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Strange ☼ Attraction

A M4L Device

What is Strange Attraction?

Strange Attraction is a device for Max/MSP and Max for Live (M4L) that enables parameters within Ableton to be controlled by strange attractor algorithms.

What's a strange attractor?

Strange attractor equations come from the field of mathematics known as dynamical systems. In this field, what we call an *attractor* is a set of states that a system tends to evolve towards. For example, the swing of a pendulum clock can be modeled as a dynamical system where the point of the swinging weight is plotted over time. In this example, the resulting system is a periodic function and the attractor is the equilibrium point (when the weight is at the bottom).

In contrast, strange attractors exhibit chaotic behavior. Whereas a

pendulum clock oscillates in a predictable pattern, strange attractors are complex and unpredictable. One of the ways they are used is to describe natural phenomena such as the flow of fluid in motion ("fluid dynamics").

The mathematician Edward Lorenz was studying the behavior of rolling fluid convection when he discovered his Lorenz attractor. In his physical model, gas was placed in a solid rectangular box with a heat source at the bottom.

Why should I use these equations?

Strange attractors are unique in two senses:

1. That the motion of the system never repeats itself (non-periodic).
2. That one cannot predict where on the attractor the system will be. Two points that are near eachother at one time will be arbitrarily far apart at other times.

In our opinion, these qualities makes strange attractors ripe for musical applications.

How does Strange Attraction work?

Strange Attraction is built in Max/MSP, but all of the math is implemented in Javascript. This decoupled approach allows for the flexibility of Max with the response times of a language that isn't vector-based.

Let's look at the equations being used as they appear in the `attractors.js` file:

```
// Lorenz Attractor
if (attractor == 1){
  if (isChanged){
        dt = 0.005;
        z_offset = -0.75;
        gain = 0.03;

        a = 10;
        b = 28;
        c = 8/3;
  }
```

```
    x = x + dt * (a * (y - x));
    y = y + dt * (x * (b - z) - y);
    z = z + dt * (x * y - c * z);
  }
```

Note: thanks to timohoogland for sharing their code.

This is a simplified version of the original Lorenz attractor equations, translated into js.

Using Strange Attraction

Strange Attraction is designed to be used as a device within Ableton.

1. First, create a new MIDI track inside Ableton by typing Cmd+Shift+T (on Mac) or Ctrl+Shift+T (Windows).
2. Drag "Strange Attractor" from the M4L MIDI Devices folder onto the new MIDI track.

Strange Attractor is now ready to use. You will need to enable another track, either audio or MIDI.

Next, click the "Map" button and then navigate to the parameter you wish to control on your other track and click on it. Now, start Ableton Live's transport and Strange Attractor will begin sending MIDI values to the chosen parameter.