# About Chaotic Conductor

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There are four pendulums suspended above four stretched and mounted canvases. Each canvas has a loudspeaker nearby.

*The pendulum is one of the oldest known time keeping devices. A metronome, used by musicians to keep time, is an inverted pendulum.*

Visitors to the gallery are encouraged to give any of the pendulums a push.

*The swinging pendulum creates a tempo. Since all four are of the same length, they will all keep the same beat. Since the height of the pendulum determines its period, and the height is dictated by the gallery space, the tempo of the piece is site specific.*

On each canvas is a set of colored pieces made from flat laser-cut plastic. The canvases are 3 foot square and have been prepared with flat white gesso. The plastic pieces are opaque and made from 6 colors of stock, the 3 primary and 3 secondary colors.

The contours of the plastic pieces are based on some of the actual rocks contained in the pendulum weights. First the rocks were digitally photographed. Next digital outlines were extracted from the photos using image analysis software. Then the digital outlines were used to drive a computer controlled laser-cutting machine. The cut pieces were then sorted into 4 groups for the 4 canvases. The somewhat fuzzy groups are 4-sided, 3-sided, oval, and irregular.

*The canvases and the plastic color on them create pseudo-paintings that can be changed. And just as note symbols on staff paper can be moved, so too are the plastic pieces moveable.*

Each pendulum has a downward facing camera. When the pendulum swings the camera arcs above the canvas. As the camera scans the canvas the path of the "video eye" of the pendulum crosses variously colored plastic pieces.

*The moving cameras are like eyes scanning a painting.*

As each “eye” scans a "painting" it detects (via an Apple Macintosh computer executing real-time image analysis) when it crosses the various colored marks at the center of its view. Each time it scans a given colored mark the computer will trigger a corresponding sound.

*The moving cameras are like eyes scanning a musical score. The swinging pendulum also keeps time like a conductor with a baton.*

(continued on reverse)

Each pendulum has its own distinct timbre. The four timbres used are all from percussive instruments…piano, xylophone, glockenspiel, and vibraphone.

*The pendulums are thus also like a quartet, with each player reading and playing a score.*

Each pendulum is coupled to two others with ropes near the top. This turns the entire mechanism into a technically chaotic system. An individual pendulum is simple and entirely predictable. Coupled pendulums, like all other chaotic systems, are over time entirely unpredictable as a matter of scientific principle.

Rather than uniformly running down as the energy in the system dissipates, coupled pendulums tend to start, stop, and start again as the energy in the system "sloshes" about from one pendulum to another. The resulting sound will exhibit more structure than, say, the random sound of wind chimes.

*The careful listener will be rewarded with repeating patterns (due to the periodic swinging of the pendulums over the same colored pieces), synchronization of different timbral lines (due to the pendulums having the same period), and the alternation of instrumental parts (as energy transfers from one pendulum to another).*

Chaotic systems are not merely random, but often exhibit a coarse short-term consistent behavior punctuated with unpredictable surprises. Art and music also exist in this in-between realm of order and disorder. Predictability allows the audience to follow the work, but surprise keeps the audience engaged. Some music (e.g. Gregorian chant, Justin Timberlake) is more ordered, while other music (e.g. Free Jazz) is more disordered.

*Chaotic Conductor also exists in this in-between realm of balanced order and disorder, as the pendulums keep relatively perfect time, and yet chaotically trade parts and create sonic variations.*