

ARTICULATED NOISE

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ABSTRACT

Articulated noise is a computer-assisted strategy for applying various flavors of noise to the structuring of musical compositions. The approach applies equally well to creating electroacoustic music and instrumental scores, and makes no assumptions about musical style. Articulated noise is discussed here in terms of its precedents, philosophical and aesthetic basis, methods adopted by the author, and current compositional work employing the approach.

1. ORIGIN OF ARTICULATED NOISE

The impetus for articulated noise emerged from “Rose of the World,” a work of computer music I composed for the CD “Clairaudience: New Music from Electronic Voice Phenomena (EVP)” [4]. EVP is a scientifically unverified method of allegedly detecting spirit voices captured on blank media such as magnetic tape. Absent confirmation of supernatural causation, EVP may be regarded as an example of a statistical “type I error,” a false positive. My compositional approach in “Rose of the World” was to mix an EVP recording into a synthetic noise texture, thus reversing the process: a sound extracted from analog noise was re-inscribed into digital noise. Patterns perceived in, or imposed upon noise emerged as a primary aesthetic goal.

2. AUDIO EXPERIMENTS

My first experiments with articulated noise were inspired in part by a noise unit generator found in a popular acoustic compiler that used a poor-quality pseudo-random number generator (PRNG) with a short period before repetition. The result of using this unit generator was to hear noise that repeated an audible rhythmic pattern, due to the short periodicity of the PRNG. I experimented with laying noise looped in different periodicities, and found that when the layers are separated spatially, the repetition patterns are quite easy to hear. When the period lengths are lowered to the audible frequency range, a clear, but somewhat rough pitch is perceived. Tones generated this way can be banked into chords. This kind of looped noise is similar to the Karplus-Strong algorithm [3] but lacking the feedback and lowpass filter element. One important difference to Karplus-Strong is that the noise contents become more important to the resulting sound. In Karplus-Strong, the effects of feedback and filtering soon overcome the specific attributes of the triggering noise burst. However in looped noise tones, the timbre is significantly determined by the noise content, since the noise segment is treated as a waveform. The

interaction of looped noise segments, spatial articulation, and various levels of structural articulation remains an ongoing research project feeding current compositional work-in-progress.

3. POST-COHERENT MUSIC

The experiments with audio noise at various time scales led me to consider the application of noise to the articulation of musical constructs appropriate to expression in traditional score form. Of course generating scores algorithmically is a relatively old practice, and precedents are discussed below. But the emphasis here is to give noise as much influence on the music at all levels as possible, just short of having the music itself sound “random.” The intention is to foster “type I error” listening in both electroacoustic and instrumental music. This kind of music and listening engages a long-standing concern with what I now call “post-coherent” music. A discussion of post-coherent music requires a discussion of musical coherence, which is well beyond the scope of this paper. However I will propose as a baseline notion that the coherence of a musical work is inversely proportional to how robustly it can survive having its elements randomly reordered.

Coherence can be maintained in electroacoustic music by limiting the sonic vocabulary of any particular piece and drawing on a relatively predictable gestural syntax, such as is often present in acousmatic music. But a post-coherent approach takes advantage of the lack of performance cues inherent in electroacoustic music, along with the computer-based ability to easily store and catalogue huge varieties of sound, to pursue surprise, non-linearity, and incongruous juxtapositions, at the risk of losing touch with traditional musical notions of coherence.

3.1 Beyond 20th Century Coherence

Post-coherent music could be considered a reaction to late 20th century modes of information perception, notably a nonlinear information overload resulting from exposure to increasingly rapid push media with conflicting ideological messages, as well as the basic mode of information traversal on the Web itself. I'd further suggest that an extreme view of musical coherence is itself a 20th century ideology, promoted by two of the most important European art music theorists of that century: Heinrich Schenker and Arnold Schoenberg. Schenker's model of tonal music [8] promotes a hierarchical view of levels, each following similar rules of good construction based largely on J. J.

Fux's rules of species counterpoint [2] and on a rejection of J. P. Rameau's chord-based theory of harmony [7]. Ultimately, extended tonal pieces are seen as ramified expressions of a simple contrapuntal framework that expresses a single tonality, thus viewing tonal compositions as coherent, organic unities. As Schenker states in the introduction to his summative work "Free Composition," "I present here a new concept, one inherent in the works of the great masters; indeed, it is the very secret and source of their being: the concept of organic coherence. [7]" Schoenberg's "method of composing with twelve notes which are related only to one another other" is a compositional attempt to achieve post-tonal coherence, by defining a single structure, the tone row, as the source of all musical material for an entire composition according to the principles of motivic and set-based transformation. In his essay "Twelve-Tone Composition" Schoenberg asserts, "the main advantage of this method of composing with twelve tones is its unifying effect" [9]. Whether the ideas of Schenker and Schoenberg constitute timeless, universal insights into the art of musical composition (as the tone of their writings often suggests) or rather a localized product of the historical and political climate in which they were formed remains an open question.

3.2 A 1990s Example of Post-Coherent Music

In the realm of computer music, Christopher Penrose's work is an important representative of post-coherent strategies. One finds in early Penrose works from the 1990s such as "Fraud" [5] an overwhelming amount of sonic material, and audio processing strategies. The music is more concerned with how to move from one distinctive sound to another than with defining a coherent sound world. However coherence can be established not just by interrelated materials, but also by form, and "Fraud" does indeed have an extremely clear and well-articulated large-scale form over its 27-minute duration. In later works, starting from "Manwich" [6] formal coherence is abandoned and fluid forms are embraced in which any potential event no matter how seemingly unrelated to what came before, can be accommodated into the musical structure.

4. SCORED NOISE ARTICULATION

The technique of articulated noise applied to instrumental music uses noise to make musical decisions at most levels of a composition. However composer design is fully engaged at two crucial levels. First, the composer designs templates – musical structures that can be combined to provide a set of constraint specifications at any point in the piece. One template might describe pitch constraints, which might result in a specification of an unordered pc-set, a series of randomly chosen pitches, a single pitch, the absence of pitch material (requiring either silence or "noisy" non-pitched articulation), or even a specification to the composer to invent local pitch materials. Other templates might affect meter, rhythm, tempo, dynamics,

articulation and so forth. The second composer intervention is at the surface level of composing. The intersection of noise-driven templates results in a specification set, sometimes extremely constrained, that still allows some degree of compositional discretion. Thus the composer fully crafts the surface of the piece within constraints that were also composer-determined, but randomly applied. Two important results obtain from applying this technique. First, at whatever granularity that is selected, there is no guaranteed correlation from one grain to the next. This frees the composer to focus completely on the crafting of single grains, without concern for how they relate to other grains in the piece. Second, the intersection of random decisions and selections of multiple templates results in combinations that the composer is unlikely to have selected if working purely by intuition. In extreme cases this may result in musical surfaces that are physically impossible to perform at the specified tempo. The result of this technique is a carefully crafted musical skin, painted upon a structure that is noisy at every other level, inviting "type I error" hearing below the surface.

4.1 Types of Noise Employed

In my recent uses of the technique, I have employed white noise, grey noise, and pink noise, all from PRNGs in SuperCollider. But the noise source could come from anywhere, including digitized natural sources of noise such as solar noise.

5. THREE ARTICULATED NOISE COMPOSITIONS

My completed instrumental articulated noise compositions are for relatively small forces: two duos one solo piece, and most recently a song cycle for mezzo-soprano and small mixed ensemble. Noise is often associated with mass, and I wished to use noise to generate much more delicate surfaces. My "Three Noises for Violin and Piano" explore different degrees of de-correlation between the two parts. In the first movement, "White," the violin and piano parts are almost completely uncorrelated, as each has its own complete set of unrelated templates. The one exception is that one of the piano templates calls for the piano to double the violin, so at certain moments the two instruments play the same materials. In the second movement, "Pink" there is a high degree of correlation as piano chords provide pitch materials for violin harmonic melodies. The final movement, "White" is a toccata-like piece where the piano exclusively hammers chords on noise-generated rhythms while the violin follows various melodic templates. Although violin and piano follow different templates, the complimentary nature of the templates invites a unified hearing of the two instrumental parts of this movement.

5.1 White and Grey

My flute duo "White and Grey" employs white noise and grey noise. The two parts vary in pitch correlation from no correlation to similar or identical pitch

materials. Modes of articulation often vary between the two parts. Any particular bar might find the two flutes cooperating, conflicting, or one of the flutes taking a solo. Noise driven tempo changes often result in sudden shifts of musical character. Use of two flutes creates potentially heterogeneous textures, but requested spatial separation on stage in performance invites segregated hearing as well.

5.2 Piccolo Noise

This piccolo solo is based on white noise. Its rhythms are much simpler than my other two works discussed here, as the templates organize a stream of exclusively 16th notes at a fixed tempo of mm 115. Most of the patterning is in pitch, dynamic patterns that encompass several bars, and rhythmic modes. The result of this is a rather light piece, which feels almost as if it could have been composed without the use of noise. However certain surprising breaks to the texture suggest otherwise.

6. PRECEDENTS - XENAKIS

There are many precedents for this work in the history of both instrumental and computer music composition. I will discuss three of the most prominent. The most direct precedent is the work of Iannis Xenakis, both in his writings, notably *Formalized Music*, and in his compositional practice of stochastic music [10]. There are however differences to Xenakis' practice. Xenakis was often concerned with noise as mass, whether from nature (rain drops) or mass movements of people. The noise as mass is shaped by sieves or generated according to desired density patterns. Mass textures are not a specific concern of articulated noise, but rather belong in the domain of algorithmic composition. Xenakis very carefully organized his musical structures, from an aesthetic standpoint, particularly at the larger level of form. Xenakis did indeed generate formal structures stochastically, but he would moderate the results if they were not in keeping with his musical intentions. In articulated noise, larger structural determinants are noise driven, including matters as fundamental as overall duration. In general compositional intervention is avoided except at the surface level of the music.

6.1 Cage and Indeterminacy

Another important precedent is John Cage's work with indeterminacy [1]. Like Cage, I am using random procedures to bring about musical results that would not have come about from intuitive methods. But Cage uses indeterminacy procedures in an attempt to free himself from his own preferences. I embrace my preferences, and use them as a guide to creating the music I want to hear. Articulated noise is simply another compositional strategy for exercising my preferences. A different composer using an articulated noise approach will arrive at very different sounding music than I do.

6.2 Ferneyhough and New Complexity

Like some outcomes from articulated noise, Brian Ferneyhough's music is often impossible to play as notated. However in Ferneyhough's music, every individual moment is playable, and generally quite idiomatic to the instrument as well. It is the accumulation of concentrated musical information over time that overloads the performer's processing capabilities resulting in performance failure, an anticipated outcome for this music. The intent is for the performer to try as hard as possible to perform the work accurately even while knowing that some degree of failure is unavoidable. This generates considerable performance excitement in Ferneyhough's music. The impossible passages that result from articulated noise procedures have a different meaning. They occur, if at all, as an artefact of allowing the intersection of templates to generate extreme behaviors. They could be filtered out if desired, so that the decision to leave an impossible moment in a score becomes an aesthetic decision for the composer. And its presence in the score becomes just another interpretive challenge for the performer (see Figure 1). In a new complexity composition, the performer cannot predict when he or she will become overwhelmed in the performance. By contrast impossible moments in articulated noise compositions tend to be isolated, and thus can be identified and prepared for in advance of performance.

7. FUTURE WORK

I have recently completed a song cycle for mezzo-soprano and small chamber ensemble on two Dutch poems by Samuel Vriezen, commissioned for this piece. By agreement with the poet, the meaning of the poems was not revealed to me until after the text had been set. Noise drove such aspects as vocal-emotive expression on a per-word basis, orchestration, and large-scale harmonic schemes. Early reports from rehearsals indicate that the experiment was successful. I now plan to write articulated noise compositions for much larger ensembles. I am also working on a multi-channel electroacoustic articulated noise piece using as its primary source material audio frequency waves detected in Jupiter's magnetosphere. In the electroacoustic genre, noise procedures are useful for specifying processing schemes, panning schemes, and parameters. It is possible to use the sound source itself as a source for random numbers.

8. CONCLUSIONS

Articulated noise is a compositional strategy with great flexibility that delivers structural randomness while leaving plenty of room for individual surface-level compositional expression. The approach as described here is closely tied to a post-coherent musical aesthetic. However such linkage is not inherent in the method. Indeed my articulated noise compositions may well sound more coherent to some listeners than some of my music composed with more traditional strategies. But articulated noise is a strategy of destabilization. It

invites composers to be guided by noise to the maximum possible extent, while still affording us the luxury of shaping the results at the tail end of the process.

[10] Xenakis, I. *Formalized Music: Thought and Mathematics in Composition*. Pendragon Press, New York. 1971, 2001.

Figure 1. Excerpt from “Three Noises for Violin and Piano,” movement 1, “White.”

9. REFERENCES

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