Lesson #3: Compositional Method with MxM for L-Systems

What's It All About?

Just as Turtle Graphics provides a way to render L-systems graphically, MxM provides a way to render L-systems sonically. You can think of MxM as a tool for exploring musical phenomena. Mostly it is used to investigate tonal music in one way or another. But it also incorporates a bit of L-systems definition and generation functionality.

Downloading and Running MxM

You can find the `MxM` program, in the form of a `.jar` file, at the following location:

```
http://www.cs.oswego.edu/~blue/software/
```

After downloading the `MxM` program to a suitable directory, you can run the `MxM` program by typing the following into a terminal window, presuming your are in the directory to which you downloaded the program:

```
java -jar MxM.jar
```

MxM and L-Systems: Introduction

You can investigate L-Systems in the Iannis Xenakis portion of MxM. Just click on him (the right most face after you have launched MxM), and you will see a control panel with, among other things, the following three buttons:

1. -DLSYSTEMS – Meta command to display the current L-Systems (Algae, Cantor, Koch, plus any that you have just defined).
2. -XLSYSTEMS – Meta command to explore an L-System that is known by MxM, by simply determining the next generation on command.
3. -NLSYSTEM – Meta command to create a new L-System.

MxM and L-Systems: Compositional Method

To craft an L-System based composition in MxM, you might proceed as follows:

1. Get into MxM, finding your way to the algorithmic composition part of the system (represented by the image of Xenakis).
2. Create a new L-System (use the NLSYSTEM meta command).
3. Explore/expand it to obtain a generation that you can work with (use the XLSYSTEMS meta command).
4. Save the string of symbols that comprise the generation.

5. Leave MxM, and then get back into it, but this time finding your way to the tonal world (click on the image of Chopin, the leftmost face that you will see after launching MxM).
6. Enter a region in which to work on your L-System composition.
7. Define a command called PATTERN consisting of the generation previously established, but with the letter S prepended to each L-System symbol.
8. Perform a "pattern rendering" by defining SA, SB, ... in terms of Clay primitives, such as `play`, `rest`, `rp`, `lp`, `x2`, `s2`, `x3`, `s3`.
9. Perform a "piece rendering" by contextualizing the pattern within some number of MxM commands.
10. Run the piece.
11. Edit as you wish.
12. Save the piece as a midi file, and then exit the system (in order to save your composition).
13. Render it, if you like, as an MP3 file, using whatever method you have at your disposal.

MxM and L-Systems: Example Composition

Just a few highlights:

1. Creating the L-System using `-NLSYSTEM`:

   Hit the button. Then interact by choosing the button with four symbols (A B C D) and defining the productions at the prompts:

   - Prompt A: A
   - Prompt B: B A
   - Prompt C: C B A
   - Prompt D: D C B A

   Finally, when prompted, type in your chosen name for the L-System, like ABCD.

2. Display your L-System using `-DLSYSTEMS`. Among those displayed you will see:

```
name=ABCD
vocabularity = { A B C D }
productions...
A --> A
B --> B A
C --> C B A
D --> D C B A
start=D
```

3. Expand your L-System using `-XLSYSTEMS`

```
G0: D (1S = 0A 0B 0C 1D)
G1: D C B A (4S = 1A 1B 1C 1D)
G2: D C B A C B A B A A (10S = 4A 3B 2C 1D)
G3: D C B A C B A B A A C B A B A A B A A A (20S = 10A 6B 3C 1D)
```

4. Get out of Xenakis's world and leave MxM, the re-enter MxM and get into Chopin's world.
5. Enter a region in which to finish your composition. Then enter:

```
LPATTERN >> SD SC SB SA SC SB SA SB SA SA SC SB SA SB SA SA SB SA SA SA
LPIECE >> AGOGO S3 4LPATTERN X3
SA >> X2 PLAY PLAY S2
SB >> PLAY 2RP PLAY 2RP PLAY 2LP PLAY 2LP
SC >> PLAY LP PLAY LP X2 PLAY S2 RP RP
SD >> PLAY PLAY RP PLAY PLAY LP
```

6. Play `LPIECE`.
7. Save `LPIECE` as a Midi file.
8. Convert the Midi file to an MP3 file, any way that you like.

An MP3 file for this L-systems "composition" can be found among the sound files on the course web site.