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The Application in Original Musical Compositions of
Algorithms Within Four Music Composition Software
Programs and the Development of Composition
Algorithms Within *Phrase Garden*, an Original Music
Composition Software Program

Steven James Campbell

Bachelor of Music with Honours, Graduate Diploma in Education,
University of New England, Armidale, NSW, Australia

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I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.


Signature

ABSTRACT

In the field of automated composition, algorithms are generally developed by composers with computer programming experience, and documented in relation to the composer's own musical compositions. With the rise of commercially available music software in the mid-1980s, algorithms have been made available to composers who do not have computer programming experience. However, there exists a paucity of studies pertaining to the application of such algorithms in works composed with commercially available software, which this study attempts to address.

Firstly, this study provides an examination of the application of algorithms from the commercially available software programs *M*, *Jam Factory* and *Symbolic Composer*. The applications of algorithms are in the context of three compositions written specifically for the study. Secondly, it provides an examination of a fourth example work composed with *Phrase Garden*, a software program developed specifically for the study using the software development program *MAX*. Overall, this study includes historical and technical aspects of individual algorithms used in the four example works, with the applications of algorithms detailed through the function each algorithm performs in the context of the example works. Algorithms in the initial three example works are limited to those available within the commercially available software programs employed, while in the fourth, new algorithms are developed within *MAX* and used in the *Phrase Garden* program.

The study is in five parts. Part One (Chapters 1-2) provides definitions of terms related to the field of automated composition, details the existing literature on automated composition using historical surveys, and provides overviews of the commercially available software used in the study. Part Two (Chapters 3-6) details the algorithms employed in the compositions written with *M*, *Jam Factory* and *Symbolic Composer*. Part Three details the compositional style used in the works composed with *M* and *Symbolic Composer*, along with brief analyses of two further instrumental works. These analyses serve to demonstrate incompatibilities between composition processes provided in commercially available software and those used in the compositional style. Part Three (Chapter 7) serves as a

background to the substantial Part Four (Chapters 8-9) of the study in which the development of the *Phrase Garden* program is detailed with reference to the compositional style, and details an example work composed with the *Phrase Garden* program. Part Five (Chapter 10) presents reviews of the study and a discussion concerning the use of algorithms in automated composition programs that draws on the applications and development of algorithms carried out in the study.

Five appendices are given, the first three providing the relevant notated parts or scores for the example works, the fourth providing *Symbolic Composer* 'scores' for the work composed with *Symbolic Composer* and the fifth providing notes on audio examples supplied on an accompanying Compact Disc. The *Phrase Garden* program is supplied on an accompanying, Macintosh formatted, 3.5" diskette.

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