Notational Indeterminacy in *Music Concrète Instrumentale*

by
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Submitted to Dr. Erik Lund

There is a long history in the Western classical tradition of the use of noise in concert music, by no means was the generation starting with the Italian Luigi Nono the first to do so[1]. The first well-known twentieth-century work that utilized noise as a constitutive factor of the material and its behavior could be said to be Edgar Varèse's percussion ensemble work *Ionisation*, written between 1929-33 – in this work (as in most of Cage's compositions involving noise) rhythm and proportion are the primary structural determinates. Next is perhaps the works of composers of the textural music of the fifties and sixties such as the Pendereçki of *Threnody for the Victims of Hiroshima* (1960), and Ligeti's *Aventures* (1962).

Although a certain amount of indeterminacy was featured in Pendereçki's work, the noise counterpoint sections of *Threnody* are actually highly determinate in the sense of order and placement. The composer utilized serial techniques to generate noise canons so that he could have some way of controlling a material that could clearly not be controlled by more conventional means. Pendereçki, however, didn't understand the potential of noise to the same degree, as did composers of later generations. For Pendereçki, noises needed to be tagged and filed away under an imposed categorical system. This system did not take into account the inherent qualities of each noise – a high pitch was a high pitch, bowing behind the bridge was bowing behind the bridge – there was no attempt to recognize and utilize timbral distinctions and variations available for each technique. Pendereçki's canons essentially behaved as Stravinskian superimpositions *cum* the introduction of *Le Sacre du Printemps*. Ligeti's *Aventures*

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[1] To state one famous example, consider the use of live cannons in Tchaikovsky's 1812 Overture. Of course, one need only go as far as to mention the use of percussion in the orchestral ensemble – a fact which stimulated Helmut Lachenmann's earliest foray into the genre in his orchestral work *Kontrakadenz*. In *Kontrkadenz* Lachenmann sought to orchestrate gestures in the other three families that flowed out of the sounds generated from various operations carried out on the percussion instruments.

comes nearer to understanding noise in the way that Sciarrino's generation of composers did. *Aventures* is organized into sections loosely based on noise type, or mode of production. Using this method guarantees that (level of intricacy notwithstanding) both composer and performers will be aware of the possibilities of timbral distinction within each technique, there will be – in other words – interpretive choices to make, phrasing predicated upon timbral distinctions. Still though, the relationship between material and structure remained distant and arbitrary – formal differentiations still are not realized in the realm of timbral continua, but via categorical imposition.

The generation of composers writing what is known now as *musique concrète instrumentale* include Helmut Lachenmann[2], Mathias Spählinger, Gerhard Stäbler, Nicholas Hüber, Beat Fürrer, Vinko Globokar, Salvatore Sciarrino, and many others. *Musique concrete instrumentale* has become one of the dominant aesthetic forces in European music today, although it's influence in the United States and Great Britain remains, for various reasons, rather attenuated. Much like the music that preceded it, narrative structures continue to be very important – although mediated through new conceptions such as Lachenmann's concept of *super-sequenz*, and Sciarrino's *figures*[3]. Despite increased attempts to create formal seamlessness in much of the music, it is still quite possible to segment the works into formal "sections" that are constituted in much the same ways as other kinds of music. The practice of organizing sections of the music via contrasting ideas and textures remains, as does the practice (for most works) of

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[2] who coined the term in the 1960's to describe the music he was attempting to write.
[3] More on Sciarrino's *figures* below.

notating gestures within more or less traditional metric lattices (though in many cases, in such a way as to prevent any indication of traditional meter)[4].

The important differences in the way composers of this ilk conceive of and notate their music begin with the treatment of noise (really timbre, or "sound") as the primary carrier of narrative information. Probably the most important distinction to understand has us beginning where Pendereçki left off (or perhaps more appropriately, Ligeti) – sound as existing in a continuum, and each possible kind of sound (pitch and every kind of noise) as existing on separate continua of timbral quality. Recall that Pendereçki asked the string players of *Threnody* to play "the highest pitch possible" indicated by a blackened triangle pointing upwards instead of a regular circular shaped note-head. The composer Mathias Spählinger adopts and adapts this notational convention in his orchestral work *Passage/Paysage* (1990) by using one to three triangle-shaped note-heads stipulating the *relative* highness of the very high indeterminate note. This allows him to be more specific; to create clouds of high pitches within relatively well defined range bandwidths. And now it is also possible to create a musical *phrase* predicated upon this newly available distinction.

Helmut Lachenmann's Second String Quartet "*Reigen Seliger Geister*[5]" transmogrifies the familiar "extended technique" of *flautando* bowing across a prism of subtle, yet related differentia predicated upon the vertical location of the bow between the bridge and nut, the distance above the string and amount of pressure used (the lightest of which he terms "*flautato*"). *Flautato* bowing requires an amount of restraint that can be thought of as the opposite of over-pressured bowing (in which varied levels of

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[4] Although, various frequencies of "periodicity" is a common feature of temporal organization in many of the works.

[5] "Round of the Blessed Spirits," a reference to a selection from the second act of Glück's opera seria *Orfeo ed Euridice* (1762)

pitch distortion are called for). The player must actually hold the bow at a position above the string so that the slightest possible pressure is applied to the strings. As in over-pressure bowing, the pitch becomes unrecognizable, but due to a means of production that lies on the exact opposite extreme of the continuum of bow pressure. In this work, bow pressure *means* something – in the same way that in Beethoven's "*Les Adieux*" Piano Sonata an Eb major triad means something – it becomes a structural quantity, albeit one for which neither an adequate means of notation nor a readily available theoretical tradition is in place.

For the most part, none of the composers of this family of genera utilize the functional tonal hierarchic system (except referentially, for dramatic purposes, and only for short stretches of time), nor do they use the twelve-tone method, or set-class structuring (except as a means to pick pitches, which in many cases is seen as either relatively arbitrary, or necessary only insofar as the literal sound of the music benefits from it). The rhetorical structure of a composition for many of these composers is not, as was for the pre-war generation and their immediate offspring, a matter of generating intelligible structures based on categories of nomenclatures (such as can be found in dodecaphonic techniques like row derivation or combinatoriality), but in means of organization that capitalize upon the various kinds of gradation offered by the physical acts utilized in the production of sounds (pressure [of bow/fingers], placement, breath, speed, fingering). Transitory noises – such as fret noise on a guitar – were explored with a depth of attention and craft that was not pursued by composers of previous generations. Where in the music of Pendereçki, it is truly not a stretch of the imagination to call the extended instrumental techniques "sound effects," in the work of Sciarrino and his contemporaries, to do so would be unthinkable. These composers see instruments as having vastly greater sound vocabularies than is commonly understood, and they are

exploring these techniques in ways that make them into the primary elements of structure.

As was noted previously, this conception of musical narrative quickly stretched the bounds of traditional notation beyond the edges of usefulness. The kinds of continua evoked by *musique concrète instrumentale* – bow pressure, advanced fingering technique, advanced harmonics concepts – those techniques that are not best represented in the x/y axis of pitch and rhythm, can only rather clumsily be represented (if at all) using this inherited language. Composers have generally responded in one of four ways: descriptive notations, use of symbols (within the framework of traditional score presentation), graphic notation, or action notation.

Descriptive Notation

Descriptive notations represent the smallest deviation from traditional practice. Typically they use a combination of familiar symbols, widely known extended techniques (such as jeté bowing), or verbal descriptions (either of the resulting sound, or the means of production). The benefit of this notational principle is that the performer is given a directly decipherable set of indications as to either what sound result is wanted, or a description of how to produce it (though the former is more commonly the case). If the former is the case, then the performer has the opportunity to use their own experience with the instrument to arrive at as close a facsimile as possible to the desired sound quality. The potential drawbacks of this method are inaccuracy caused by a composers misunderstanding of the techniques and quirks of a particular instrument, or the performers own unfamiliarity with atypical ways of producing sounds on their own instrument. Very often performers are trained to get a specific sound from the instrument (which is, much like the traditional notation system, designed to optimize the qualities of

a very specific kind of music). This is often a great barrier to be overcome (and the cause of much unintentional indeterminacy). Furthermore, it is often very difficult to communicate a sonic result (an inherently non-verbal phenomenon) via verbal means – to describe the sound of Lachenmann's concept of *saltando/tremolo* or *subtraction sounds* – such as the post-articulation muting grip – to someone who has never had any aural/conceptual experience with such sonic discourses. Endeavors of this kind often dissolve into bouts of verbal circularity.

Sciarrino uses this mode of representation for the extended vocal techniques in his "azione invisibile" *Lohengrin* for actress, three male vocalists, and 14 instrumentalists. He combines symbols in the form of shaped note-heads (see below), with verbal descriptions of the desired sound. Sciarrino traverses the typical difficulties of descriptive ambiguity by utilizing sounds that have specific significant connotations for the listener such as the sounds of birds[6] (figures 1 and 2), the sounds of horse hoofs[7], gasps, shouts, and other vocalizations.

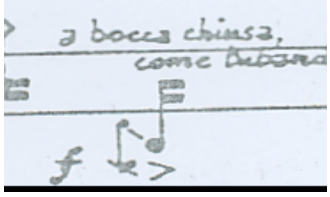

Figure 1: One kind of bird sound in Sciarrino's *Lohengrin*

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[6] produced by closing the mouth and performing a sharply accented downward glissando (which is itself created by constricting the vocal chords and abruptly releasing them. Figure two is produced by pronouncing KR in a high-pitch (yet full) head voice, rolling the R, and performing a downward glissando to an indeterminate point. In figure 2, the seagull calls are punctuated by the bird noise type from the first figure. Rhythmically, the 16th note values and the quarter-note values are interpreted loosely as short and long sounds and the space between them seems to be spatial, based on the actresses interpretation of the gesture.

[7] created by chattering the teeth in the familiar *bolero*-esque rhythm. This technique is used in the first scene to ironic and unsettling effect as a reference to the character of Lohengrin as "the knight on his horse" riding in to rescue the severely mentally disturbed Elsa.

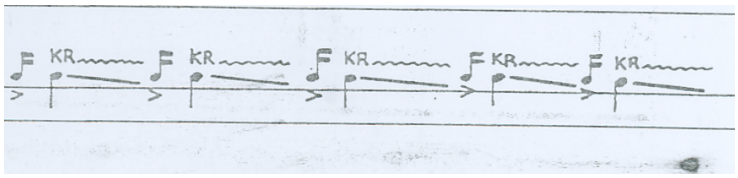

Figure 2: Another kind of bird sound from *Lohengrin*.

Symbolic Notation

The extensive use of symbols fitted into the framework of a traditional score represents another approach to notating noise vocabularies. This mode was especially popular in music of the sixties and seventies. Composers like Pendereçki, Kazimirez Serocki, Boguslaw Schaeffer, Roman Haubenstock-Ramati, Roger Reynolds, and many others drew symbolic lines and note-heads of all shapes and sizes, and graphic indications overlaying and adapting the traditional mode of notation. Attendant with these symbols is usually (at the beginning of a work) a long list of descriptive indications in a legend of some kind. The benefit of this type of notation is that the page of music is not congested with instructions that the performer has to read around. A page that is too clogged with verbal descriptions may guarantee some level of accuracy but potentially at the cost of a great deal of fluidity. Once the performer has internalized the meaning of each symbol, they will be able to read with ease (as they already have hundreds of conventional musical codes memorized already). The difficulties with this kind of notation are firstly that, since there is no well-developed performance practice, the same technique in one piece may be notated using a different symbol than another composer has used for their own piece. Several attempts have been made, beginning in earnest in the sixties, to codify and stabilize the meaning of various symbols in dictionaries and encyclopedias of music notation, but for many of the symbols, a disparate collection of

varied practices remains as a token of the failure to make such a corporate achievement[8].

Berio's *Sequenza III per voce femminile* (1966) is a fine example of this method of notation. Many of Berio's symbols have – as well as any new symbol could – entered into the lexicon with some degree of universality. Berio creates axis' of interpretation expressed as continua between sets of binary oppositions such as voiced/unvoiced (figure 4), periodic-distinct rhythm/aperiodic-fused rhythm (figure 5), relative pitch/specified pitch (figure 6), and phoneme/word (not shown). These binary continua represent a step beyond the simplistic uses found in *Threnody*, but like Ligeti's usage in *Aventures*, they are an intermediate step. Time in the *Sequenza III* is articulated in ten second units, but within these temporal containers (and much like in Cage's *Music of Changes*), the pacing of events is to be spatially interpreted. In this work Berio also uses minimal descriptive notations – mainly single words that describe emotional states – the immediacy of which remind one of their use in Sciarrino's monodrama. However, there is no indication of the means of their production or the exact degree of constituent sonic factors, leaving the performer to exercise her freedom in interpretation (though clearly there are a limited number of actions that one combines in producing the affect of "nervousness"). The relative similarity between different renditions of the work can be attributed not only to the craftsmanship of Berio's notational concept, but also to the real sense of performance practice that has developed surrounding the work (as is the case with works like *Threnody* whose proscriptive indications are actually far less precise than those of Berio). It is also fortunate, and perhaps not inconsequential, that this kind of

[8] Various books by authors such as Gardner Read, Kurt Stone, George Heusenstamm, David Cope, Laszlo Boehm, and many more attempt to collect and codify symbols found in period scores, and also attempt to institute new methods of their own – most of which have failed to catch on.

music came to flourish as recording technologies were developed and became quotidian.

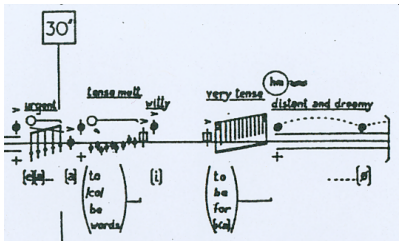

Figure 3: symbolic/descriptive notation in *Sequenza III*

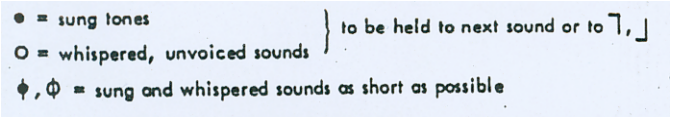

Figure 4: the voiced/unvoiced continuum in the *Sequenza III*

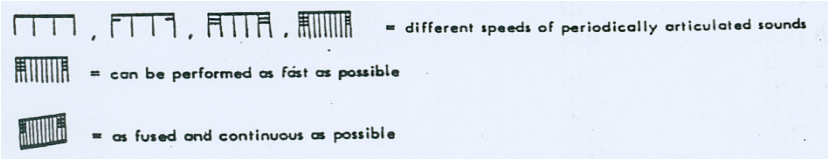

Figure 5: The rhythmic continuum in *Sequenza III*

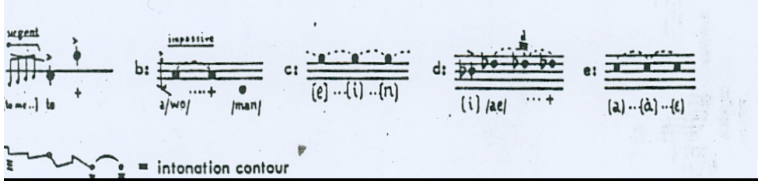

Figure 6: The pitch-specificity continuum in *Sequenza III*

Graphic Notation

In the most basic sense or course, all music notation is graphic. Graphic notation in the sense that is invoked here, represents the farthest remove from traditional modes of notation. It is the method that grants the most freedom of interpretation to the performer and admits the least amount of control to the composer. As such, it is only those composers for whom the end of the notational practice is not the depiction of a technique or even a specific depiction of the form and overall shape of the music. It is typical that for such composers, the indeterminate elements of the work and all that they

do mentally for the performer are the area of greater focus, and the techniques are a means to achieve those ends. Many of John Cage's works fall in this category, as well as do many of Haubenstock-Ramati, Sylvano Bussotti, Trevor Wishart, Earle Brown and others. The benefit of utilizing this form of notation is that the performer feels often far less constrained and self-conscious when interpreting the work. They are free to manifest their own creative compositional faculties and strategies without feeling that they are encroaching upon those of the composer. The clear drawback is that the composer can't actually specify which technique is represented by which graphic – or at least not with the air of specificity that characterizes other modes of notation. Although a surprising amount of information can be encoded using conceptual metaphors common to musicians (such as up = high / down = low (in terms of pitch), and left = now, right = later (rhythm)), too much is left un-specifiable to be an attractive option to most composers of *musique concrète instrumentale*. Graphic notation doesn't necessarily abet any relationship to material except insofar as it encourages an experimental concept of sound. Performers know that Earl Brown is a composer of bizarre music, and so they naturally render bizarre sounds when they play his works. This reality is borne out by the briefest perusal of the recorded catalogue of Brown interpretations.

There is however a form of graphic notation, utilized by Helmut Lachenmann in his works *Pression* (1969), and in the String Quartets – specifically in *Gran Torso* (1972) and *Reigen Seliger Geister* (1989) that enables the kind of specificity more fitting of a well-developed economy of technical gradations. Lachenmann invents his own clefs that are essentially maps or pictograms of the face of the stringed instruments. These clefs allow him to notate with immediacy and specificity the exact physical location of each gesture – and through that, Lachenmann is able to be rather specific about the sounds that result. In *Pression*, the composer uses small pictograms that represent the hands to

demonstrate unfamiliar modes of performance that verbal instruction alone would probably not suffice (figure 7). Where the first sense of graphic notation (the type which is more common to Wishart, Bussotti, and Haubenstock-Ramati) is a mapping of visual elements onto the plane of sonic shapes and events, this second type is a mapping of physical spaces onto representational diagrams – in the manner of a VCR manual or a set of dance-step instructions.

Sciarrino uses the first type of graphic notation in the third act of *Lohengrin* (figure 8) to depict aspirate sounds that are interpreted by the performer such that the bent angle protruding from the harmonic note-head (here representing that the sound is aspirate) and connecting to the accent represents the tension of the vocal chords, as well as the rate of change in tension. The elbow of the figure marks the point at which the tension-glissando shoots up rapidly into a series of glottal stops, which sound like coughs. Here, as in other places in the opera, the sonic effect/affect is interrupted by the spoken text of the composition (which is taken from the 19th century adaptation of the traditional medieval German tale by Jules Lafourge) so that the Elsa's notations create a two dimensional surface[9].

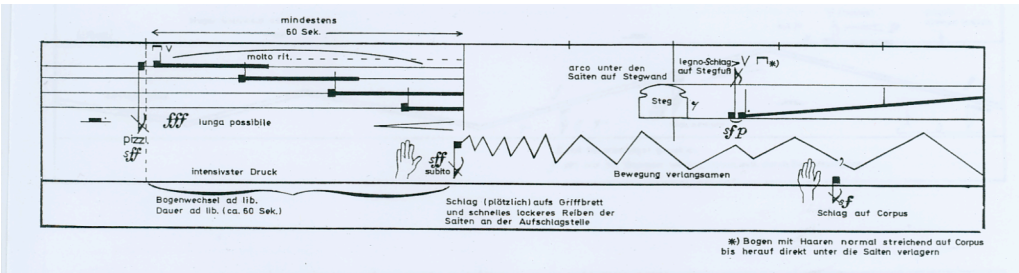

Figure 7: graphic notation in Lachenmann's *Pression*

[9] I have written elsewhere of Sciarrino's concepts of interruption and multidimensionality. It suffices to say here that his formal concept is articulated by means of a network of meta-narrative techniques that are predicated upon physical and visual analogies rather than rhetorical relationships of nomenclatures.

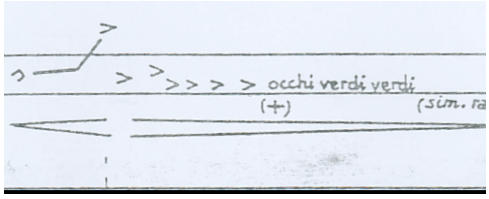

Figure 8: graphic notation of aspirate sounds in Sciarrino's *Lohengrin*, from act III.

The line between graphic notation and the final notational response (action notation) is in the case of Lachenmann, at times thin. I have included the above example under graphic notation because it utilizes graphics (pictures), but this is not the only way to notate actions, as the next segment will show.

Action Notation

The final response, the one favored by most composers of *musique concrete instrumentale* (including Sciarrino), is a term once again coined by Helmut Lachenmann – *action notation*. There are actually two things potentially meant when the term is invoked. In the first sense, it means that there will be a margin of difference between the gesture as it is notated and the resulting sound, as for instance when one notates *col legno tratto* at a dynamic of triple-forte (as it is physically impossible to achieve a true triple-forte because of the nature of the technique – bowing on the instrument with the wood of the bow). The point of such a notation is that – however weak the actual sound of the *C.L.T.* – there is a *difference* in the technique that is brought out by playing with actions that would produce triple-forte in any other manner of playing, and playing the technique using actions that would produce a pianissimo with another technique.

In the second sense, it means than instead of notating results, the composer notates the actions that are required to produce them. Very often in this form of notation, an enhanced staff system, or some graphic adaptation of a standard staff system is

utilized in order to separate out the physical stages upon which sound acts. So for instance one line, or one system will be dedicated to factors of the arm (or bow), one to factors introduced by the fingers, another to factors introduced by the breath, and other possible sites of physical gradation. Clearly, a level of indeterminacy is invoked by such a practice (however in this case, intentional). I make a differentiation between graphic notation as seen above in the Lachenmann example (figure 7) and the example below from American composer Aaron Cassidy (figure 9)[10] that merely reinterprets traditional symbols.

Superficially speaking, the nature of the techniques themselves are likely to produce results that fulfill the expectations the composer has of them (a trilled harmonic that is *sul ponticello* will sound irregular, glassy, and sharp – as well as active [as it is trilled]), but if spectrally analyzed, they are likely to produce a highly irregular waveform that looks more like noise than pitch. This fact of their sonic instability becomes much more significant as the focal point of much of this music shifts from macroscopic events (like melody and figuration) towards microscopic levels of detail (Sciarrino's *infinitesimal differences*)[11]. Another kind of indeterminacy (on a broader level) occurs when there is a separation of the sites of production (the arm, breath, fingers, etc) in notation, a practice that is often referred to as *decoupling*. Here is becomes impossible, or at least improbable, that the actions undertaken will produce exactly (or at times even remotely)

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[10] This differentiation also exists, I might add, within Lachenmann's string quartets themselves, which generally use a combination of descriptive/symbolic/graphic/action notations.

[11] This term is not Sciarrino's; rather it is a commonly associated description of the fact that the drama of his music occurs on a microscopic level (Thomas, 194). One should be careful, however, not to confuse the Sciarrienen concept with Spählinger's *microdramaturgy*, as the latter is concerned not with the grains of a single sound itself, but with the narrative interplay that occurs between small gestures and single notes/events. The parallel concept in Sciarrino's music exists in the form of the five formal phenomena in music I discussed on page 12, footnote 9.

the same sounds when repeated. This is especially the case when actions that are commonly paired together in performance – such as the placement of fingers on the keypads and the ignition of the air-stream – are staggered, or superimposed in irrational configurations. The success of such techniques is predicated on the inability of the performer to literally reproduce the actions that engender different instances of the same notation. The example below, taken from Aaron Cassidy's solo string piece *The Crutch of Memory* (2004), demonstrates the technique of decoupling quite well.

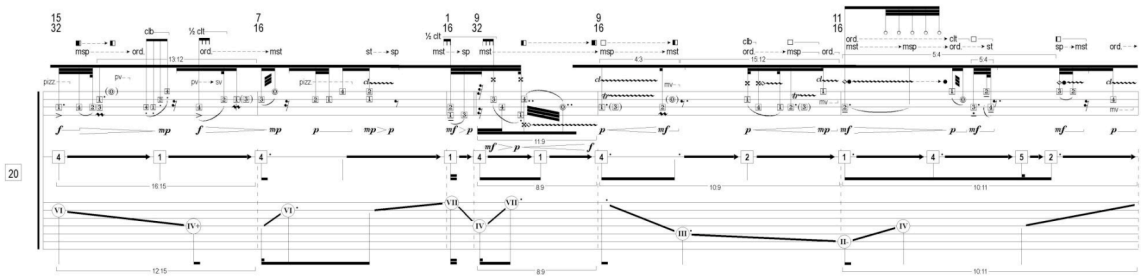

Figure 9: Opening staff system of *The Crutch of Memory* for string player.

Cassidy says about the composition:

> The Crutch of Memory continues my long-standing interest in prioritizing and foregrounding the physical, choreographic elements of musical performance. As in a number of my recent works, here it is physical states, the interface between the body of the player and the body of the instrument, and physical gestures that drive the sonic surface. I am interested in the ability of these corporeal actions to be present as musical material in their own right and not simply as means to an aural end. As such, the notation employs a detailed, multi-layered tablature that independently controls the movement up and down the fingerboard, the spacing width of the fingers, the contact between fingers and strings, as well as the actions of the bow and right hand. And of course, because it is physical movement that is prescribed, the piece can be performed on a variety of string instruments (any bowed, non-fretted instrument with at least four adjacent strings) and with a variety of scordature (which may be chosen by the performer based on a series of guidelines given in the score)[12].

The top staff represents the rhythms and actions of the fingers of the left hand, and the lower staff represents the relative position of the hand on the string – the center staff indicates the string (I – IV) upon which the bow moves. Each staff is presented with

[12] (Cassidy)

its own rhythmic profile (one that is easily more complex than is actually performable). And while some writers (for example Roger Marsh) point out that the number of streams of attention required to carry out an accurate interpretation of the notation is actually psycho-physically too great, in practice most composers of complex music (Cassidy included) allow for a fair amount of interpretive freedom[13].

Synthesis

It must be said at this point, that it is rare for a composer of *musique concrète instrumentale* to utilize only one of the above highlighted modes of notation. Their numeration represents a catalogue of common responses, however clinical in design. The choice of notational technique is of course dependent upon both the effect desired, and the types of information that are meaningful to the production of said effect. Descriptive notation is best suited to sound vocabularies that have either common connotative associations for the performer, or modes of production that draw easily from knowledge that the performer already holds (so that the fewest number of words are required). Symbolic notation is really best used to depict sound vocabularies or modes of production that have well-defined notation and performance currency, as well as sounds and modes of production that are ubiquitous in the piece (so as to justify the use of the symbol). Graphic notation in the first sense is best used to depict the most general formal and affective shapes – leaving much choice to the performer. Graphic notation of the second sense is separated from action notation only in that pictorial indications are used rather than adaptations of traditional notational concepts. Such graphic notation is best utilized to portray sound vocabularies and events for which the mode of production

[13] (Marsh, 83-6)

guarantees that the desired sound will result. This mode of notation requires from the composer a modicum of insider knowledge of each instrument that they compose for that transcends the usual demands of basic knowledge from an orchestration viewpoint. Action notation of the first type (where there will exist a degree of difference between the mode of production and the result) best portrays sound vocabularies and gestures where typical notation would be misleading – such as in the case of *col legno tratto*. Finally, action notation of the second type (where the sites of sound production are addressed separately) best depicts vocabularies and gestures that find no dependable descriptive recourse in performance practice, verbal description, or other means. In none of the four methods presented above is it possible to manage timbre with the same degree of quantization that Western composers have wielded in the arenas of pitch, harmony, and rhythm[14]. This fact does not seem to have prevented the composition of heretofore-unimagined sound worlds as distinctive from one another as they are from the musics that preceded them.

[14] For many of the composers of *m.c.i.* this is not an earth-shattering problem – though one gets the sense that Lachenmann is trying to reduce the gap between the two worlds of notation as much as possible with each new work.

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