The Maxwell Demon

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Abstract

The Maxwell Demon (TMD) is a comprovisation based on the James Clerk Maxwell experiment in 1871. This comprovisation (composition + improvisation) aims to enable multiple agents to exchange sound interactions through common equipment but not commonly used for sound and artistic practices: the mobile phone. TMD proposes the possibility of technical equality between musicians and non-musicians and sound discovery through interaction and interactivity relations between agents x agents, agent x environment and agents x algorithms. One of the performances of TMD can be seen in: https://www.youtube.com/watch?v=6sYOe1q7INE&t=138s

1. The Maxwell's Demon (TMD)

The Maxwell's Demon (TMD) is a comprovisation inspired by James Clerk Maxwell's 1871 experiment. In this experiment, the Maxwell Demon is an imaginary creature designed to contradict the second law of thermodynamics, the tendency of every system towards entropy. Maxwell's experiment can be represented as a box with a divider placed in the middle, separating it two compartments, left and right. This partition has a door that can be opened and closed by an imaginary being, called Maxwell's Demon. The demon opens the door to allow only the fastest molecules to flow to one side of the chamber. Only the slower molecules flow to the other side, gradually causing one side to warm up, while the other remains cool. Thus entropy is reduced. We use TMD as an artistic metaphor focused on sound (rather than thermodynamics) to simulate an imaginary being - in our case, a stochastic algorithm - that seeks to control the sonic outcome to increase or reduce its entropy. Conceptually, we treat stochastic algorithms as *Gelassenheit* entities [Heidegger, 1966; Koutsomichalis, 2011]. A Gelassenheit entity has an "independence" in time and space, its dynamics are established by stochastic processes.

2. Materials and Procedures

Materials/Equipments:

Mobile: We designed a Pure Data (PD) patch running on the MobMuPlat application capable of producing sounds: 1) easy to manipulate; 2) accessible to all agents (through deployment on mobile platforms based on Android and IOS systems).
The mobile screen patch features four rectangles that act as controllers of additive synthesis oscillators. Simultaneous control of up to four banks of oscillators is possible. Four FM synthesis oscillators feature control parameters for frequency, duration and delay. Processes are controlled by tapping the phone's screen and can be turned on and off at any time. The frequencies vary from 220 Hertz to 1320 Hertz. Frequency increments are associated with gestures from left to right.

Beside each rectangle there are three oscillators switches (on/off buttons) and two envelope controllers. One with a condition of attack, decay, sustain and release short and another with envelopes in longer conditions. The left button at the top of the screen controls a stochastic algorithm connected to all the oscillators frequencies. This triggers random changes in each oscillator. The remaining three buttons control delay processing of the sound material. From left to right, there are fixed delay rates of 150 ms., 300 ms. and 750 ms.

Stochastic Computational Algorithm: The computer running the automated algorithm is connected to two loudspeakers. The loudspeakers were placed at the two corners of the location where the performance/experiment took place. The agents moved around the perimeter of the environment. We developed a patch (PD) that runs on a desktop computer with similar sonic features as the algorithms for the mobiles. Rather than being controlled by the participants, stochastic automated processes determine when and how sound events will occur. With the touch of the green start button, the entire performance/sound experiment occurs in an automated way. At the ringing of the bell begins the artistic narrative finalizes.

Sonic materials - We use an emulated bell (based on FM) that plays at the beginning of the performance/experiment and ends it when it is heard again. This sound is triggered by a PD patch. The entire performance takes five minutes. All sound content that occurs between the ringing of the bells are contingencies resulting from interactions and sound discovery.

Location and participants - TMD is designed to run in a small place. Preferably a place with poor lighting. We suggest a hallway, or a small room.

Having Maxwell's procedures as inspiration, we use two types of agents, those with traditional knowledge of music and those with little or no knowledge. In other words, no musical training is required. There are no limits of participants.

All participants must have a mobile (operating system, Android or IOS), with the application MobMuPlat installed and the TMD patch running. We recommend the existence of internet to enable the implementation of agents willing to participate in TMD.

*Estimated Time :*TMD is designed for three runs of approximately five minutes each. We suggest small discussions of five minutes between the performances. Approximate total of 30 minutes adding performance and discussion.

3. Material Summary

- 1 AC 110v power;
- 2 Amplified speakers;
- Small or medium room with poor lighting;
- Interested agents with or without musical training;

4. Composer/performer Bio

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5. References

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