Resonant Systems (2012)

A performative exploration of sinewave-driven cymbal spectra.

Premiss:
In Resonant Systems a single sine-wave drone excites the resonant frequencies of two or more mechanically coupled cymbals, making a network of interacting harmonies. This varies between three typical states, (1) a single pitch with linear harmonics, (2) a multiphonic-like, complex inharmonic sound of several interacting vibrational modes, (3) chaotic vibration, where the energy cascades, activating many modes simultaneously in a noisy spectrum.

In performance, the sound mostly develops in its own time as acoustic energy builds up in the cymbals. Occasionally the performer will 'nudge' the system with very small changes in frequency (generally less than 1-2Hz) or amplitude, to force the system to evolve in a different direction. The performer's goal is to find points where the sound hovers between stable and unstable states, gradually being pulled into a new state. The performance will typically explore a few different frequency areas: e.g. 699-721Hz and 1600-1650Hz. Performance duration depends on context: concert performances should be 6-15mins, installation performances can be of any length, though 5min breaks may need to be included every 30mins to ensure the transducer does not burn out.

The two cymbals are strongly coupled (using a metal rod, see diagram below) to a transducer (see below). The transducer is essentially a loudspeaker without a cone, so it does not project much sound unless directly connected to a resonating object or surface: the cymbal in this case. Each cymbal has its own resonant frequencies, which have coupling relations with each other. Two or more coupled cymbals increases the complexity and unpredictability of these relationships as the different resonant frequencies and vibrational modes interact with each other, interfering constructively and/or destructively.

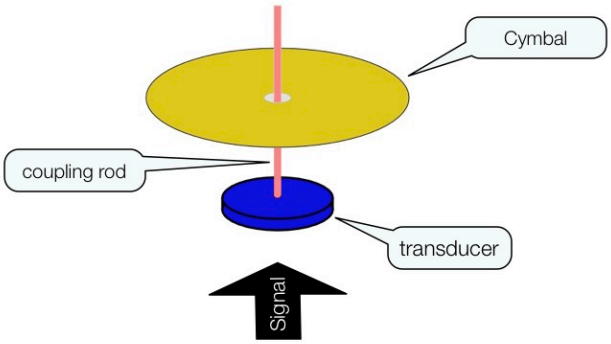
Setup:
See diagrams and images below for setup, the note the strong coupling of cymbal to connecting rod using nuts, these must be tight to prevent rattling. The position of the cymbals will alter their coupling relationship and the available harmonics. No particular setup is preferred, each has its own spaces to explore.

The transducer should be at least 60W, and requires a comparable amplifier to power it. The transducer also needs to be fitted with a screw socket so that the cymbals can be coupled to it via the screw rod.

The sinewave may be generated by any means but should be capable of extremely fine changes in frequency (smaller than 0.5hz) and amplitude. The composer has a MaxMSP (version 5+) patch for this purpose and will supply it on request.

[email] scott@lutins.co.uk [mobile] +44 (0) 7834 992064

Mechanism



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