

# **MORPHEUS >> emergent music**

## **(contents may vary)<sup>1</sup>**

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### **>> abstract**

MORPHEUS is a CD of fluid dance music. It features 16 tracks or ‘songs’ by 6 composers and is designed to behave, and be experienced like, a normal audio CD although having to run on a macintosh computer rather than a CD player. In contrast to normal audio, each song uses its own generative algorithms to enable it to exist in a state of ‘fluidity’, so that each time you run a song you get a unique ‘performance’. (You could say that the music on MORPHEUS is something between a recording and a live performance.)

I present here the origins and achievements of the project together with the basis of a discussion of some of the aesthetic issues surrounding it.

### **>> the idea**

My first attempt at creating ‘fluid’ dance music was in 1999. A big dance hit at the time was by DJ Jurgen and Alice DeeJay - ‘Better Off Alone’. I was struck by the record’s sparse and economical style and apart from a limited vocal refrain the recording used predominately synthesizers to create the sound. From my burgeoning interest in algorithmic composition I hypothesized that it would be possible to make a track with similar qualities using algorithms instead of fixed sequences to achieve fluidity within the song. I listened to ‘Better Off Alone’ and made an analysis of its content in terms of : structure, melody, harmony, rhythm and timbre. I then set about extracting some of its underlying ‘rules’ to create a generalised form of the piece which could be used to reconstitute it as a ‘fluid’ version. In March 1999 I

worked with computer scientist Ross Clement to programme the idea in SuperCollider resulting in a piece we called 'Alice'<sup>2</sup>.

Although 'Alice' is primitive and in sonic and melodic / harmonic terms often falls short of its precursor, the idea worked and fluid dance music in 'song' form existed.

As an algorithmic composition approach defined by Supper<sup>3</sup>, Alice and MORPHEUS align mostly clearly to what he calls type 1: - 'Modeling traditional, non-algorithmic compositional procedures'. It will be seen that most algorithms within the project relate in various ways to the decisions that conventional composers and producers of dance music make.

In October 2000 a funding opportunity from the University of Westminster permitted me to develop the idea further and I committed to making a whole CD of generative dance music.

### **the brief**

Although the collaborating group never met as a whole, some of us discussed and agreed a 'brief' which specified some ground rules for the project. All pieces should be:

- made in SuperCollider 2.2.11<sup>4</sup> to run on a 400MHz Macintosh computer (minimum)
- stereo (although 4 channel would be considered for a promotional event)
- of limited duration (say between 3 and 8 minutes)
- algorithmic / fluid / generative in some way
- non-interactive and have absolutely no GUI (graphic user interface) elements
- dance music / beat based.

There was a general desire that rather than creating systems that created wholly new music each time, there should be a notion that 'pieces' exist as a finished entity whilst subject to fluidity.

### **the 'humming' test**

A question that is sometimes raised about the whole notion of generative music is whether the music can ever be really enjoyed and appreciated, the way we enjoy our favourite pieces and recordings. Working against this is the fact that generative music changes, and hence we cannot

'know' a piece absolutely and achieve the pleasure derived from music which relies to some extent on our memory of previous listenings and the nostalgia and associations those memories bring.

Often, music that we like stays in our consciousness in the form of melodic / rhythmic fragments but also as a memory of the energy or emotional intensity generated. If we find ourself humming a tune as we walk along the street we could say that a piece has passed the 'humming test'. I was interested to see whether any of the material on MORPHEUS would pass!

### **generative versus interactive**

Debate at this stage focussed on whether to include any elements of interactivity. Although interactivity is often considered an attractive feature in terms of marketability in this case it would be contrary to the basic aims - to place emphasis on generative algorithms that would consistently produce coherent dance music. The overriding view was that any degree of interactivity would devalue the generative content.

### **musical quality**

Of fundamental importance to me was the idea that the quality of the actual music produced should be high. I am frustrated by examples of generative composition where although the idea and work behind the music may be of great interest, the music itself is not. Already I have noticed a tendency among generative composers to say - "it doesn't sound that great because its generative". Nor do I believe that it is acceptable to expect for it to be good only some of the time. Although the "contents may vary" it would not be acceptable to have music that lacked coherence and quality on any occasion.

Whether or not this could be achieved would, at the very least, be highly subjective. Furthermore we could never know the music that MORPHEUS would make once it had been distributed and played at home.

## >> the content

Each composer designed and used their own algorithms for creating their music. These varied greatly in content and scope.

### Alex Marcou - 'Section 9'

The most straight forward approach is taken by Alex whose 'Section 9' is structured

intro                      masterarrange                      outro

where the intro and outro are fixed and the masterarrange section consists of 3 fixed sub-arrangements which can be heard in any order and represent a contemporary version of the 'Dice Game'<sup>5</sup> model. I believe the title refers to the number of unique possibilities this generates. ( - although if my probability theory is correct the title should have been 'Section 6'!)

### Fabrice Mogini - 'Memory'

'Memory' uses a funky jazz rock style. Although its overall form is fixed, its algorithmic fluidity extends throughout its rhythmic and tonal content.. An example is the funky bassline which, following the drum introduction, is the second instrument heard. The bassline is fluid in terms of rhythm and pitch. Although its timbre is fixed, an algorithm which allows some notes to slide (like a fretless bass) provides flexibility, variety and richness to the sound. The bassline develops intelligently and economically throughout the piece making appropriate use of repetition and variation.

'Memory' successfully allows several 'instruments' to improvise and jam around a mostly fixed structure.

### /fO - 'Patch 5'

There is a story behind 'Patch 5' which I would like to relate. Fredrik and I met in Stockholm in August to discuss generative music and visit a 'free jazz' concert. Some way into the concert (as it was reaching a peak of intensity) he turned to me and said, "That's what can never be achieved in generative music - that excitement..."

About a week later he emailed Patch 5 to me. Although very different from a free jazz gig and, like all music, has its limitations - it has something.. some qualities of excitement, energy and 'liveness' that I had not heard in a generative piece before. For me, Patch 5 is a turning point in generative music.

Patch 5 also uses its fluidity in more subtle ways than most. Of all the pieces on Morpheus it is the one which sounds most similar each time and is one of the most easily recognizable. Despite this, its fluidity is rich, running through nearly every aspect of the music from the duration of each section, the synth timbres and tunings, and the drum rhythms.

The drum patterns and fills which energise the music, and are primarily responsible for creating the intensity of the piece, deserve particular note.

### jnrty - Salty

This is a techno inspired piece with an emphasis on melody, filtered arpeggiators and intricate drum patterns. The sound is characterised mostly by the use of airy synth sounds achieved using detuning and bitrate degradation which has the effect of promoting high frequency overtones. Drum sounds are varied although are all created solely through synthesis using WhiteNoise, Sine and Square waves. No samples are used at all.

In contrast to the tempo, timbral, rhythmic and tonal elements which are entirely fluid, the form of the piece is constant, rather like a mould the music is poured into.

Rather than using lots of random generation, my main goal was to see how I could take a few melodic and rhythmic fragments and expand and develop them throughout the length of the piece. This idea appears most clearly in the relationship between the main theme and the arpeggiated figure which are simply different representations of the same material.

Rhythmically, the main theme, arpeggios and bass drum all draw from the same motif.

### mintyfresh - night

Overtly dance music based, this piece relates closely to Ben's work as a live performer and DJ. Although very different in style from Fredrik's Patch 5, Night is also highly focussed in its musical content and is fluid only within tight constraints. The main elements of the drum beat are mostly fixed relying on the swung sub-beats to provide fluid rhythmic and textural

interest. Apart from the rhythm of these sub-beats the sound of them, ranging from tight hi hats to rather sqelchy unpitched synths also varies.

Although none of Ben's Morpheus works have tonal elements, each piece is a feast of sonic detail within its highly restricted framework.

### Lapdance - iDAB

None of Nick's works conform to the Morpheus brief, they are included however because of their sheer brilliance and are by no means a million miles away from the aims of the project.

iDAB (infinite Drum And Bass) creates a drum 'n bass feel for 16 bars or so, pauses momentarily and then creates an entirely new one, continuing forever!

The most remarkable thing about iDAB is the range and stylishness of each feel it creates. Each one is genuinely new, drawing on an apparently vast range of stylistic and musical abilities. Often the feel has frenetic energy but sometimes the it is more laid back, occasionally becoming outrageously minimal!

The algorithms used are well documented<sup>6</sup>.

iDAB does not create whole pieces and so cannot be evaluated as such. For what it does do, creating beats and 'feels' it is remarkable and, like Patch 5, is able to create a real sense of energy.

### **>> can you hum it?**

It is probably natural for most people with an interest in dance music to compare MORPHEUS to existing recordings. The comparison is not a straightforward one. One of the reasons for this is the difference between a studio recording which tends towards a sort of idealisation of the music and a live performance which sacrifices idealisation for 'uniqueness'. As an algorithmic album MORPHEUS represents a synthesis between live and recorded approaches and inherits the benefits and disadvantages of both.

Feedback about the musical quality of MORPHEUS is only beginning to come in. Judging by reactions at the launch party there is a clear interest and excitement about the idea although it is less clear if people will actually listen to and enjoy it. In this case I believe it is appropriate

to offer my own opinion. I have listened to MORPHEUS a lot and propose the following observations:

- the quality and consistency of the music satisfies our initial aim in achieving fluid dance music with high quality and consistency
- each of the pieces are clearly recognizable as a distinct and coherent piece within its scope for variation.

I have found myself humming several of the Morpheus pieces. But what is it that I hum, is it one specific performance that was particularly good or the last version perhaps? To be honest I'm not really sure, but I believe that I hum a sort of generalised 'aggregate' version of some elements, fusing some of the most common melodic and rhythmic tendencies of a particular piece. Although far from a rigorous empirical study, I believe this indicates some scope for optimism for the future of fluid dance music.

## >> **appendix**

### **chronology**

October 2000 Project begins

Jan 2001 SuperCollider Study Group meets at University of Westminster

July 2001 'Interactive Dance Music Summer School' University of Westminster, Harrow Campus and SuperCollider day at Public Life, Spitalfields, London. MORPHEUS group is formed.

Nov 19th 2001 MORPHEUS launch party at Great Eastern Dining Room, Shoreditch, London.

### **contributors**

The five other contributors featured on Morpheus are as follows:

**Nick Collins (Lapdance)** - a musician with a strong background in software engineering in audio applications. Currently a researcher at Middlesex University specialising in algorithmic composition.

**Fabrice Mogini** - originally from Paris now living in London, Fabrice plays guitar and has been developing interactive devices in SuperCollider that he uses to perform live.

**Ben Millstein (mintyfresh)** - graduated from California Institute for the Arts in 2001 and performs and records regularly as mintyfresh generating much of his material in SuperCollider and has developed sophisticated live performance instruments.

**Fredrik Olofsson (/fO)** - comes from a background including classical composition and experimental jazz. He currently lives and works in Stockholm working part-time for the Interactive Institute.

**Alex Marcou** - a second year undergraduate on BA Commercial Music at University of Westminster experienced in conventional dance music production and no previous experience in algorithmic composition.

## >> Notes by contributors

### **Fabrice Mogini - 'Memory'**

1. Some elements are fixed:

- The sound of instruments (drums, bass, chords, riff voice, solo voice)
- the tempo
- Source samples (drum sounds only)

2. The following use generative algorithms

#### **Length of section:**

Between 2 and 32 bars per section, always an even number. Most of the other parameters to be calculated are then valid for the current section only.

#### **Complication level**

At the beginning the values are simple (for instance the drums do not play off beats, the harmony used is tonal, no solos etc...) As the track develops, more choices are available and more complication prevails.

## **Harmony**

For the first section, a mode is given (a number of notes from the chromatic scale, between 5 and 9). For each new section, a new mode is calculated.

## **Modal transformation**

Instead of choosing a totally new mode when calculating data for a new section, the computer just removes two values from the previous section's mode and chooses two other notes from the chromatic scale that have not been used yet. So the harmony changes randomly but is dependent on past choices and evolves smoothly.

## **Modal transposition**

The mode can be subject to transposition for half a bar. When this option is chosen, it affects all the instruments to ensure they refer to the current tonality.

## **Melody / riffs**

The bass line, the chords and the solo create each phrase using notes chosen from the current mode for this section. The phrases are built up accordingly to the complication level. For instance, melodic leaps (or interval jumps) get larger when the complication level rises.

## **Rhythm**

For a section, the bass line, the chords, the solo use rhythmic phrases chosen for each from a range of values. The basic length of a bar is divided, equally or not into smaller units used as the main rhythmic phrase. This phrase is then recycled (permutation of all sorts) to create a variation in the next bar although sometimes it is merely repeated. The speed and pattern-type of durations depend on the complication level of the section.

## **Melody / riff variations**

In the same manner as for the rhythms, the bass line, chords and solo can actually play different variations of their basic phrase. So for a section of 16 bars we could have 8 bars of the normal basic phrase and then 8 bars with a melody starting a different degree in the mode for instance. As for rhythms, the phrase could be repeated in the next bar. Many variations of

allsorts are used. When the section is finished, calculate the next section and all the other parameters that apply to it.

As the title suggests, memory has an important role in this composition: A whole section or whole phrases can be stored randomly (or depending on the current state of other parameters). Finally, these sections or phrases can reappear just after some complicated parts.

Memo (track 3 on MORPHEUS) is a remix with the same code and different samples and starting values.

Fabrice Mogini Dec 2001

### **Fredrik Olofsson**

My algorithms generate slight variations on given musical skeletons. By carefully selecting which parameters to vary and to which degree, subtle differences that may go by unnoticed gives each listening situation its uniqueness.

Generative algorithms are used for:

Length of sections, instrument entry time, timbre (e.g. number of overtones), melodies (order of given frequencies, approximate frequency), rhythms (weighted probability of given notelengths, random delta time).

And at a detailed (note) level:

note envelope (attack and release time), note panning, note amplitude.

Fredrik Olofsson Dec 2001

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<sup>1</sup> Sleeve note from J. Eacott et al, 'MORPHEUS >>> emergent music' Mushi 006 CD rom. Mushimushi, London 2001

<sup>2</sup> J. Eacott and R. Clement; 'Alice', Algorithmic dance track in SuperCollider 2. 1999

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<sup>3</sup> M. Supper; 'A Few Remarks on Algorithmic Composition' CMJ 25:1 Spring 2001

<sup>4</sup> SuperCollider - a real time sound synthesis environment for the Macintosh by James McCartney.  
[www.audiosynth.com](http://www.audiosynth.com)

<sup>5</sup> W. Mozart; 'A Musical Dice Game' K 294d

<sup>6</sup> N. Collins; 'Algorithmic Composition Methods for Breakbeat Science' 2000