

The Arrow Of Time

Gilberto dos Santos Agostinho Filho

Biography

Gilberto dos Santos Agostinho Filho was born in Osasco, Brazil in 1986. After composing only as a hobby during his studies of physics at the University of São Paulo, he decided to change his area of studies in 2006 to fully dedicate himself to music. From that year until 2008, Agostinho had private composition lessons with professor Mário Ficarelli in São Paulo. After a short period studying composition at the University of São Paulo, he was then approved to study at the Prague Conservatory, where he had composition and conducting lessons with professors Otomar Kvěch and Miriam Němcová, respectively, from 2008 to 2011. In 2011, he was approved at the Music Faculty of the Academy of Performing Arts in Prague (HAMU), where he studies with Luboš Mrkvička. After graduating in 2014, he is currently enrolled in the master's programme at HAMU.

Agostinho has composed works for several formations, from short piano pieces to large orchestral works, and has worked with both instrumental and electroacoustic music. His recent works employ generative techniques in an algorithmic approach to produce both instrumental and electroacoustic compositions.

Contact information

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Information about the piece

The *Arrow of Time* is an electroacoustic piece for 8-channels created with generative methods in Pure Data. As sources of sound, it uses eight recordings of the ticking of eight different clocks (labelled as clocks A-H in this text). The sound of each clock will always be reproduced by a same speaker.

The structure of the piece has five phases, labelled as *opening*, *shift*, *chaos*, *transition* and *ending*:

- opening: the piece start with clock A ticking at 60bpm, while clocks B-H will start playing one by one, also at a rate of 60 bpm, but in different phases than clock A. When this process is finished, a stable and constant rhythmic cell will have been generated.
- shift: one by one, clocks B-H will slowly and smoothly change their bpm speed to another value (randomly generated). Once this final value is reached, a clock will remain ticking constant in this new speed.
- chaos: one by one, clocks B-H drop their constant beat in favour of a completely random and variable speed within a certain range (that is, after each tick a new random speed is selected), so they won't have a steady beat as before.
- transition: slowly and one by one, clocks B-H will start changing their speed back to 60 bpm (but out of phase with clock A).
- ending: once all clocks are at 60 bpm once again, one by one clocks B-H will stop to tick, leaving only clock A in the end

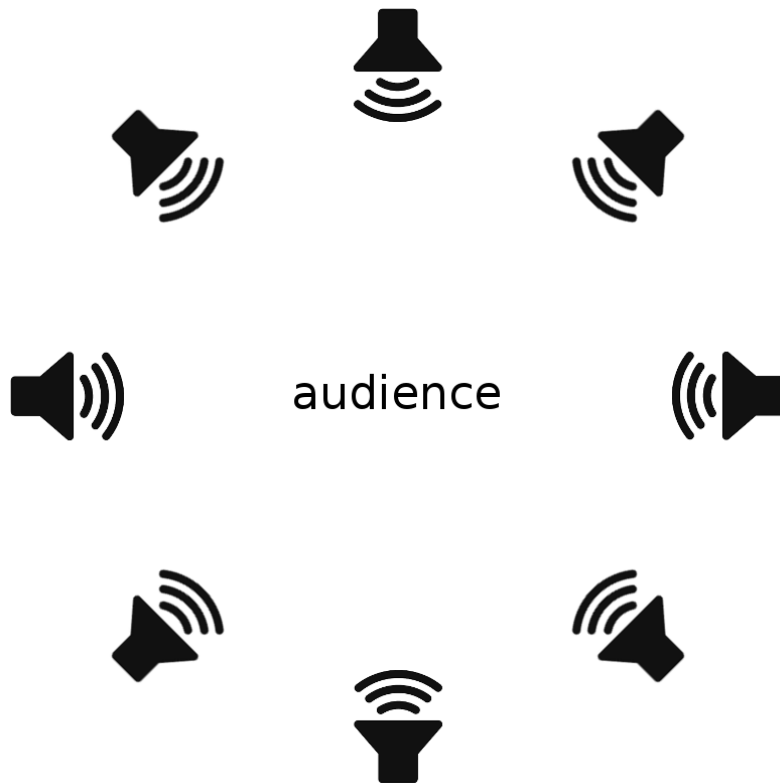
Notice that clock A never changes its bpm value nor its phase, and thus remains as the reference throughout the piece.

This piece explores concepts such as entropy and the arrow of time. Entropy dictates that the level of disorder of a closed system can only grow in time, which in turn is what gives directionality to time, creating the so-called *arrow of time*. In this present work, the system tends towards an extremely chaotic middle section, when it suddenly reverts its direction, as if going back in time, and symmetrically returns to its initial state (at which points the work could, at least in principle, start over and over again).

This work also aims to study how a listener understands and percepts rhythms and patterns. For instance, the simultaneous use of acceleration and deceleration causes an unsettling effect (most music deals with either one or another at a given time), a sense of confusing about the tempo. It also shows that, in a stable rhythmical situation, any slight change of the expected pattern – even if minimal! – will result in an accents (at least perceptually speaking). At the slightest apparent constancy, our mind is immediately tricked into expecting stability.

Setup

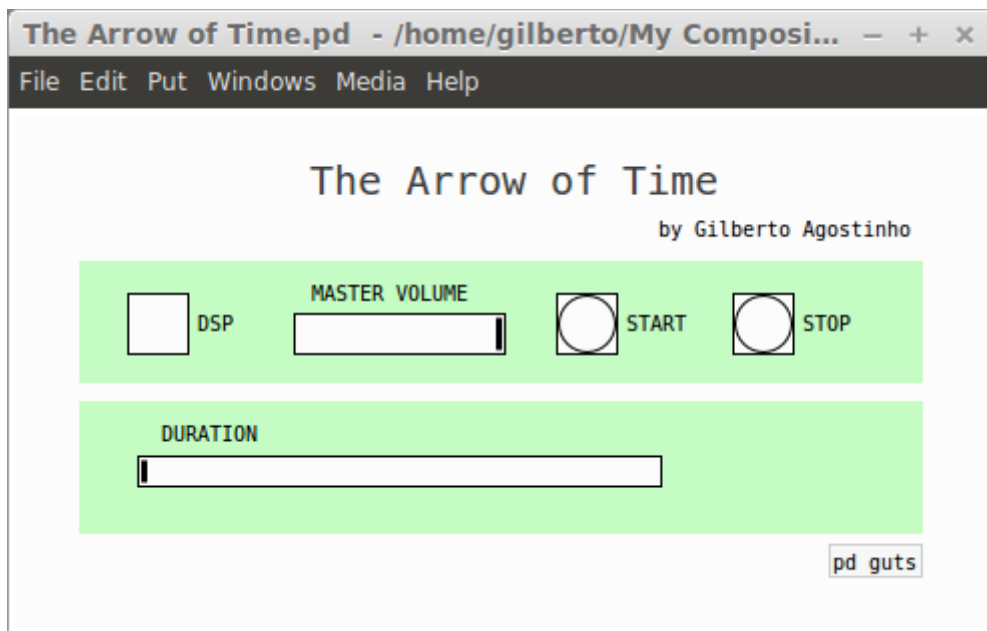
If performed in a concert hall, the eight speakers should be distributed symmetrically around the audience as follows:



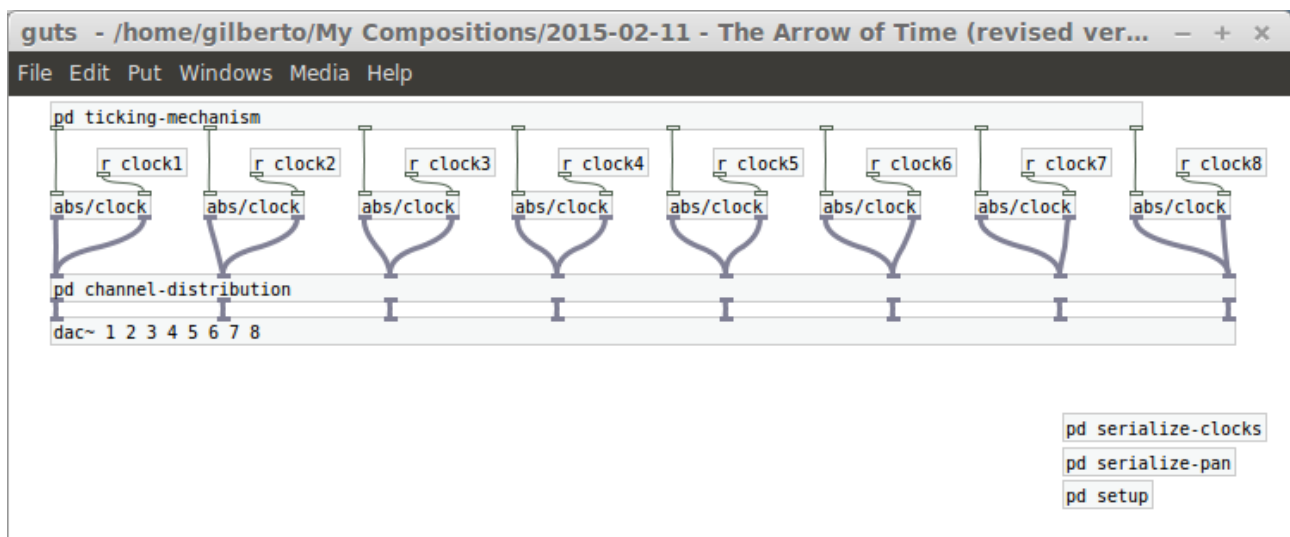
disposition of speakers in a concert hall

Pure Data patch

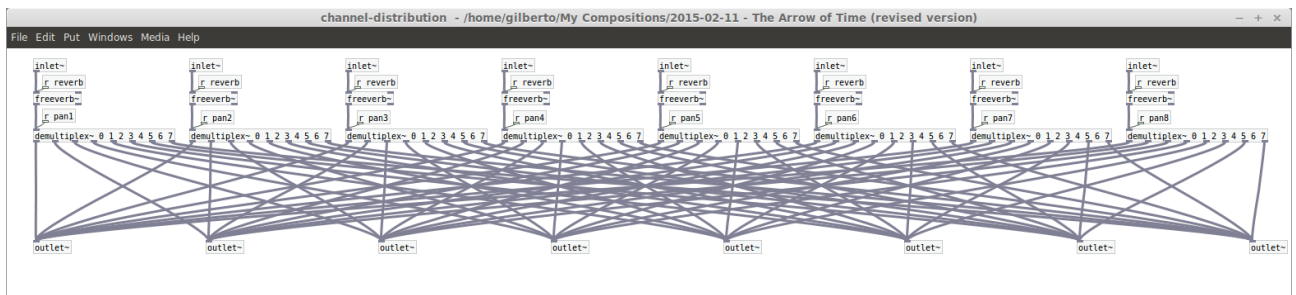
The following images show how the Pure Data patch was constructed.



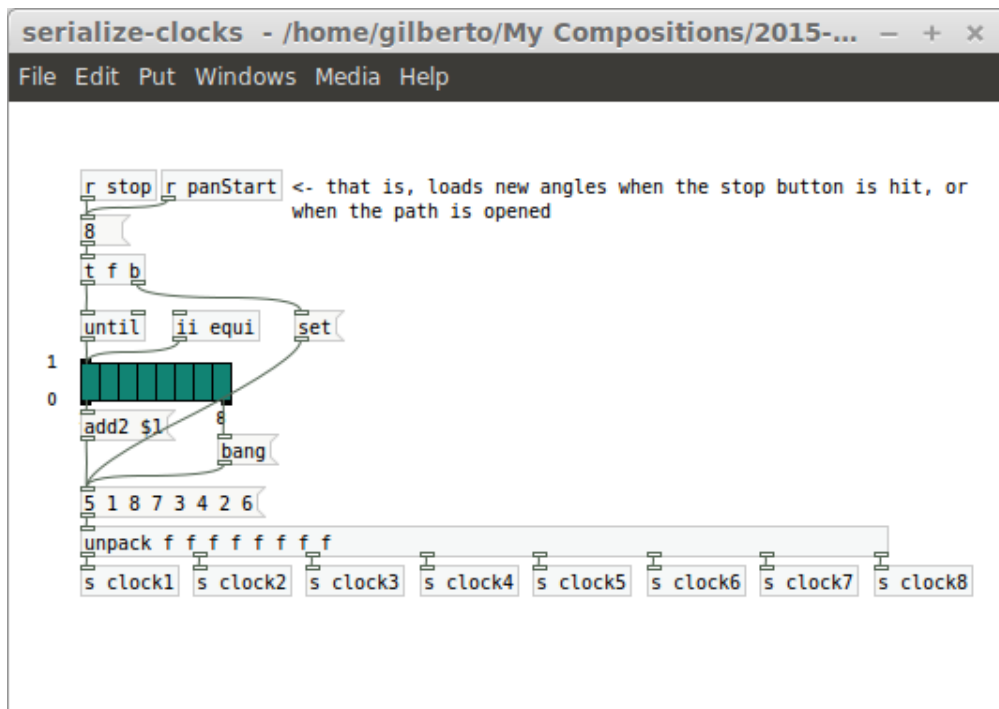
The Arrow Of Time.pd, main patch



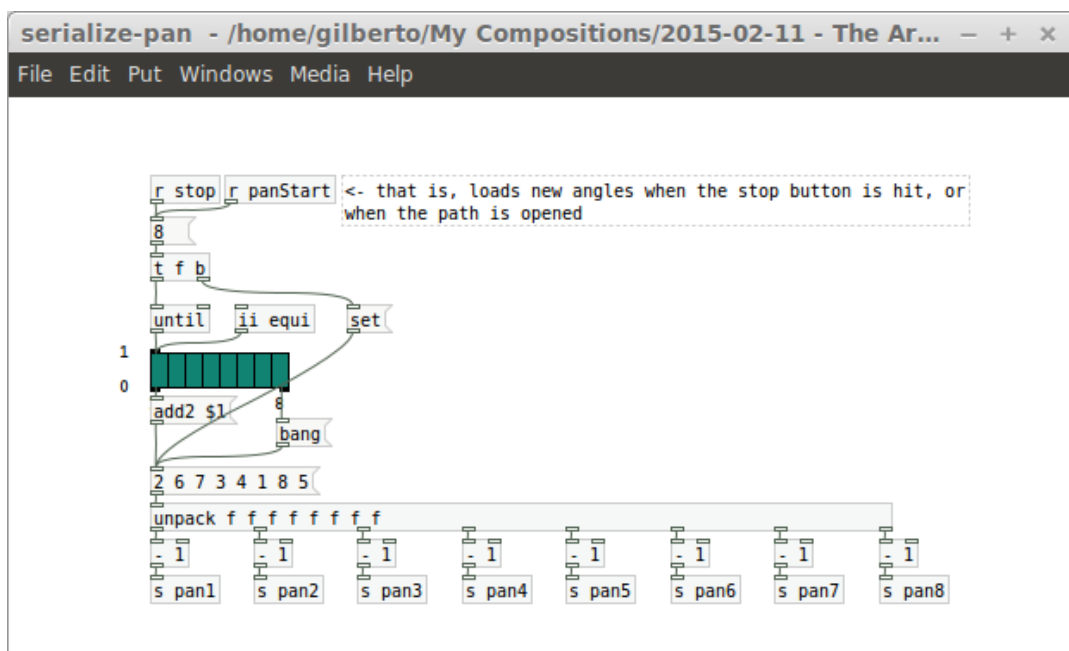
guts subpatch



channel-distribution subpatch



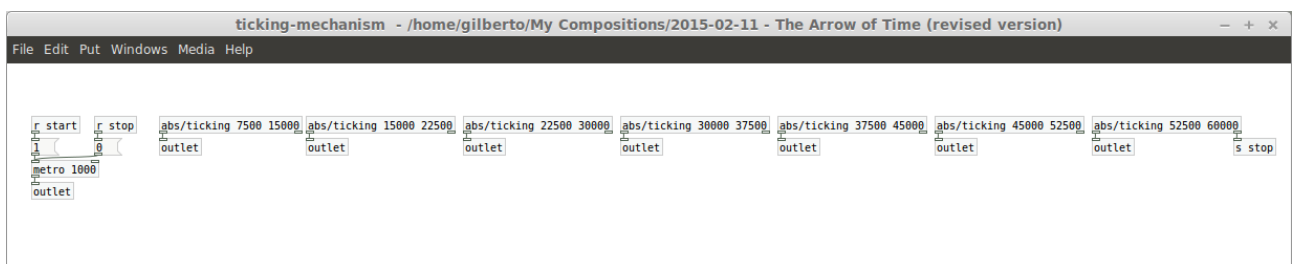
serialize-clocks subpatch



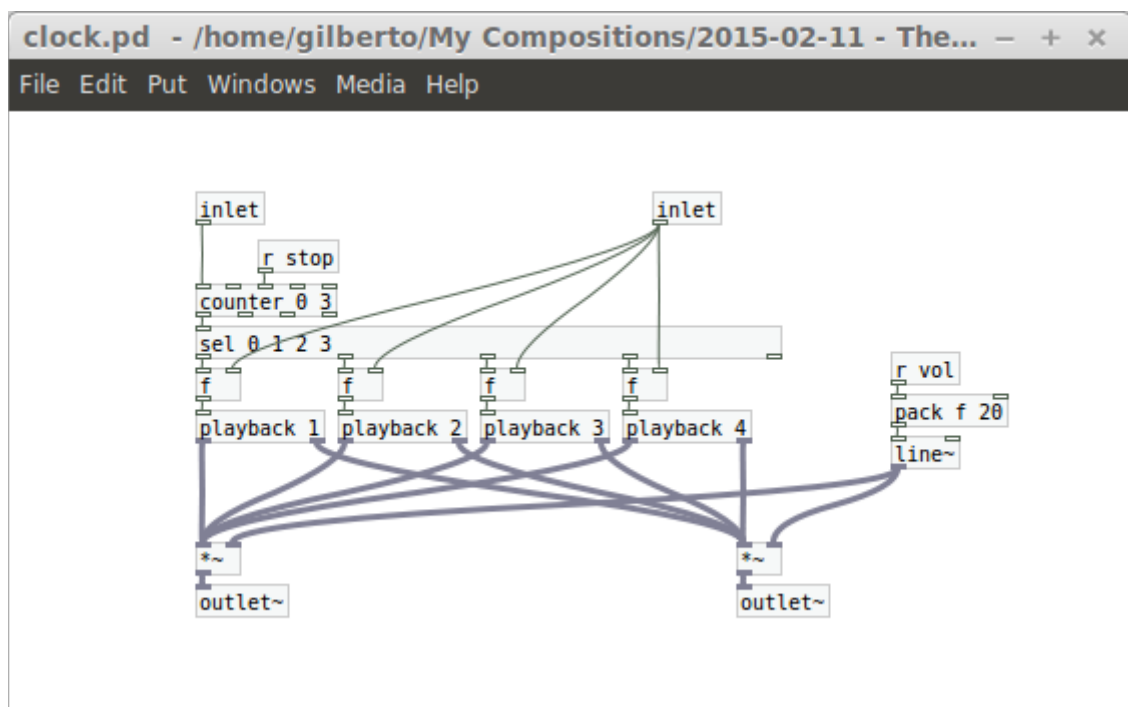
serialize-pan subpatch



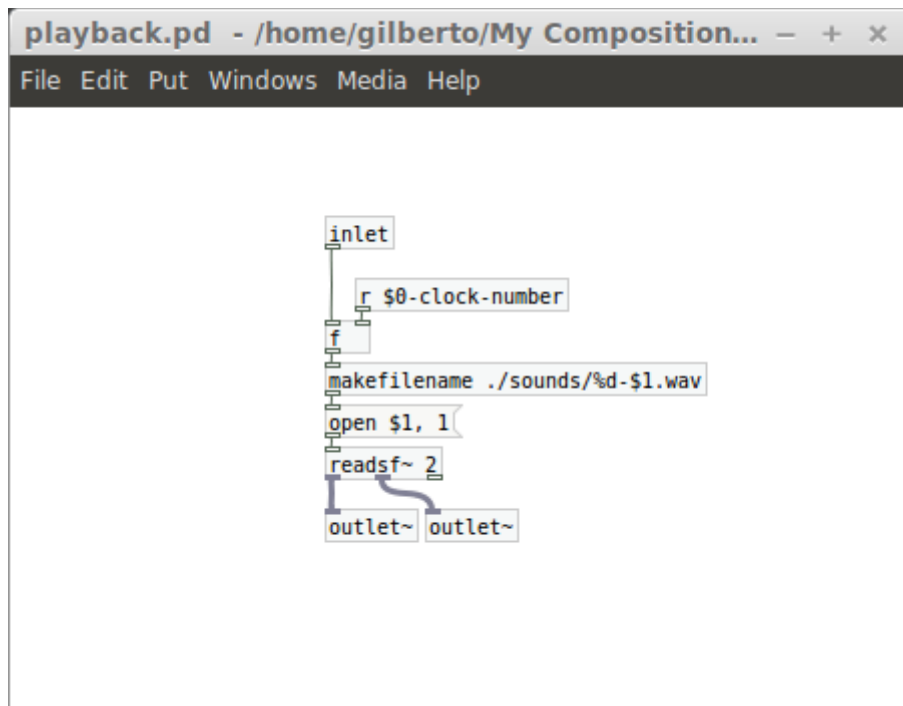
setup subpatch



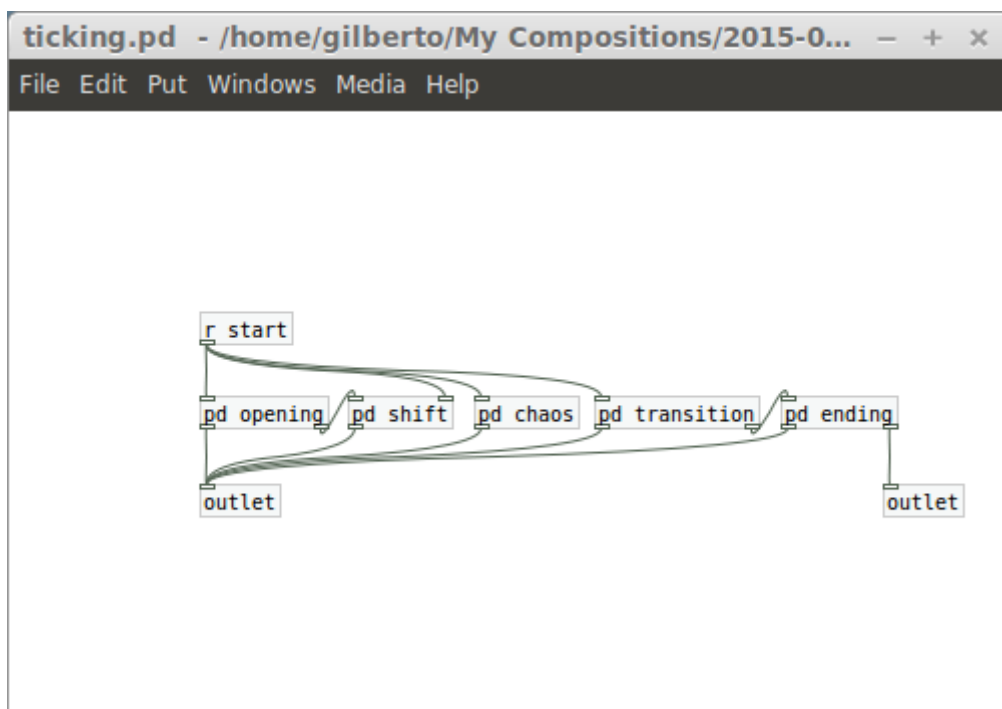
ticking-mechanism subpatch



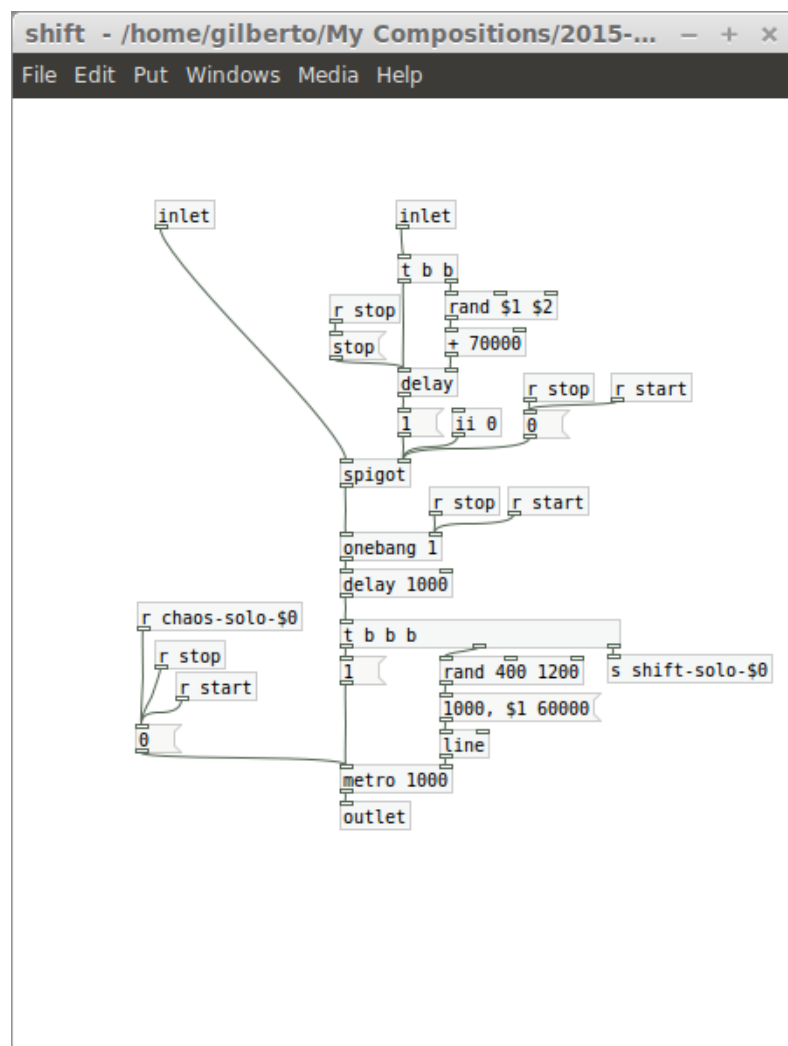
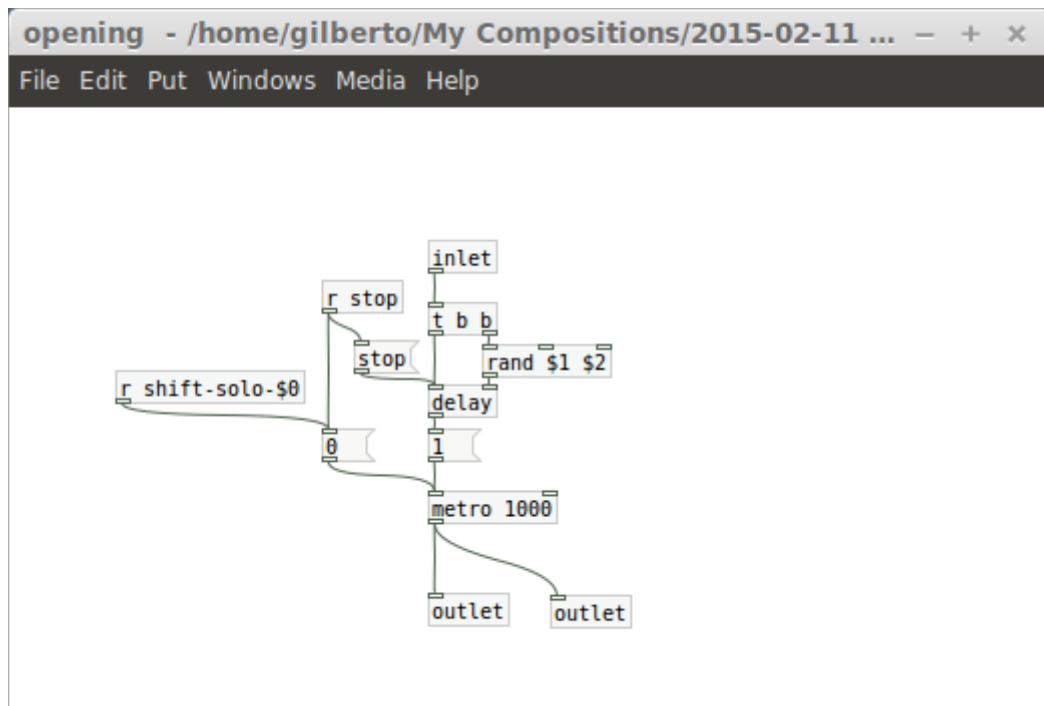
clock.pd, abstraction

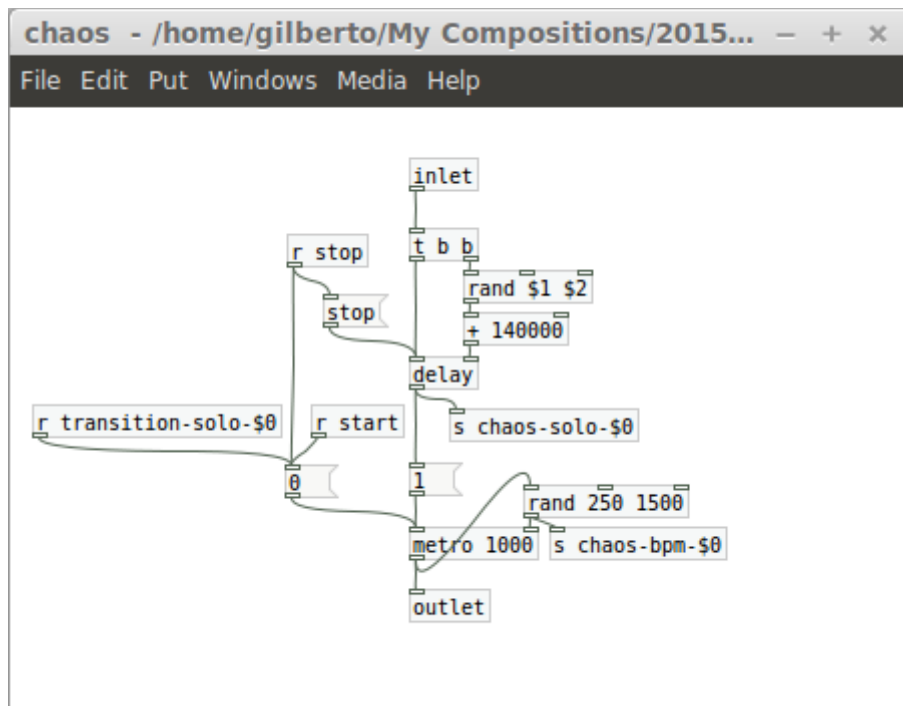


playback.pd, abstraction

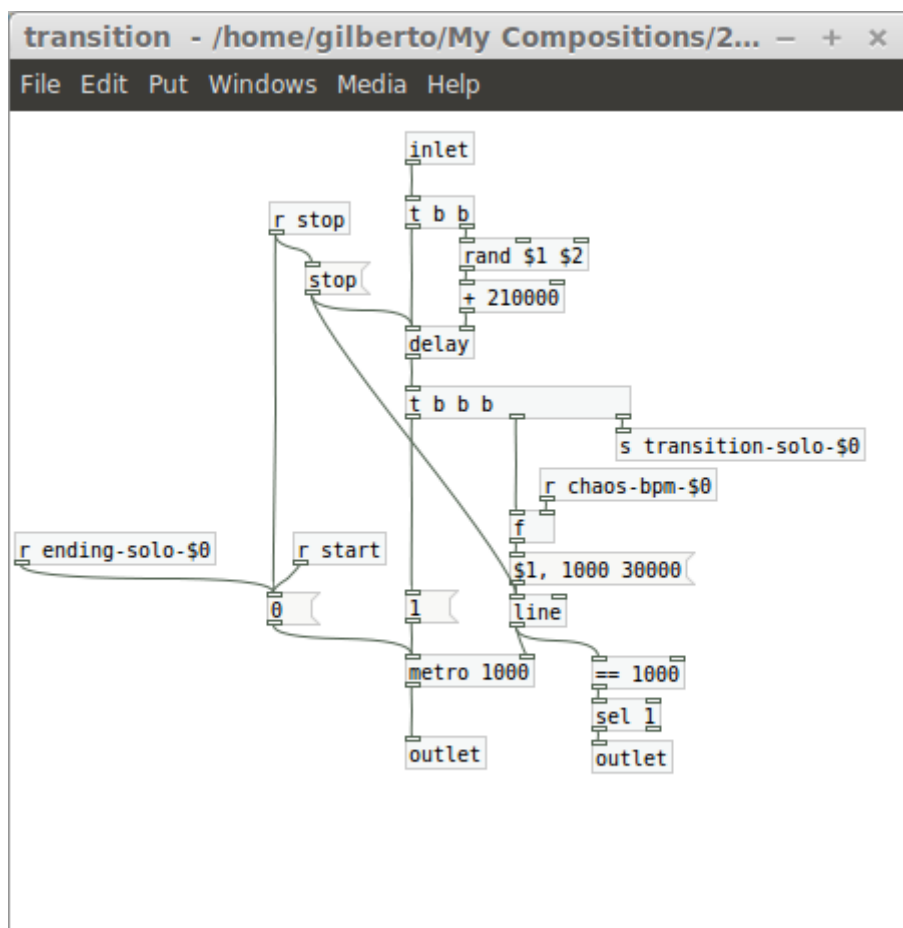


ticking.pd, abstraction

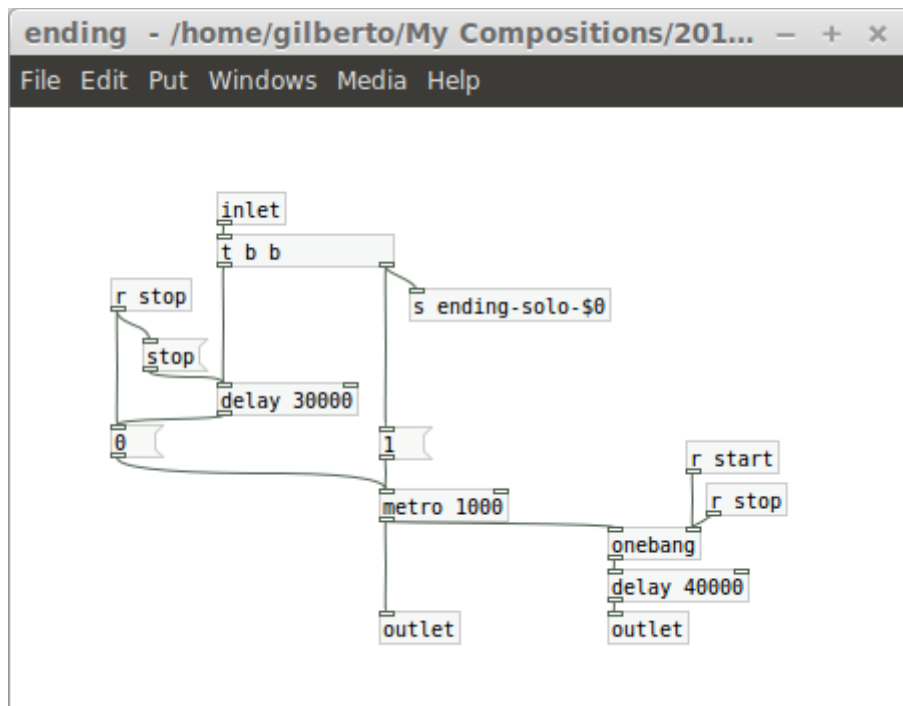




chaos subpatch



transition subpatch



ending subpatch