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“Timescale and Gesture in Approaches to Morphological Representation of Electroacoustic Sound”

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TIMESCALE AND GESTURE IN APPROACHES TO MORPHOLOGICAL REPRESENTATION OF ELECTROACOUSTIC SOUND

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Underneath the varied definitions of gesture, gesture draws from motion a semiotic unit. This semiotic unit is characterized by a morphology; a morphology defined by change over time. Music theorists are now using the concept of gesture as an analytical tool and applying it as a 'biologically grounded, inter-modal synthesis that shapes motion (pitch motion, rhythmic motion) in time to create expressive force.' [1] To use gesture as a metric for musical analysis is to correlate particular aspects of that transformation to aspects of physical motion. This paper offers a definition for using gesture as an analytical tool and uses Phillipe Manoury's Jupiter as an example to reveal how understanding musical gesture can articulate structural and compositional elements of electroacoustic music.

"To describe a bit of melody as a 'gesture' is to conceptualize music in terms of physical motion." [2] Physical motion also implies physics. Notions of gravity, inertia, and momentum all play key roles in this approach as well as linking these notions with perceptual features and compositional practice. "Just as every physical gesture derives its character in part from the ways in which it moves with respect to physical forces, so every musical gesture derives its character in part form the ways in which it moves with respect to musical forces." [2]

In this paper I hope to provide quantifiable definitions for gesture and posture in music and use data visualization as a method of analysis. I hope to show that posture or texture relies on micro gesture and timescale of repetitions. Phillippe Manoury's Jupiter provides examples of acoustic and electracoustic gesture and texture. By moving away from traditional musical analysis and using gesture and posture as an analytic tool I hope to link aspects of acoustic morphology to electroacoustic morphology and human motion.

TOWARDS A THEORY OF MUSICAL GESTURE

To use the body as a metric for musical analysis is to extract data from the music and correlate particular aspects of it to physical motion. Underneath the varied definitions of gesture, gesture draws from motion a semiotic unit and argues that time, space, and the human body can be simultaneously articulated. Music theorists are now using the idea of gesture as an analytical tool and applying it as a biologically grounded, inter-modal synthesis that shapes motion (pitch motion, rhythmic motion) in time to create expressive force. [1] Posture is the other end of the movement spectrum and also yields a semiotic unit. Often defined as stillness or frozen movement, posture is an absence of movement. More specifically, posture can be thought of as movement that falls beneath a particular threshold.

Although Larson [2] describes musical gravity as something that "pulls down on melodic pitches above a stable melodic platform," I prefer to think of the concept gravity in music in terms of an equilibrium point. One of the limitations of much of the musico-theoretical writings about using gesture and physical force to describe aspects of the music is a reliance on tonal melodies and triadic harmonies. With tonal music, there are clear stable pitches derived from the cadential points in the scale (I,IV,V). With serial and post-serial music these points of stability are often established through repetition, and neighbor note resolution.

Using a music theory rooted in 19th century seems to belie the progressive notion that our bodies are integrated into the cognition and experience of both producing and receiving art-music. Furthermore for electroacoustic music, much of the lattice-based analysis techniques are non-functional. The older triad of melody, harmony and rhythm is collapsed in using gesture and posture (integrating the body into a metric) as an analytic tool for music. Duration, repetition, pitch direction, dynamics and timbre are far more significant factors in establishing gesture and texture.

There is a time threshold to our ability to perceive certain motions as gesture or posture. Should the sweep of an arm (to use a physical example) is very slow, we may still experience that as gesture, until motion stops–then it would be considered a posture. In music, there is a perceptual threshold dependent on time after which musical motion crosses into texture (posture).

For music to 'stop' while still generating sound, we hear repetition and changes beyond our temporal perceptual threshold as posture (this means very fast and very slow). In Justin London's Musical Rhythm: Motion, Pace and Gesture, he links tempo perception to walking, attempting to show that 'music' is perceivable only within a 'gate' threshold. He compiled a perceptual chart that may prove useful for this analysis. Musical motion that is quicker than 200ms and greater than 2000ms are beyond a perceptual melodic limit. [3]

Regardless of London's own conclusions (attempting to define the limits of what listeners perceive as musical), his research taps into a useful distinction—that the perception of musical time is perhaps the most critical aspect of listening, and that the perceptual limits derived from human motion are a major contributor to distinguishing individual elements of music (form, timbre, melody, harmony). These perceptual limits help give context for the notion that musical gesture and musical posture operate in some relation to these perceptual limits.

DETERMINING A GESTURE

If we combine these perceptual limits presented above and measure the acceleration characteristics of pitch direction, dynamics and timbre, a definition of musical gesture can be offered: A musical gesture is a sound event that articulates the combined acceleration and de-acceleration of pitch direction, dynamics and timbre within a 200ms to 2000ms threshold. Musical texture or posture relies on the repetition of these characteristics such that they fall outside of the perceptual threshold. Equilibrium, Momentum, and Inertia are tools that provide points of reference from which to estimate this acceleration. As a basic limit of gesture the 200-2000ms threshold is blunt and issues of momentum and thematic memory will alter this perception

PHILLIPPE MANOURY'S JUPITER

To demonstrate this approach I will use material from different sections of Phillippe Manoury's Jupiter. One of the first interactive works, the piece clearly articulates three levels of material, instrumental, synthetic, and instrumental extension.

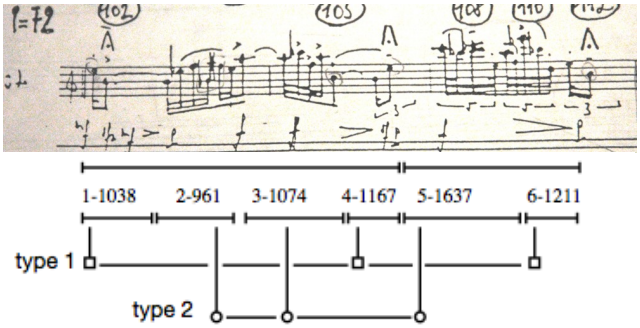

Figure 1. Section IIIg, Jupiter, with gestural timings in milliseconds.

Section IIIg provides an example of instrumental gesture. Repetition and return create a sense of equilibrium on B, with excursions interspersed. I have taken what might be called two phrases and broken them into 6 gestures. These six gestures–some consisting of only two notes–in turn, help create a single connected larger gesture. This notion that smaller gestures can create longer gestures still experienced can be linked to secondary levels of analysis. Momentum and inertia can connect across our loose cognitive borders of 200-2000 ms. The pitch which sounds the most is B natural, it also bookends the large gesture. This B forms an equilibrium point. This is further enforced by the weight it is given by surrounding the gesture. The six gestures that form the basis of the phrase are illustrated below, with recorded timings of: 1: 1038, 2: 961, 3:1074, 4: 1167, 5: 1637, 6: 1211 (in milliseconds)—all within our cognitive threshold. (N.B. the fermatas extend timings not spatially represented by the score.)

4	11	3	5	10	6	3	9	t	5	9	11	4	0	6	3	4	9	5	3	10	2	4	11
0	-5	4	2	-7	8	-3	6	1	5	4	-10	5	(7)	-2	5	-11	5	-4	10	5	8	2	5
208	729	104	104	104	104	104	312	104	104	104	556	695	83	83	166	83	83	83	83	83	83	139	278
4	4.5-2	2	2.7	3.2	3.9	4	5	5	4	3	2	5-2	5	4.7	4.4	4.1	3.8	3.5	3.2	2.9	2.6	2	2

Table 1. Table of Motion. Rows: 1–Pitch Class, 2–Half-Step Change, 3–Duration (ms), 4–Dynamics.

Gesture (1) of two-note motif, compositionally used for beginning and ending of gesture. This establishes a sense of equilibrium. Longer flourishes (type 2) propel momentum. and use register to create a sense of excursion. These two phases get connected through momentum. The sustain of a high A in the type 2 gesture establishes an upper bound for the gesture. By ending that phrase with leap away from the equilibrium note, momentum has been put into motion. The higher register of the second gesture is connected to the sustained high A in the first. Its resolution back to the B natural finishes the connection.

Another aspect to this section that deserves attention is the electroacoustic part. Here, Manoury is freezing certain pitches from the gesture, and generating what can be thought of as musical posture. Here the individual tones, interactively

articulated and 'frozen' by either a reverb process or synthesis; they are literally motion stopped. Although so quick as to be beneath our stated threshold, the initial articulation of the note has gestural qualities, and can be linked by momentum to the occurring gesture at the time of its grab. Written timings (converting bars and beats into milliseconds) of the tones grabbed and suspended that the opening gesture of the E moving to B with a decrescendo show lengths of 3125 ms (cue 101 and 102). This is out side our established threshold. More significantly, however, is the lack of variance of any particular parameter. Once frozen in an initial motion, the timbre, dynamics, and pitch are fixed.

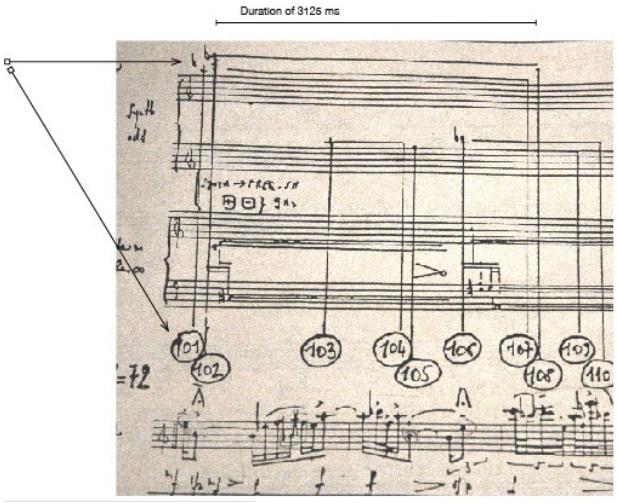

Figure 2. Example of Posture as Texture from Section IIIg, Jupiter.

Furthermore, there is an argument here for a foreground/background distinction to be made. Although the tone at cue 105, is a jolt, having gestural qualities especially since it can be associated with the previous gesture from which it is taken. The micro gesture which starts each of these postures is analogous to the stopping motion. There is no acceleration of parameters. In the above example I have connected gestures to show how they can form a sound object, and how micro gestures, without subsequent acceleration characteristics transform into posture.

SECTION IXA: A SIMULTANEITY OF GESTURE AND POSTURE

A more challenging example is drawn from the electroacoustic part of Jupiter in section IXA. Here a long electroacoustic deccelerates into a solo flute passage. This part operates both as posture, or musical texture, and gesture. Visualized by Manoury as a series of descending squiggles, this passage can provide insight to the many levels in which ideas such as momentum, gesture and posture operate. Here micro-gestures contribute the experience of texture while accented notes, which can follow a particular trajectory also generate a sense of gesture. In the previous example micro gesture was a point of departure for a 'freeze'–a direct correlation to the sensation posture. In this example a continuous barrage of sound where each micro-gesture occurs at a frequency smaller than the 200 ms short-time threshold creates the sensation of texture. However in this example accents of a line inside the texture pop out, and these are within our thresholds, allowing us to hear a series of connected gestures. Because of the timbral consistency and repetition of this section with the connected gestures, we hear this as a linked compositional unit of 33 seconds.

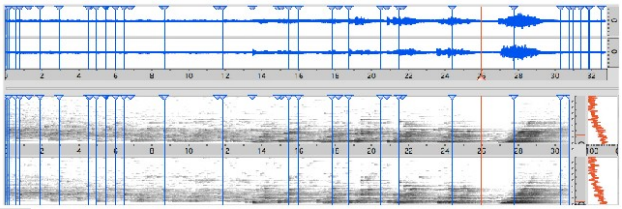

Figure 3. Section IXa, Analysis with Audio Sculpt. Markers represent gestures within perceptual threshold.

List of marker timings showing the 'gestures' of the descending synthesis line: 139, 546, 795, 1132, 1887, 2995, 4627, 4999, 5527, 6051, 6502, 6844, 8736, 10014, 11576, 11880, 12411, 13516, 14874, 15088, 15483, 16018, 17856,

18193, 18752, 20515, 20849, 21496, 21682, 24398, 27788, 30343, 30833. Except for the very last parts, the markers all fall within the 200 to 2000ms range. By the end of the passage, we have linked the gesture onset outside of the threshold to the earlier gestures. Each of these onset's primary gestural attribute is the acceleration of the decrescendo. Each accented synthetic tone, quickly decelerates.

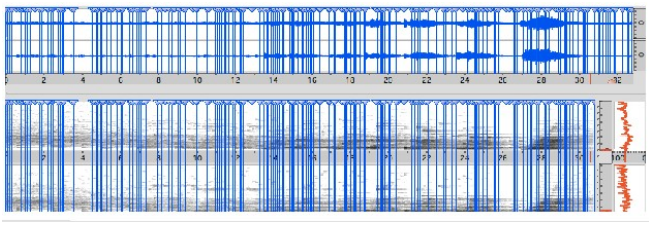

Figure 4. Section IXa, Here the event markers show 583 event onsets.
This is too quick to experience gesturally.This is musical texture.

A REAL TIME THREE DIMENSIONAL VISUALIZATION OF GESTURE

To demonstrate how this might look in a real-time context, I used Max/MSP/Jitter to create a gestural analysis based upon the same concept as used above. This is achieved by frame differencing spectral amplitude to show only spectral changes (velocity). Slower changes and partials with less energy are not shown. This can reveal gestural contours in both a pitch register and timbral register, because the only the strongest morphological partials are revealed. Timbral morphology is revealed by the number of partial areas morphologically active. Textural information is not visualized. Motions that are too fast, too slow, or repeated do not register enough variance to generate visualization.

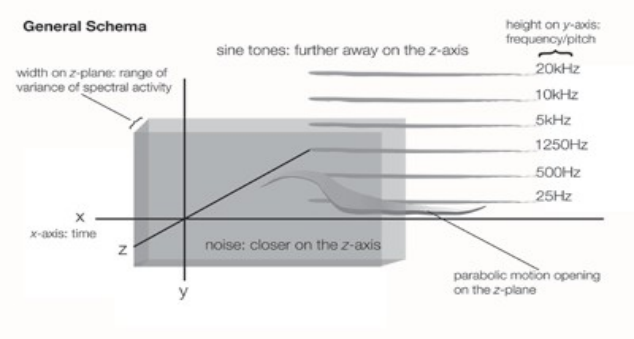

Figure 5. General Schema for visualizing spectral morphology in three dimensions [4].

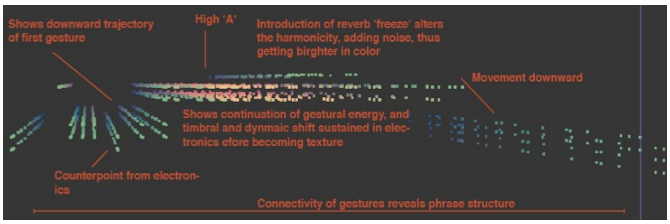

Figure 7. Real-Time Three Dimensional Morphological Visualization of Section IIIg, Jupiter.

CONCLUSION

In this paper I have attempted to use gesture and texture as a method of analysis for a mixed media work by Phillippe Manoury. In order to do this I have developed a theory of how gesture might work from kinematics, music theory,

musicology, and cognitive theory. In so doing I am attempting to form a link between our experience of music and the human body in motion. Using the human body as metric for musical experience may be a way to articulate and link aspects of music not commonly considered.

It is important to realize that while these cognitive borders can help concretize the concept of gesture I have put forth here, it is still flexible. There is no essentialist quality to this analysis. I am not arguing that gesture in this formulation is wresting from the music essential qualities not able to be recognized by traditional methods. But what I am suggesting is that in the analysis of contemporary music, where the 19th century notions of tonic and scale do not really resonate, this approach to analysis can provide insight into compositional character of certain pieces.

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