my previous project here at the Institute (1-5-82). (See appendix II.) Koenig attempts to find a general musical structure which appears flexible enough to produce a group of variants which could be likened to the various members of a family- all being unique expressions of the same genetic stockpile using PR2. (See Koenig's composition "UEBUNG FUER KLAVIER" which was composed using PR2.) For my purposes, a general musical structure becomes the starting point for a compositional process in which the generalities (or broad boundaries) are constantly shifted in the direction of the more specific (more precise boundaries)- constantly being focused down- in a type of 'self-corrective' mode. This is done until the final range of random possibilities does not reflect so much one aspect of a structure; but reflects my intention for a somewhat specific structure. For my work the general is illustrated by the input data. An individual variant is a specific. This is a goal oriented,

causal process. Another aspect of my approach considers input and output data as steps across time in which, in a feed-back situation, transformations took place from point 'A' to point 'B'. Often a set of input data was gradually altered and each resulting output became part of a musical 'chain' over time. (See figure 2.) The computer can be a valuable counselor in this process. Disciplines as diverse as physics, meteorology, and building construction have found the computer to be an invaluable tool- why not music also?

SIMULATION

Simulation is defined in computer science as the mathematical representation of problems allowing physical situations to be represented mathematically as a means of problem solving. Webster's Dictionary defines simulation as: *"the imitative representation of the functioning of one system or process by means of the functioning of another"*. A compositional program can allow one to examine problems which are not subject to direct experimentation. If composition can be viewed as a kind of problem solving (a one-sided viewpoint in my opinion, but sufficient at the moment) then a program such as PR2 enables one to reproduce or represent under what could be termed 'test conditions' various musical phenomena. The computer, due to its powers of simulation, can be utilized as an aid in compositional processes.

By the rapid simulation of numerous variants (via sounding output) and the many dimensions of a structure which can be presented, explored, and studied no implication should be construed that part of the computer's value is that of a 'time-saving' device. On the contrary, the implications of this experience have meant a lengthening of the compositional process for me. The responsibility of exploring this method of composing- the ability to be able to try out numerous possibilities in a short amount of time (a heuristic approach)- requires more time if it is to be used to its fullest advantage. A model musical structure can be constructed, predictions can be made, a multitude of variations in the initial structure can be tested; but, importantly, the time needed for working without a computer would make this type of compositional method prohibitive.

REACTIONS

In many ways, my methods were easily adaptable to PR2, but at times I found that I was attempting to use the program in a somewhat unidiomatic manner. Even when attempting things for which the program was not really meant, though, I found that I was able to produce successful results. One of the values of a compositional program can be its flexibility and usefulness in various situations.

I did feel some constraints because the program has no facilities for organizing variants from a higher level. Other global facilities could be convenient and useful; such as, the ability to be able to alter tendencies dynamically across time via transformation rules. I found that often I was more comfortable altering the description for a particular selection principle rather than the stockpile from which the selection principle could choose.

FINAL PHASE

The final phase of work will be the interpretation of the computed, printed data. This stage is the most important for me as a composer. Another kind of interaction between composer and machine takes place here. One is confronted with information which must be converted into another form, Conversion, in a mechanical sense, in which the machine is expected to give printouts to be directly translated for performers without the necessity for composer control would be lacking something, in my view. This conversion can best take the form of transformation. The process begins with composer-created input data.

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The computer interprets and transforms this data. The output from the computer becomes input data for the composer to transform into a composition as another form of output. If the composition is for performers, instead of tape, then the composer's output (the composition) becomes the input for the performer who in turn, transforms this data into a sounding performance. In all stages of this process, the output stage can (by a feed-back process) return to the input level. (See figure 3.)

Musically meaningful data interpretation becomes an integral part of the compositional process. Just as the composer is the link between input and computer, he is also the link between computer and output. The creation of the rules of a composition is the first step, setting the rules in motion and studying the results is the second step, and lastly the reconfirmation of those rules, the rewriting, or even breaking of compositional rules is the most important stage of composition in programmed music.

NOTES

- (1) Joravsky, David. "BODY, MIND, AND MACHINE" The New York Review of Books. 1982.
- (2) Koenig, G.M. "PROJECT 2, A PROGRAME FOR MUSIC COMPOSITION". Electronic Music Reports 3. Institute for Sonology. 1970.

FIGURE 1

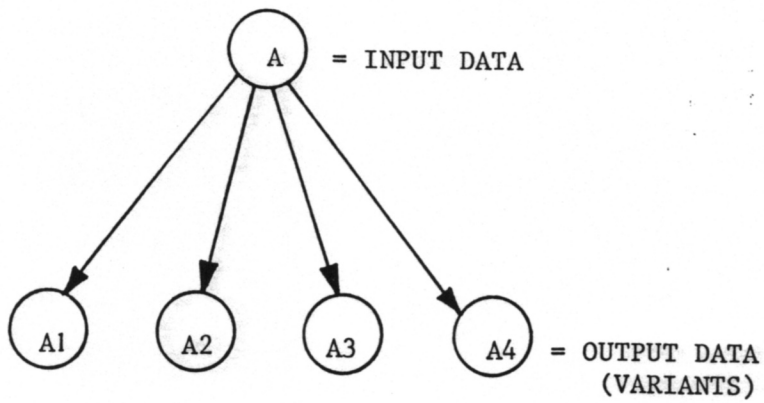
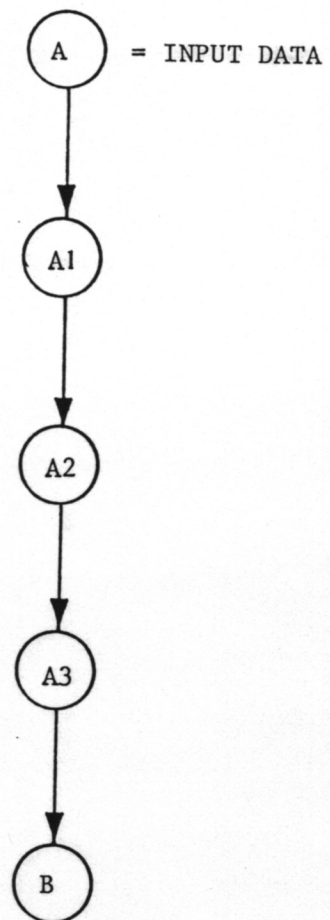


FIGURE 2



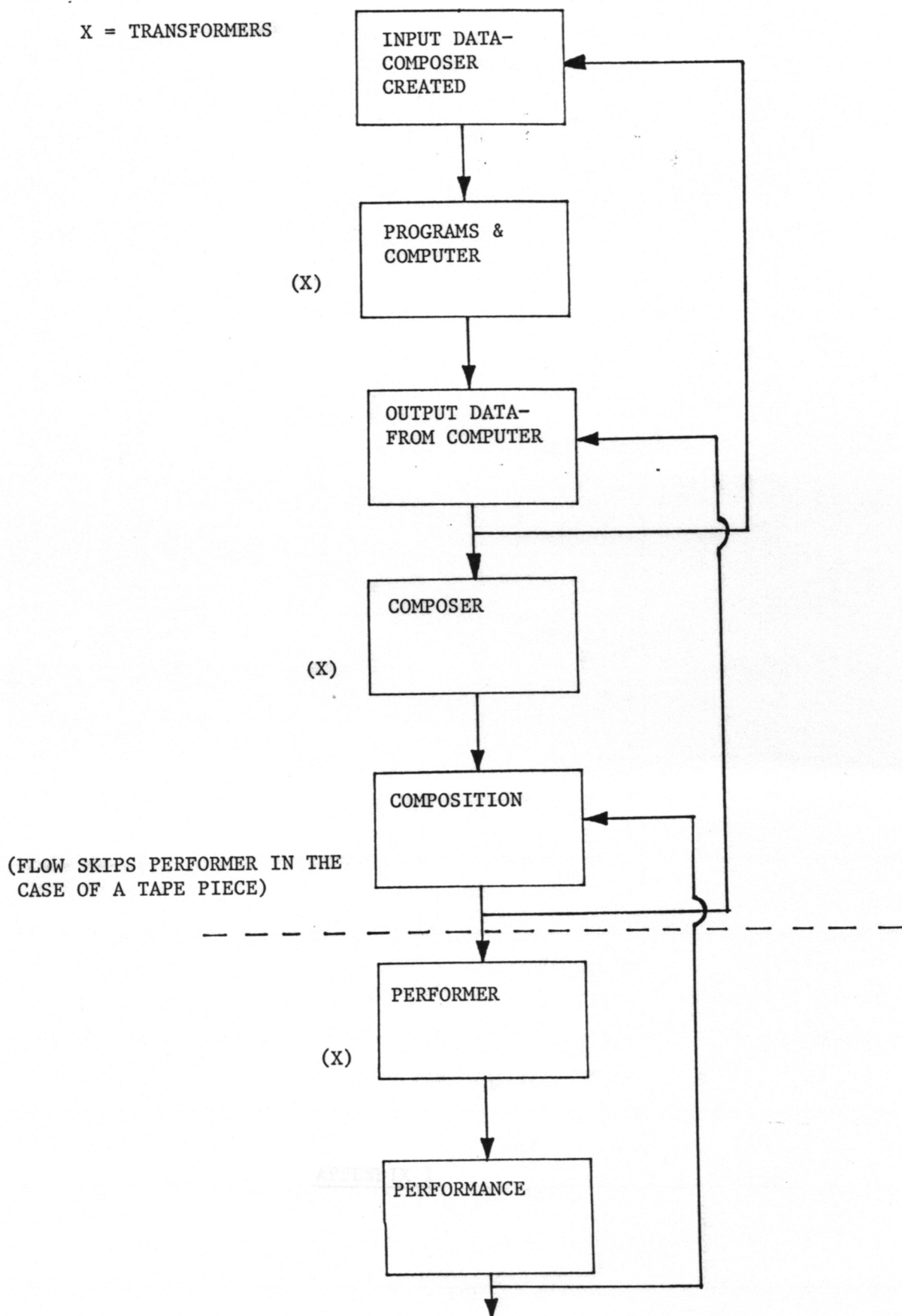
IN FIGURE 2 A1, A2, A3, & B CAN BE VIEWED IN TWO WAYS:

(1) A1, A2, A3 ARE ALL STEPS IN A HEURISTIC METHOD WITH B BEING THE ONLY FINAL OUTPUT.

(2) A1, A2, A3 ARE ALL OUTPUT DATA (VARIANTS) WITH B REPRESENTING THE FINAL VARIANT IN A TRANSFORMATIVE PROCESS OVER TIME.

FIGURE 3

X = TRANSFORMERS



APPENDIX I

This report represents an accumulation of ideas and results of approximately three months of working with the compositional program PR2. The type of work in which I am involved is didactic. This is a sensible working procedure regarding initial work with PR2. The program is complex and not an easy question/answer sort of program. A large amount of time and study are necessary in order to understand its operational mechanics; not to mention the learned ability of prediction as to results. It is necessary to become familiar with a large amount of input data. Calculation and understanding of the results is yet another necessity. A further complexity is that there are a great many interrelationships amongst the input data. Prediction and interpretation of these connections among and between input data is still to be studied.

The entire program is based on a hierarchical approach to music. One slight change can have an obvious or subtle effect on all other input data. Herein lies the major area for study. The idea of 'variants' which is basic to the aesthetic philosophy of Mr. Koenig is at the very core of PR2 - inherent in the basic structure of the working of PR2.

In the past three months I have attempted to familiarize myself with individual input possibilities. The first phase of study had been successful: an understanding of the technics and mechanics of program use. The second phase is beginning now: an approach to the program as a musician. I say musician, not composer, which may be a fine distinction in some ways, but one that I think is important. To further my understanding of the program it is necessary to explore musical production via musical ideas and goals. (I leave the word 'musical' undefined here to avoid taking this report into areas other than the main subject at hand.) Since the hierarchy and interrelationships in the program refer finally to actual musical parameters, this 'musical' perspective is significant. Only with experience, and hopefully success, in this area has been achieved can I step into the final role as a 'user' of PR2: composer. The final result of study would be ideally a composition which can be of great use in determining the value of compositional programs in general, PR2 specifically, and myself as a user of PR2.

As has been stated, PR2 is a complex program with many possibilities. The freedoms are not limitless though. As with any compositional program (no matter how general) the creator endows the program with certain aesthetic ideas, a particular aesthetic perspective. This can be accomplished on a very conscious level, or on the opposite extreme, unconsciously. Nevertheless, the combination of the author's aesthetics with purely practical considerations make up the limitations which any compositional program has.

Methodologically speaking, I decided to avoid approaching the program with too many preconceived ideas or with any sort of compositional plans or strategies. Instead, I have chosen to begin at simple starting points in the program and have tried to move in different directions until a path reaches an outer boundary of the program (either/and an aesthetic or practical limitation). Interestingly, these limitations became easier to foresee and predict as my experience has increased. In many cases the predicted limitations began to shape my working procedure, causing me to avoid reaching a supposed limitation (similar to recursive division by two). In this way the limitations took on new

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meaning, more as mental abstractions than as something concrete.

On a more personal, yet somewhat philosophical level, the question of just who is the 'composer' when one is using a compositional program (myself?, Koenig?, the computer?) is an important one. Since PR2 allows a user the two extreme possibilities of total control by the composer or total control via random choice by the computer with the flexibility for anything between these two 'extremes', a user can be lead to believe that there is nothing between himself and the computer. The program becomes invisible. At one point I thought that tests made at either extreme would reveal (or allow to surface) the work which was Koenig's in terms of 'fixed program characteristics'. This approach gave me a deeper understanding of some of the essentials of PR2. But the lines between composer (program user), computer (program), and author (of the program) are inherently blurred. Subject/object relationships are sets which intersect in great complexity. This may be analogous to the relationship between a composer and an instrumentalist working in close collaboration on a composition. If the instrumentalist is capable, then many of his ideas may be embodied, via the composer, in the composition. While, in turn, the instrumentalist's ideas are of course shaped by his instrument. The piece may end up being a collaborative effort among composer, performer, and instrument. I think a similar situation exists in using a compositional program.

The success of a compositional program lies in its ability to show a user different aspects of his compositional ideas. I hope to have more insight into this area of study in the next few months.

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18-8-82