The Spherical Glitch Studies

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Contents

- Spherical Glitch Study I (2016) & II (2018)
- Spatial sound synthesis techniques
- Spatial Synthesizer

“Spatial composition”

- Primary focus on *external physical space*
- Compositions that incorporate related aspects of sound into the compositions process: direction, location, extent, envelopment, room acoustics, etc…

- Varèse’s *Poeme électronique*
- Stockhausen’s *Gesang der Jünglinge*
- Nono’s *Prometeo*

Spherical

- Full listening sphere around the listener
- Ambisonics & VBAP

Glitch

- Taken from “popular music” culture
- Kim Cascone: *post-digital*, focus on failure and looking *behind* a technology:

  > “The medium is no longer the message in glitch music: the tool has become the message.”

- Feedback loops to amplify a system’s specific characteristics

Study

- Most famously used in Stockhausen's *Studie I* & *II*
- A title that suggests that the piece was done with the purpose of practice and investigation of a particular technique or approach

Spherical Glitch Studies

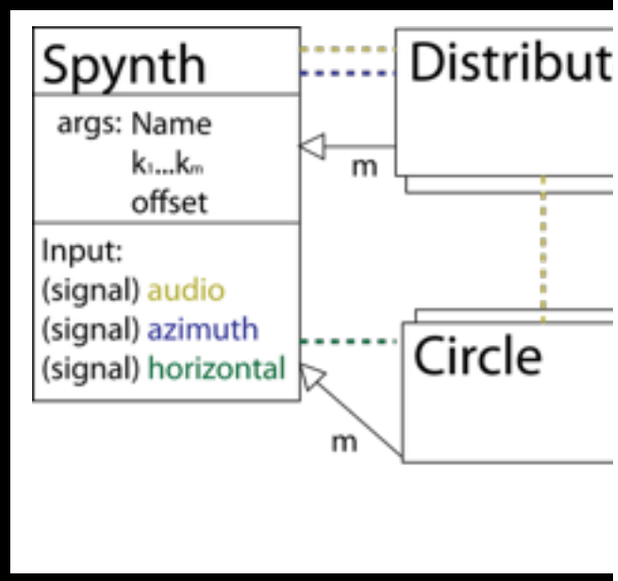
- Intended to investigate space as a compositional parameter and the technologies associated with it
- Basic starting sound material: sine tone, noise,…
- Sound design through spatial manipulation
- Space (sensation) creation through feedback
- Performative or installation pieces (drone aspects)

Background

- Hemispherical Glitch Study (2013)
  - Indirect result of my master's thesis from 2011
  - Created by "breaking" the *rapid panning modulation synthesis* (RPMS) technique

RPMS

- Pair-wise, two dimensional panning at audio rate (<20kHz)



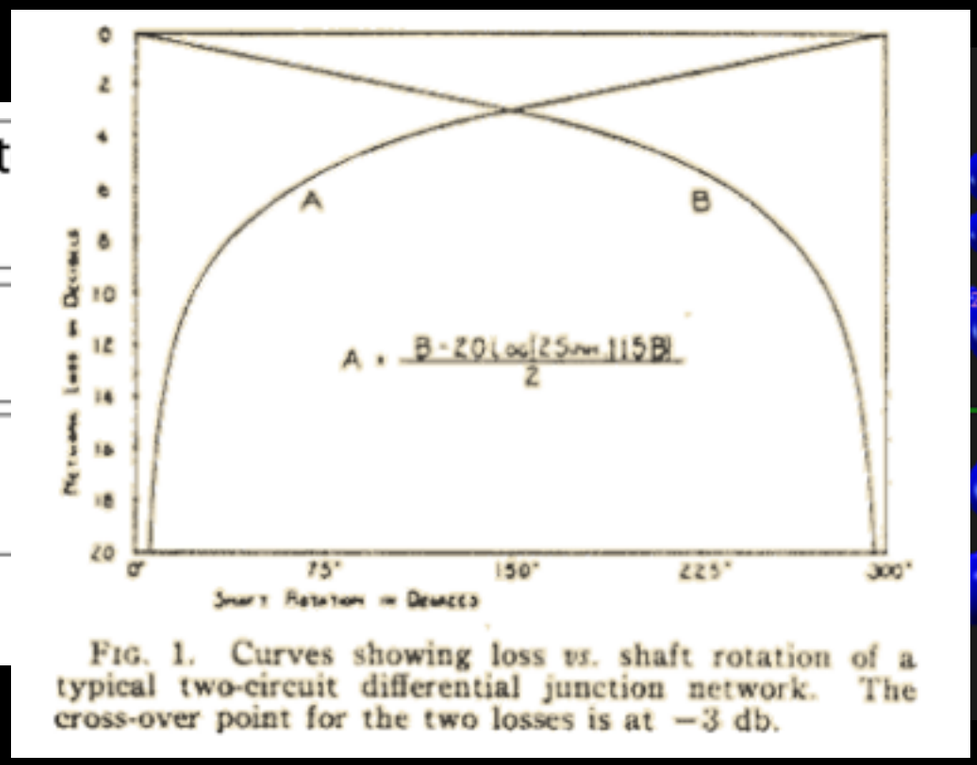
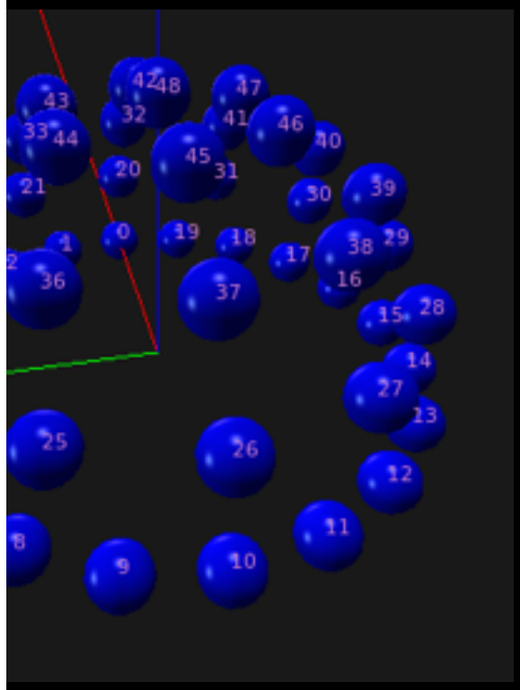
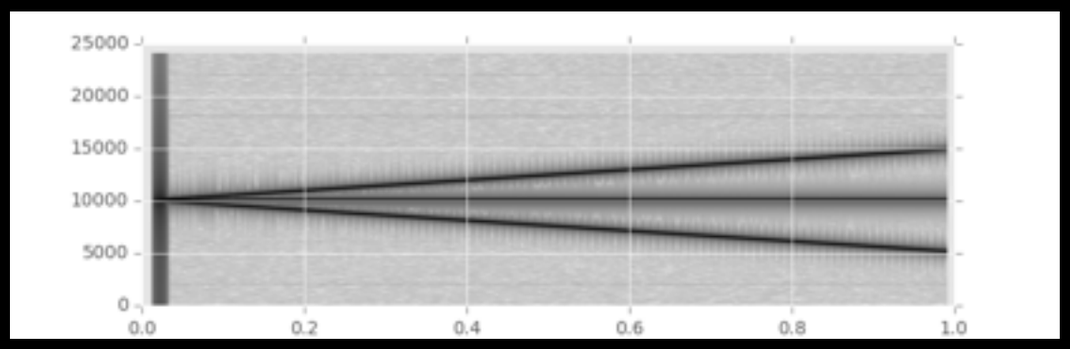
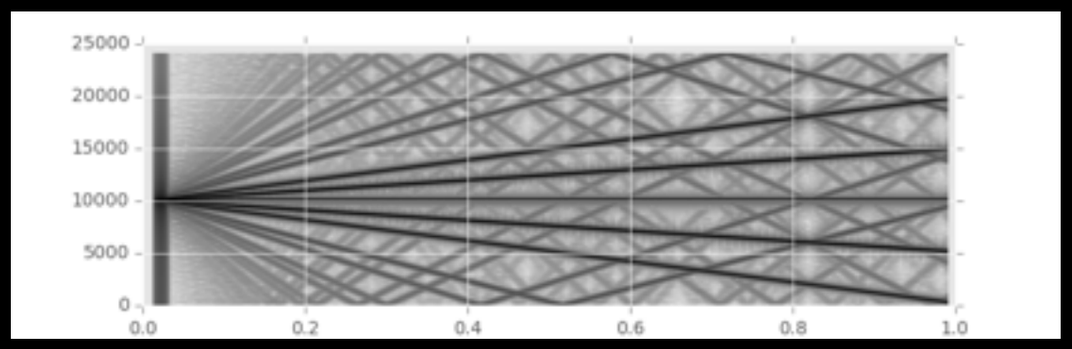


FIG. 1. Curves showing loss *vs.* shaft rotation of a typical two-circuit differential junction network. The cross-over point for the two losses is at −3 db.







Gestural synthesis

- At ~2-3 rotations per second, movement is usually difficult
- At ~5-15 rotations per second sound is omnipresent
- Sound is constantly decorrelated
- Patterns in space emerge as constructive overlap occurs in specific directions

Spatial Synthesis

- Spectral Distributors: Kim-Boyle (2008), James & Hope (2013)
- Granular Techniques (Wilson 2008, Bates 2009), Textural Synthesis (Hagan 2008)
- Oli Larkin *(2017) Microsound Synth*
- Environmental sound synthesis (Verron et. al. 2010)

Spatial Synthesis

- Marnix de Nijs & Edwin van der Heide (2010) *Spatial Sounds (100dB at 100km/h)*
- *Schumacher & Bresson (2010) Spatial sound synthesis in computer-aided composition*
- Ryan McGee (2015) *Spatial modulation synthesis*

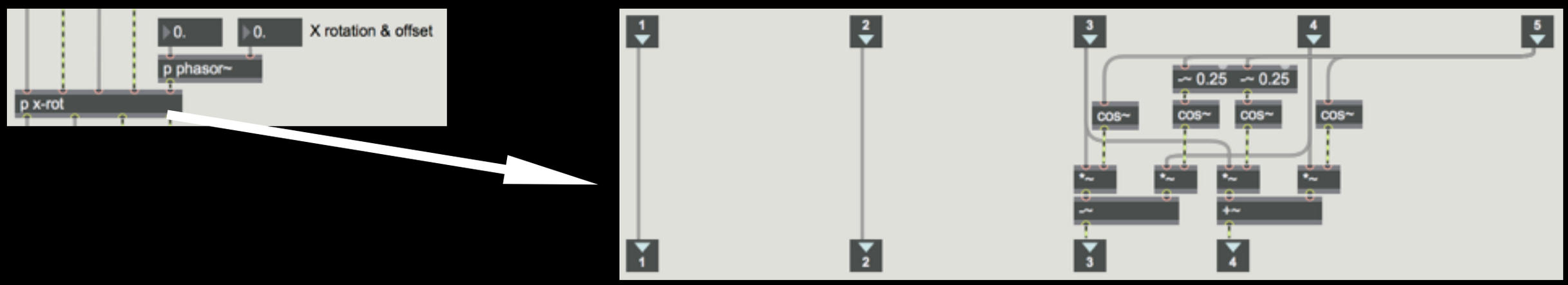
Spherical Glitch Study I

- Rotation of a sine tone (~50Hz) at high angular velocities up to 20000 rotations/s
  - around 3 axes
  - second detuned sine tone introduced at 180° offset

- Feedback a discretized representation back into the encoded ambisonic stream
  - Rotate before feedback

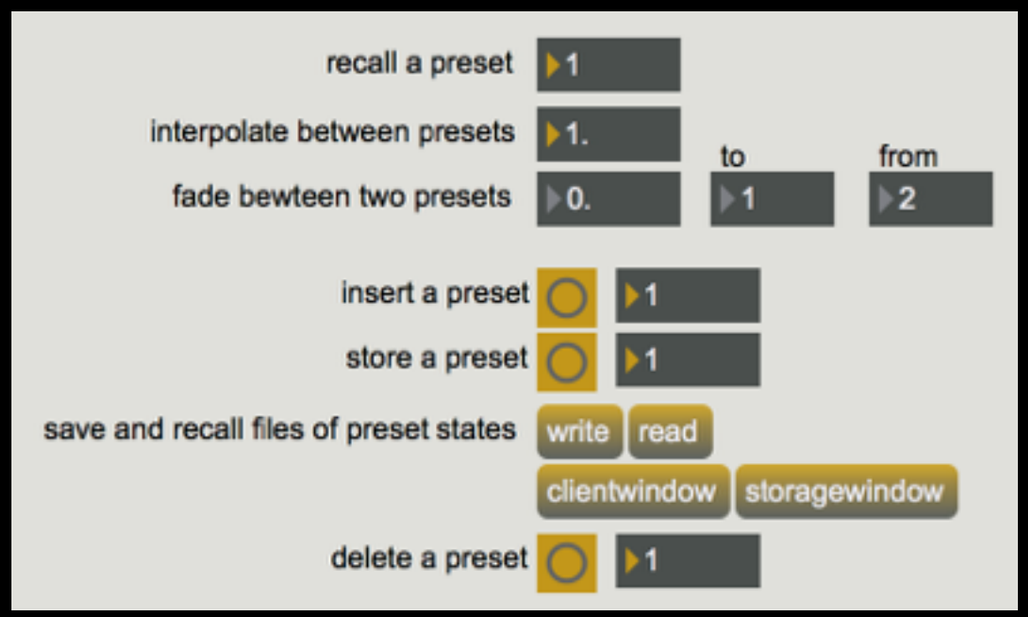
Spherical Glitch Study I

- *Rapid Rotation Modulation Synthesis (RRMS)*
  - A modification of RPMS, where rotation matrices are implemented in audio rate



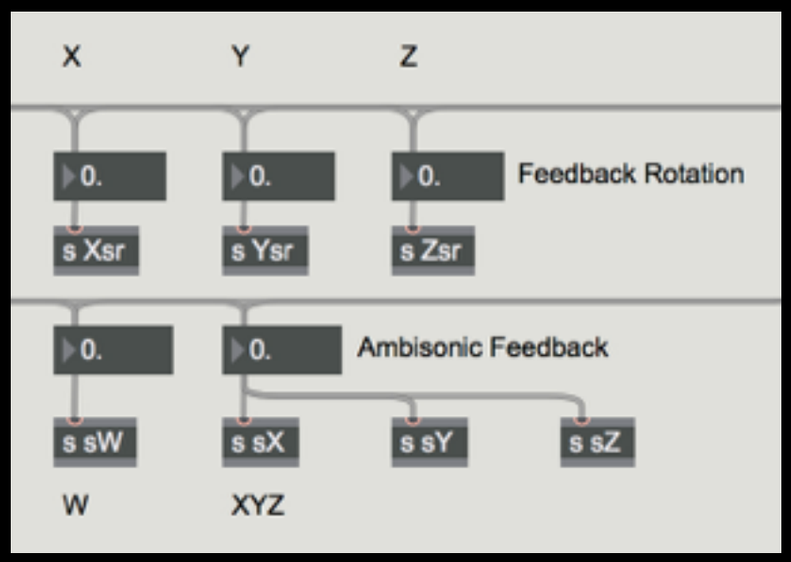
Spherical Glitch Study I

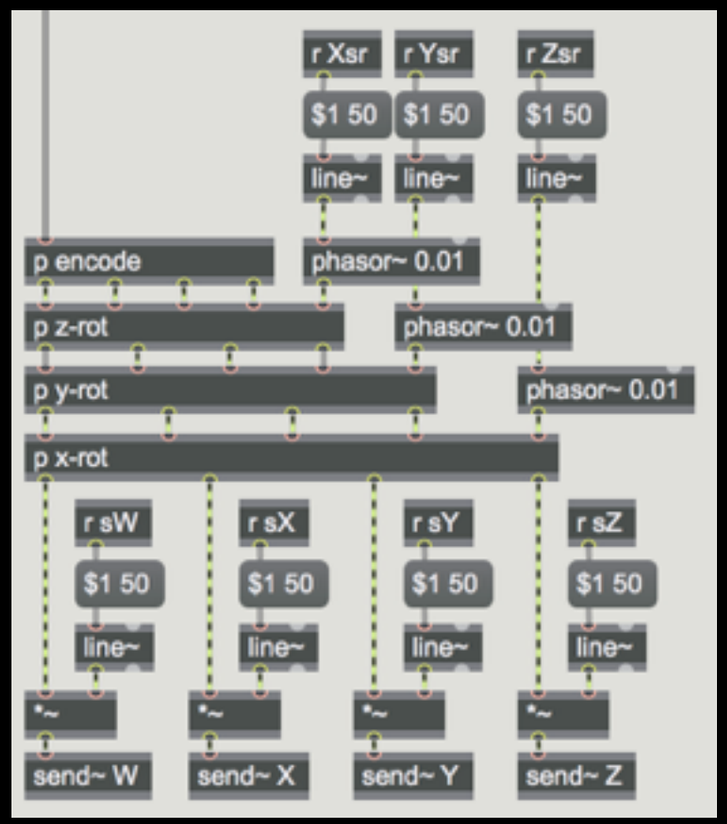
- Compositional approach done using “snapshots” using Max’ *pattr* system
  - Interpolation between saved parameter configurations
- Non-linear exploration of parameter space



Spherical Glitch Study I

- Feedback implemented by re-encoding each discretization point along the sphere
- Feedback amplifies rotation and discretization artifacts





Spherical Glitch Study I

- Snapshots predefined and ordered
- Introductory structure, easing the audience into the method and composition
- Performance interpretation based on
  - base frequency adaption to room/system
  - interpolation through parameter space based on room acoustic behavior

Spherical Glitch Study II

- Conceptually orthogonal to the first study
  - pure tone – white noise
  - continuity – discreteness
  - cohesive – modular
  - predefined snapshots – stochastic processes
  - human control – automated progression
  - …

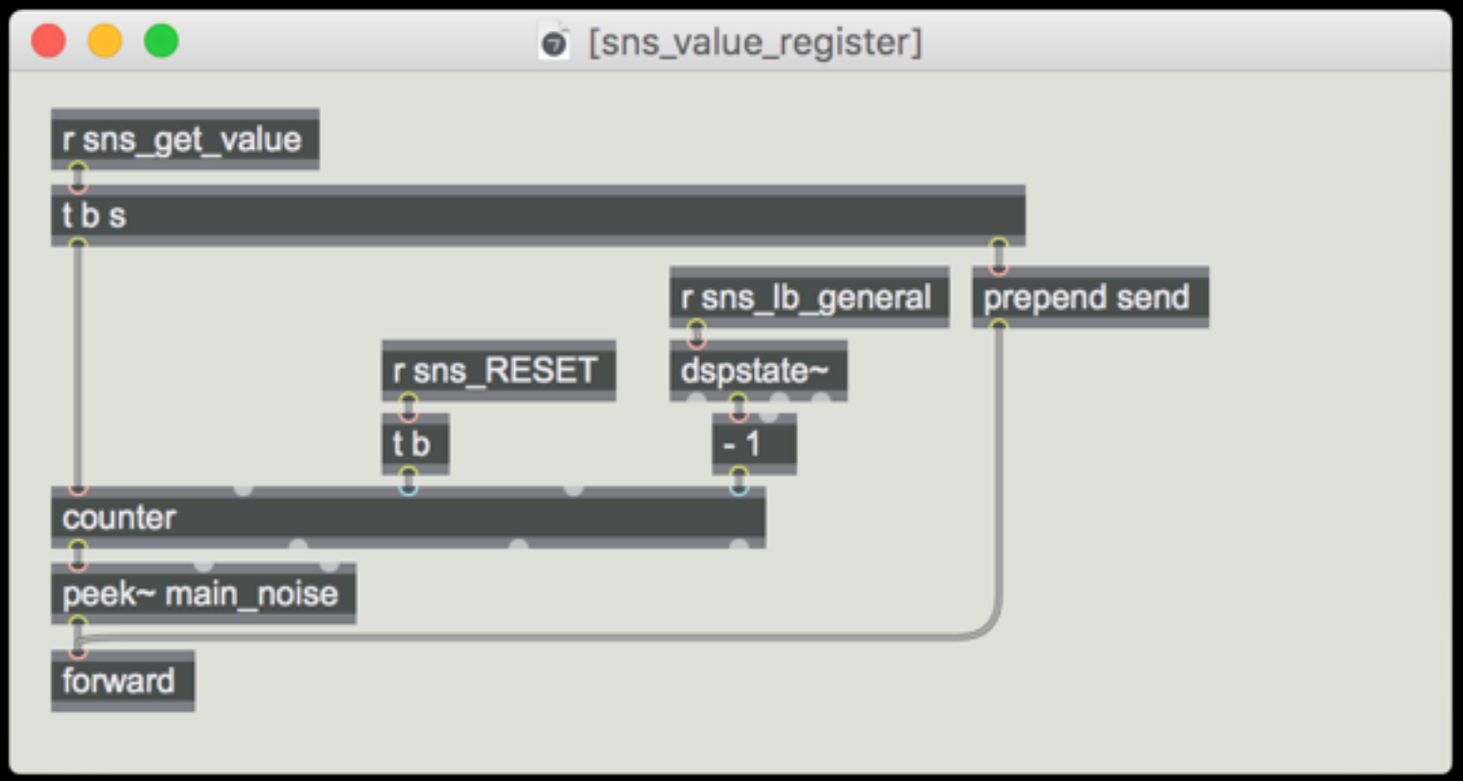
Spherical Glitch Study II

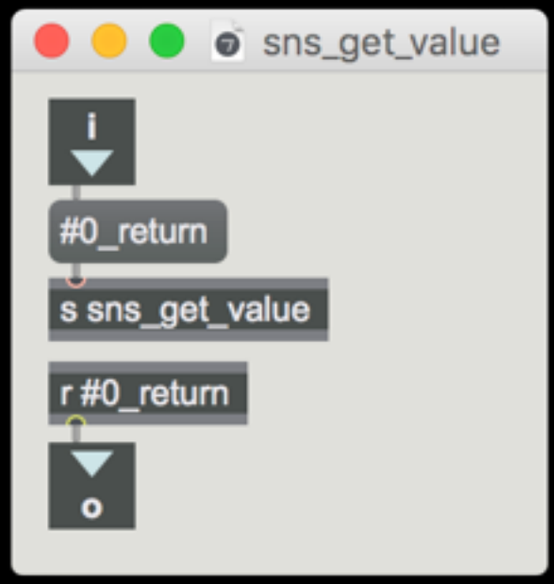
- Exploration of noise and spatialization
- Personal challenge to make white noise interesting (using spatialization)
- Modularity breaks composition up into micro-compositions
- Work in progress… forever?
- Playground to test new ideas on the subject

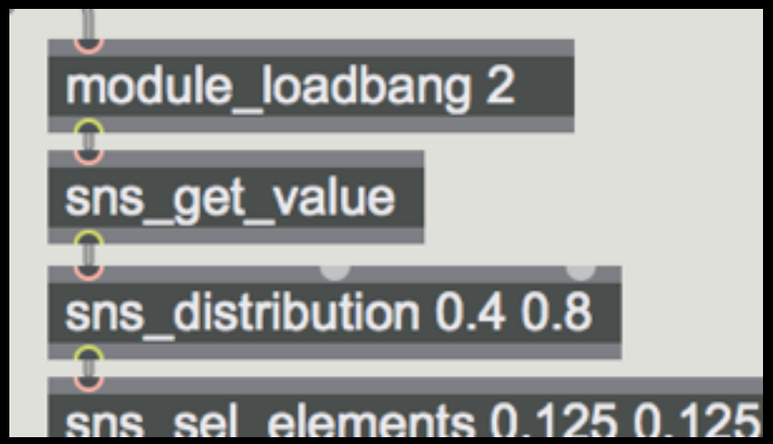
Spherical Glitch Study II

- Predefined by a single second of white noise
  - Written into central buffer
  - Any random number taken from buffer in strict sequence
  - Any audio played from buffer exclusively
  - Dichotomy between the random and the predetermined

Spherical Glitch Study II



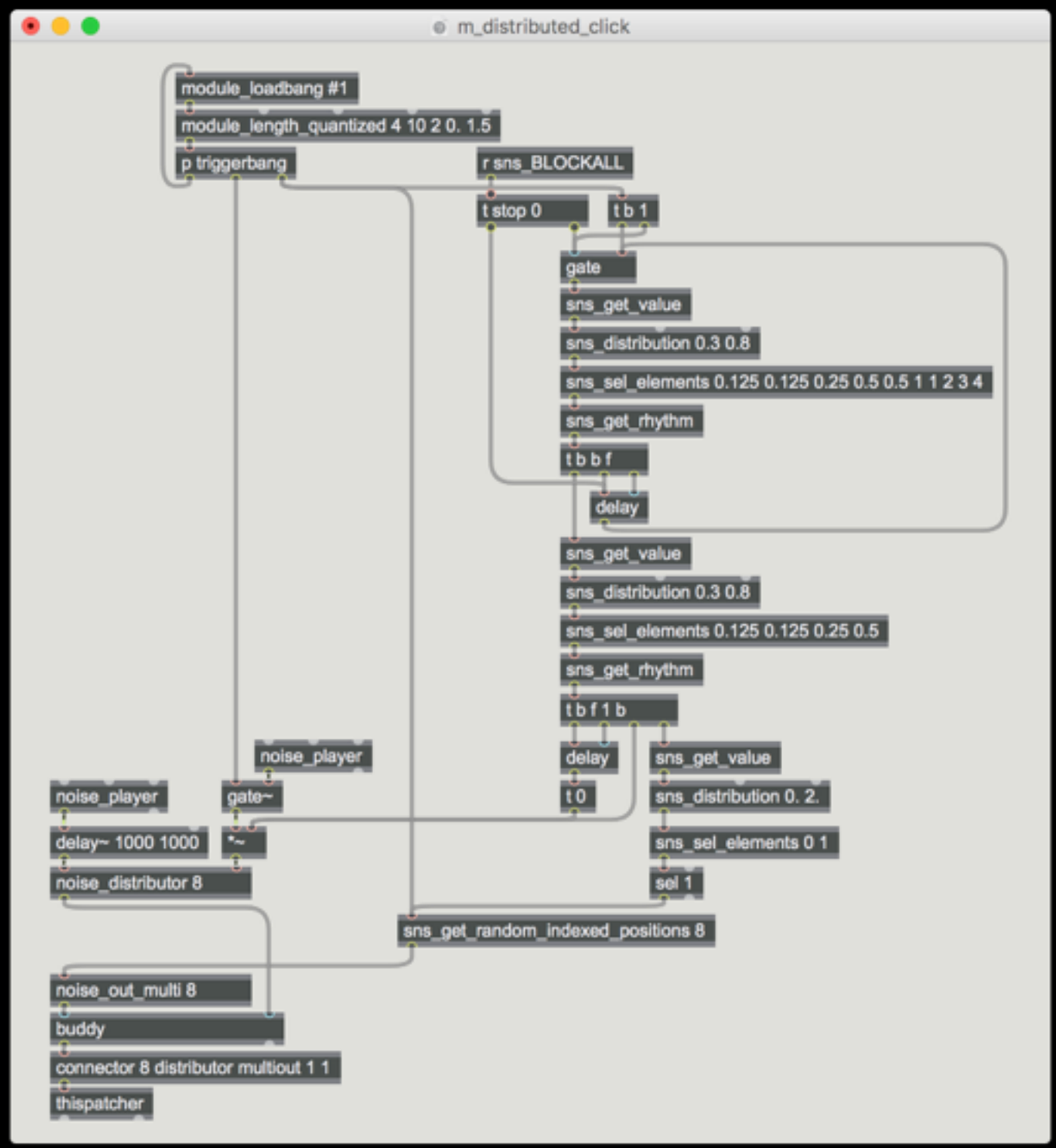




Spherical Glitch Study II

- Modularity
  - Modules define their own time
  - Time grid (bpm) fixed
  - Never overlap
  - Modules share spatialized sources
  - Mostly decide
    - Spatialization
    - Buffer read position, length and speed

Spherical Glitch Study II



Spherical Glitch Study II

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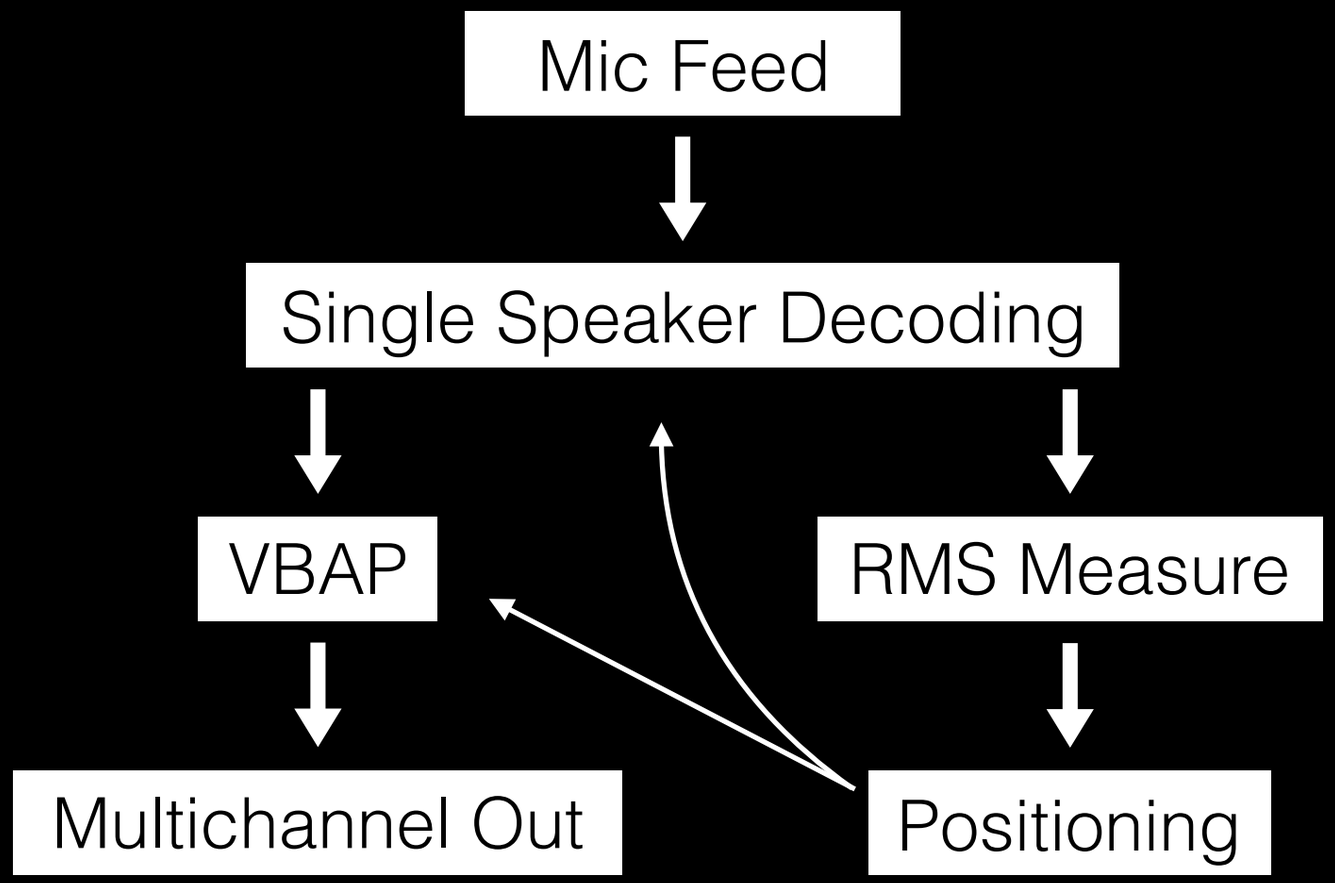
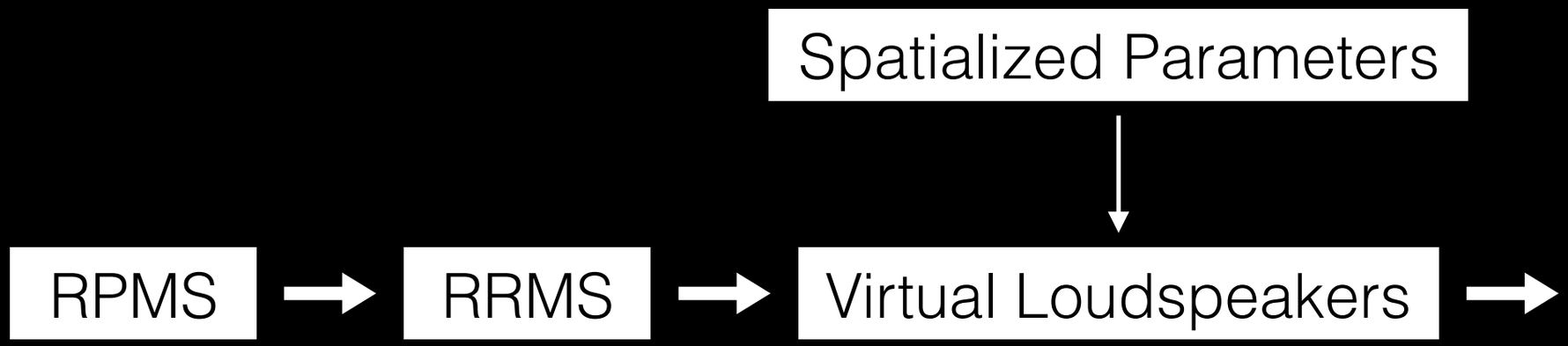


Spatial Synthesizer



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