

# Music and Algorithms

Week 1: Algorithms in composition.

## Overview of Course

1. What is an algorithm?  
Prescriptive and descriptive algorithms in composition
2. Algorithm as process: composition as system design  
Process-based composition
3. Algorithm as a formalisation of the compositional process  
Scales, modes and ragas
4. Algorithms and analytic processes  
Analysis in western and world music
5. Computational approaches to algorithmic composition  
Composition workshop
6. Algorithms in practice: Composition presentations  
Tom Arthurs and Ollie Bown electronic duo

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## House Keeping:

### Assessment modes and dates

#### 75% course work

50% essay due weds 31st May, 4pm.

50% composition exercise due weds 24th May (in class)

#### 25% unseen exam

last years paper available online. LOOK AT IT

Course website: <http://www.informatics.sussex.ac.uk/courses/maa>

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## Dictionary definition

*noun* a process or set of rules used in calculations or other problem-solving operations.

>> is composition a problem ?

>> are there aspects of the compositional process that can be usefully tackled within a problem-solving framework?

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## Types of algorithms

### Processes:

Structured physical processes

Mechanical devices which generate sound.

eg windchimes, aeolian harps

Systems which interpret existing physical processes.

eg 'sonifying' meteorological/ geological/ biological processes

Structured formal processes

Stochastic processes

eg probability distributions

Random/ chance processes

aleatoric music

eg dice throwing, card shuffling etc.

### Rule sets:

'Deduced' from existing works (grammatically or mathematically)

eg 'rules' of harmonisation

Contrived by composer for novel effect.

eg Cardews Great Learning paragraph 7

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## Applications

### Descriptive - modelling

:: understanding/ analysing certain musical styles (musicology)

:: understanding/ analysing approaches to composition (cognitive science)

:: (can be seen as formalising implicit algorithms)

### Prescriptive - composing

:: breaking free of traditional styles

:: attempting to replicate existing styles

:: (explicit algorithms)

:: automation vs inspiration

computer music research blurs into musical computer science

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## Automation examples

Mozart Dice music

Jason Freeman iTunes signature maker.

<http://www.jasonfreeman.net/itsm/>

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## examples: descriptive - digital

### Step 1 - Practice / Improvisation

- Gathering ideas, writing them down, improvise with old templates of structures samples, all these ideas are used in a sample based and sequencing program.

### Step 2 - Samples

- Found Sounds, Sample CDs, and Vinyl are gathered for the composition

### Step 3 - Beats

- Loops are then created and layered as the track builds up with the use of editing, manipulation, cutting up the samples and adding various processes to the sound within them.

### Step 4 - Structure

- The sequence is then put into a melodic structure such as a template for an IDM or electronic track, usually a fair amount of time is spent on restructuring the sounds and the actual rhythm or melodic pattern, until I am completely happy with the result.

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**examples:  
descriptive - instrumental**

- i) I sit in front of my amp with my guitar and a friend and I go through basic riffs and chord patterns which sound like they could fit together.
- ii) I then get feedback from the friend on what sounds good/bad and get an objective look at it.
- iii) I then get into a band and tell/show the band members the riff and ask them to perform in the genre it will fit in.
- iv) Using feedback I will say what fits and what doesn't.
- v) Then I would start on lyrics and harmonies
- vi) Having all the parts I will then decide the structure.

**now you try**

**examples:  
prescriptive - inspiration**

- 1. Place a lightbulb in a tough plastic bag.
- 2. Hit the bag with something heavy to smash the lightbulb.
- 3. Open the bag and look at the broken pieces.
- 4. Using only one instrument, write a piece of music best representing the resulting shapes. Each shape should have its own musical section and the size of the shape will dictate the length of the section.

**examples:  
prescriptive - automation**

- 1. Open iTunes and arrange tracks by title
- 2. Select the first 6 letters of the name of the first artist
- 3. Go through track listings and select first track beginning with each of the letters of the artist's name. (if there isn't one, use the next available)
- 4. Map each letter into numerical equivalent ( $a = 1, z = 26$ ). Take a sample of this length from the beginning of each track
- 5. Set playback speed according to numerical value of the next letter ( $n + 1$ ) in the sequence. Modify this playback speed: for numbers less than 10 divide by 20, for numbers greater than 10 multiply it by 20
- 6. Arrange samples sequentially according to original sample length of the next letter.
- 7. Repeat steps 5 and 6 progressing by one letter each time until all you have been through all six letters.

## Prescriptive algorithms

- Try writing an 'automated' composition algorithm, which you, or someone else could carry out (can be digital, electronic or acoustic)