Three Very Good Ideas

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[Note: This paper is accompanied by a PPT presentation, designated in the text, and included on this website. Much of the material in the first section on "tempo melodies" is taken from my liner notes to the New World Records recording of Beyer's music, "Sticky Melodies". Much of the work on dissonant counterpoint/Tenney is from a forthcoming article written in collaboration with Mike Winter and Alexander Barnett, which goes into far more detail, and contains analyses of Tenney's use of the ideas in specific pieces]

Introduction

Talking Shop

This paper is about compositional ideas: shoptalk. These ideas are probably familiar to most people here, in one way or another. They come from, in various ways, the three composers honored in this festival. Each idea can be stated simply, yet is more far-reaching than it appears. These ideas are concerned with what the composer Philip Corner might call musical elementals: melody, harmony, and rhythm.

The Three Composers

Of the festival's three composers, I knew one well (Lou Harrison), one a bit (John Cage), and the third I never met (Cowell passed away around the time I was studying for my Bar Mitzvah).

Lou was a brilliant and profound theorist, and one of our most articulate composers. I was fortunate to "talk shop" with him a lot, over the course of my life. Those conversations permeate my music and theoretical writings.

It's an old joke among composers that if you're lucky, you'll have maybe 2-3 good ideas in your life. Henry Cowell had a great many more than that. He wrote most of them down, cataloguing musical techniques he'd tried, like to try, and even those he'd never get around to but which it would certainly behoove the rest of us to try. We continue to do that. Some of Cowell's ideas, to the best of my knowledge, were never or only partially realized in his own work. But we're still learning a lot about Cowell's music, and any statement about the whole of it must be made provisionally. Many of Cowell's ideas propagated themselves in the works of other composers. Music's possibilities fascinated him endlessly. Like a birding "big lister," he seemed determined to envision every possible musical species.

John Cage, like Cowell, was a deep font of ideas. Fortunately, he liked to talk shop in public, both in his writings and lectures. He did so clearly, simply, elegantly, and creatively, eliding distinctions between music and theory, prescription and description, directedness and elipticality in a unique way. In "In Defense of Satie" (1948) and later in the seemingly but perhaps ironically homological, self-descriptive "Lecture on Nothing," Cage described *how* he composed. That description, both transparent and exhaustive, includes in itself a description of its own composition. In those two essays, Cage offers a primary approach to his music, from the *First Construction* (which of course has a special meaning here this weekend), through *Williams Mix*, *4'33"*, the *Concert,* the monumental etudes of the 70s, and finally to the "number" pieces. But perhaps as a by-product of his enormous charisma, invention, and personality, his own musical "primer"– *form*, *method*, *material*, *structure* – is often overlooked, overshadowed by other aspects of his work and life. Nonetheless, these ideas describe what he did when he sat down to compose. Perhaps I'm guilty of a minor obsession with these ideas (I've been gently chided about this by some very smart people, including my composition students). A

number of other writers and composers, most notably Jamie Pritchett and James Tenney, have stressed the importance of these terms in the context of Cage's work.

Of those four Cagean terms, it is *method* that concerns me today. The three excellent ideas I'll discuss here are just that: compositional methods. They are ones I find fascinating, profound, fertile, and visionary.

Three Excellent Ideas

I will discuss two ideas described by Cowell, and one by Harrison, and how other composers have developed them. These ideas are:

1) tempo melodies
2) melodic "dissonant counterpoint"
3) free style intonation

Tempo Melodies

In *New Musical Resources*, specifically, in the chapter on "Rhythm," Cowell outlines a broad approach to temporal experimentation that still stimulates our imagination. Both prescient and causal, Cowell imagined topics as diverse as independent accelerandi and decelerandi functions, non-integer and complex-integer rhythms and rhythmic scales, and the idea of "tempo melodies":

POWERPOINT SLIDE: Tempo melodies (quote from Cowell)

Cowell used some of these ideas in his work (see David Nicholls' analyses for some good examples). And obviously, the idea of complex tempi and rhythmic relationships don't originate in Cowell. He was, however, (like Schillinger) important and influential both for the clarity of his descriptions and the scope of his speculation. Cowell generalizes the notion of *melody*, or what I would call more generally, *morphology* (ordered events, usually in time), to rhythm, providing a rigorous and fertile technique for its exploration.

The fourth movements of Johanna Beyer's two clarinet suites are an intriguing and historically important example of this technique, what Cowell calls "tempo scales" or "tempo melodies." Beyer's use and notation of this technique is based on the passage in the Seeger *Treatise*…. called "Melodic Order Number 2."

POWERPOINT SLIDE: Beyer Clarinet Suites 1a and 1b (score)

These two suites are among Beyer's earliest extant works, and are influenced by the Seegers. Her use of "phrase structure" notation —with different numbers of measures per line — is suggested in the Seeger *Treatise*…. The four-movement suites use palindromic forms and what Marguerite Boland refers to as "chromatic completion," another term for what I call "dissonation" (idea number two in this talk).

The fourth movements are tempo experiments. At the end of each phrase (system), Beyer specifies "m = m" ("measure = measure"), indicating that the tempo of the next measure is derived from the number of beats in the previous. In other words, if there are two eighths in the last measure of one line, and three in the first measure of the next, the tempo becomes 3:2 faster than the previous tempo.

POWERPOINT SLIDE: Short audio examples of each Beyer suite

The fourth movements are mirror images of each other: the second is an accelerando, starting at *eighth note = 56*, and ending up *eighth note = 1276* (!). The first moves in the opposite direction, beginning at *eighth note = 132* and slowing drastically towards the end. If the modulations are followed exactly, both movements end in extreme, not quite practical tempi. The ideal tempi for the eighth note on each line (system) of the score, rounded to integer values, for the two fourth movements, are:

POWERPOINT SLIDE: Chart of tempo ratios per line in the two suites

Although in these pieces Beyer specifies "relative" tempi (to the previous line), the table shows the *absolute*, resultant tempo ratios (relative to the beginning tempo). This might be called "free style" tempo, after the Lou Harrison idea which is the third of these three "excellent" ideas. Cowell and Harrison were both deeply concerned with the primacy of simpler integer ratio in composition and perception, and explored this in parallel ways.

Beyer's tempi are not likely to be realized precisely in performance — one eighth note every five seconds for the first suite, and a tempo of 1276 for the eighth in the second (nearly impossible even *without* the final three-octave leap). Beyer was not interested, we think, in mathematical precision, nor in a conceptual statement regarding extreme tempi (and I want to mention here that this part of the talk is the result of collaboration with Marguerite Boland and Daniel Goode, the editors of the two Frog Peak Editions of the Beyer suites, and the latter, the performer of the first suite on the recent New World recording). Her notation, like Harrison's free style notation, stresses relative, not absolute tempi, allowing the performers to make slight adjustments along the way.

POWERPOINT SLIDE(S): Tempo melodies for the two movements of the Beyer clarinet suites

Cowell suggested that tempi may be structured using a simple analogy to or mapping of pitch, by using simple integer ratios. Each Beyer 4th movement develops a seven-tone diatonic scale (the first mixolydian, the second major). Assuming an arbitrary starting pitch of C, the tempi of both suites can be seen as a melody (ignoring octaves), traveling in a slightly meandering Pythagorean path, from the root (1/1) to, in the case of the first suite the tritone (729/32, or, octave simplified, 729/512), and in the second suite only up to the 7th degree of the scale.

These two (paired) movements are also, of course, a predecessor to the ideas of "tempo modulation" that later fascinated composers including Conlon Nancarrow (as in, for example the extraordinary *Study #36*, whose main idea is clearly influenced by Cowell), Ben Johnston (for example in *Knocking Piece*, *Sonata for Microtonal Piano,* or the *4th*

Quartet), and Elliott Carter (who, I believed, first explicitly used "metric modulation" in 1949). It is notable that while Beyer's tempo melodies can be considered "free style" rhythm, relating to the idea of Lou Harrison in the third section of this talk, Lou Harrison's own Fugue for Percussion (1942) is another important example of this kind of rhythmical usage, inspired by Cowell (thanks to Leta Miller for reminding me of this piece).

Other younger composers and theorists, like myself (in my *Four Voice Canons*) have used technology (both human and computer) to extend these ideas. A few good examples (that I'm aware of) are the composers and theorists Mike Frengel, Paul Nauert, Lois Vierk, Cliff Callender and most recently, Dan Trueman. All of them have explored the musical and/or mathematical ramifications of complex tempo ratios in interesting new ways. Though Beyer's (and Cowell's) "tempo melodic intervals" are of course, simpler, for purely practical reasons, they appear to be two of the earliest pieces that *explicitly* used the idea of "modulation" between integer-related tempi as a formal, organizational technique.

POWERPOINT SLIDE: References about Beyer and tempo melodies

Dissonant Counterpoint and Statistical Feedback

POWERPOINT SLIDE: Dissonant Counterpoint Title
POWERPOINT SLIDE: Cowell and Seeger on melodic dissonant counterpoint

Dissonant counterpoint, especially as a way of writing melody, is usually associated with the Seegers and the music of Carl Ruggles (among others). The general idea, succinctly described by Cowell in *NMR*, is closely related to other atonal techniques, as well as a general notion of non-redundancy, the avoidance of what Cowell calls "tautology" (in his description of Ruggles' music). This same idea, expanded on and extended to other musical parameters in the Seeger "Treatise…", was essential to the musical style of

Ruggles and Crawford Seeger, and also of Beyer, Becker, Reigger and other American composers in the 1920s and 1930s. Their works used a set of pre-compositional principles distinct from, but as rigorous as, European serial composers from the same period.

By "dissonation" I mean a more general approach to non-repetition and the avoidance of consonant relationships, which can exist in a number of parameters, not just pitch. What Cowell calls "tautology" is the fundamental concept of variation and change — how to control sameness and difference.

POWERPOINT SLIDE: Tenney on the Evolution of Ruggles style

Example of first few measures of *Portals*, strings of different pitches, consonant intervals

In 1977, James Tenney published an unusual theoretical article in *PNM* entitled "The Chronological Development of Carl Ruggles' Melodic Style," about the evolution of Ruggles' music. Using statistical methods to explain Ruggles' approach to dissonance, Tenney examined, for example how long it took, on average, for specific pitch-classes and intervals to be repeated in a single melody. He illustrated Ruggles' style as functions over chronological time — years, not measures. The approach was statistical, not probabilistic (as in the Seeger and Cowell quotes). In other words, Tenney's perspective was phenomenological ("what occurred") rather than compositional ("what was intended").

The article consists largely of graphs showing the statistical evolution of Ruggles' atonality along various stylistic axes. Sometimes the x-axis is Ruggles' life itself. Tenney considered various data sets, such as the lengths of sequences of unrepeated pitch-classes over the course of Ruggles' compositional life (they got longer).

POWERPOINT SLIDE: Tenney chronological graphs of ALSD, ALSC in Ruggles

In the two decades that followed Tenney grew more interested in the ideas of dissonant counterpoint. His investigations resulted primarily in pieces, rather than theoretical papers — pieces such as the *Seegersongs, To Weave, and Arbor Vitae* (for string quartet, completed posthumously by his student Mike Winter), his final piece. These concerns, and the Seeger texts themselves, also became an important part of his teaching.

In the 1977 article Tenney demonstrates that Ruggles' compositional intuitions, which are in some sense probabilistic and non-deterministic, can be explained statistically (thus deterministically). In this way, he connected Ruggles' music with much of his own computer-based compositional work, and that of many others of the past seventy years. The relationship between compositional probability and statistics invokes the work of the composer/theorist Charles Ames, a pioneer in computer-aided composition, and someone whose work was of great interest to Tenney (and to many other composers, such as myself and Nick Didkovsky).

POWERPOINT SLIDE: Ames on statistical feedback

POWERPOINT SLIDE: Uh-oh

Tenney was frequently concerned with *models,* particularly those that described human processes. Often he was more interested in the integrity of the model than in its efficiency. Models are funny things though, especially the kinds of "semi-empirical ones" we music theorists use. At best, they are reasonable, interesting and enlightening speculation. At worst they can be, well… I won't go there.

POWERPOINT SLIDE: Tenney's dissonant counterpoint model

To me, Tenney's dissonation technique is a *model of a model*. Again, and in my opinion, it resonates with the way that the humans in question might have worked. I can imagine RCS writing the *Piano Study…,* and saying to herself "Hmmm… I haven't used this note (or interval) in a while, maybe…", and going thru a complex decision-making process that might look, if we could see it, something like what I call the "pumping histogram" of

Tenney's algorithm (explained below). I also think, knowing what I know about RCS (and Cowell) that she (and him) would have been fascinated by the model itself.

While models often elucidate decision-making *processes*, not just *results* — questions as well as answers — this particular one guarantees more or less deterministic results via a non-deterministic process. While Tenney's model is inspired by an existing musical style, it is *not* style-simulation. That wasn't Tenney's goal, and it's not usually the goal of composers who use algorithms creatively. Style-simulation and composition are quite different. But all good models elucidate methods, old and new, and contribute to their evolution.

Ames' idea of *statistical feedback* is inherent, interwoven, in Tenney's method. This is part of the beauty of it. Ames' (and others, like Michael Casey) contributed early, insightful and well thought out mathematical- and algorithm-oriented descriptions of statistical feedback. Tenney's method is *composerly*, illustrative, in its own formulation, of what happens (like a kind of mathematical version of Cage's "Lecture on Nothing"). It is easy to program and understand, as well as flexible, and, considering the simplicity of its description, mathematically sophisticated (as we'll see below).

Tenney used this idea, which I call the "dissonant counterpoint algorithm," in many of his pieces, in quite different ways, over the last thirty years of his work. It is a model, in fact, of Seegers' more general concept of "dissonation," which can be applied to other musical domains.

The next few slides show some examples of Tenney's algorithm, in the hope of illustrating its robustness and scope. I'm currently working on a more detailed article about it with the composer Mike Winter and the mathematician Alex Barnett, and some of this material comes from that article.

POWERPOINT SLIDES until the end of this section

Freestyle Intonation and Paratactical tuning

POWERPOINT SLIDE: Freestyle Intonation title

The final idea is perhaps closest to my heart. Of the three musical seeds described today, it is the one whose flowers have yet to fully bloom. Lou Harrison's idea of free style intonation was one of his most interesting. It was also wonderfully impractical. The first "realization" of it seems to occur in the 1955 *Simfony in Free Style*, although it had undoubtedly occurred to him long before that. As far as I know, he used it in only three pieces (aside from the unpublished *Political Primer*): the *Simfony…*, *At the Tomb of Charles Ives* (1963), and *A Phrase for Arion's Leap* (1974). I enthusiastically refer everyone here to my colleague Leta Miller's excellent discussion of it in her biography of Harrison — this is not a simple topic, and she did a wonderful job on it.

Simply put, in free style intonation intervals are described and/or conceived as relative horizontal or vertical relationships, not "absolute" ones. Of course, stated in this way, the concept goes back as far as one wants it to. Scales have always been specified both by relative and absolute intervals. Lou Harrison himself had a wonderful and unnerving habit of fluidly switching back and forth between the two types of descriptions, and assuming that one was following his rapid and unannounced context-switching. Anecdotally, he was equally likely (again, without any kind of semaphore) to compute cents values and deviations not just from ET, but from some canonic scale (like Just, or, occasionally, some ideal slendro). It was fun and exhausting to talk about tuning with him.

Similarly, in free style intonation all knowledge is local, but there is a strong assumption of global knowledge. It's impractical for all the reasons you would think: fixed pitched instruments can't really do it; it requires non-standard skills and knowledge on the part of musicians; the notation is difficult; there is no "repeat factor" or "modulus" (like an octave); and by definition it can't be standardized. I propose in a forthcoming article in *PNM* on "Optimal Tuning Systems" that well-temperaments (and Lou loved these,

perhaps most of all, the great and still widely-used well-temperament called *slendro*) are an attempt to resolve the idea of free style intonation with the contingencies of ideal ratios, fixed pitch, a repetition modulus, and a system of "key and interval" weights. Essentially, this article tries to find a mathematical model for the compromise made by musical cultures between the idea of "scale" and the limitless freestyle universe Harrison envisioned. Other composers, like Partch and Johnston, employed multiplicity (lots of pitches in the scale) to attain a similar freedom. Some, like Tenney and Ezra Sims, approximated huge tuning gamuts with high-number equal-temperaments (in both cases, 72). My own approach, for some 30 years now, is to use computers to tune intelligently on the fly, and a number of composers have worked in that area as well, dealing with what I've called paratactical intonation, or perhaps adaptive tunings (the word I sometimes use, to acknowledge Harold Wagge's early work in the area).

All of these techniques, ideas, notations and systems are in a sense an attempt to solve what might be called "the historical tuning problem," that any system with more than one prime in it (other than 2) simply, can't "work." I like to call the intervals which result from primal collision "canidae" intervals, in a genus versus species generalization of the "wolf" interval, because, as Lou Harrison knew well, it's not just the primes 2, 3, and 5 our ears are interested in.

Arion's Leap

One of my favorite pieces by Lou Harrison is the thirty second wonder called *A Phrase for Arion's Leap*, the third of the three free style pieces. I thought it might be useful, in the context of this talk, to join my worthy friends David Doty (who transcribed the *Simfony* into absolute ratios) and Scot Gresham-Lancaster (who in the early 80s wrote a computer program to generate a tape for *At the Tomb of Charles Ives*), and make my own transcription of the remaining work. For all I know, someone has already done this, but I haven't seen it, and I've been meaning to do it for a long time. It's a laborious and error prone process. I've done it by hand, and somebody should check me before it leaves this room. Note that, cunningly, I picked by far the shortest of the three pieces! It's only

useful in a kind of analytic way, like a study score. It doesn't add any information, or, for that matter, subtract any.

POWERPOINT SLIDE: original score and recording for *Arion's Leap*

Notes on Arion's Leap…

The piece is anchored on E=330=1/1, with A = 440 = 4/3. Even in its brevity it includes a number of subtle, surprising ideas that are worth mentioning (perhaps towards a comparison with the other two pieces). One of the characteristics of free style, of course, is that absolute ratios tend to get extremely complex. That is, the numbers grow large and unwieldy — simple absolute intervals are not the point. But in *Arion…*, Harrison seemed to be making an effort to keep things in check, often immediately canceling out related complex ratios by using the same prime in the numerator and or denominator of subsequent intervals. Note for example, in this regard, that the first four notes in the Metal Strung harp span a simple 4/3, or that the first full P5th reached is the *wolf*, (40/27) (only obvious in the transcription).

POWERPOINT SLIDE: transcription of *Arion's Leap* into "absolute ratio" notation

Harrison seemed to be experimenting with, or maybe luxuriating in 13-limit ratios in this piece (note the 40/39 minor second, and 64/39 neutral third). Maybe the small number of instruments, two of them fixed (!), made that feasible. The harps don't really play free style, they just read and tune to it. The bowed Ya Chengs are the only ones that need to listen carefully, actually *play* in free style. Yet their task is simple and clever: they remain in one lovely, septimal 3-part chord, and move it up (and in one final gesture, down) by reasonably simple, learnable, intervals. Note that in the notation, Harrison normalizes all ratios so that the numerator is greater than the denominator (note line 2, metal strung harp), even when descending.

In fact, except for the Ya Cheng parts (whose notation becomes cumbersomely complex in absolute tuning, but is remarkably and illustratively simple in free style), *Arion's Leap*... has a scale of sorts. It is manifested in the 16-tone Metal Strung harp, and supplemented by three extra pitches in the Troubador harp. This scale would be easily (but of course, not exactly) representable in either Ben Johnston's or Ezra Sims' notation. (In fact, as a result of a conversation about this prior to this talk, Ezra made that transcription).

But it is interesting that, for these thirty seconds, Harrison must have been *thinking* in free style, and as such used free style notation where conventional notation would have been, to some extent, simpler. The harpists don't care what their adjacent intervals are, presumably, they just use them to tune the harp. In other words, in this case, the tuning system used is a compositional paradigm, not a performer problem.

POWERPOINT SLIDE: scales from *Arion's leap*

בראשית *(B'rey'sheet)*

[Just general comments]

- An example from my own work, בראשית *(B'rey'sheet)*, in which I was very clearly thinking of the idea of "the end of scale" (and parenthetically, my new work on the generalized idea of well-temperament has something of a similar motivation). But in this piece there is a "fixed scale" (the voice), but no fixed harmonic universe
- Ironic that Lou disliked electronic music so much, and that a number of my pieces, like this, and *Psaltery*, owe so much to his ideas. I'm not sure, actually, that he ever heard it, or if he did, he was kind enough not to tell me. I don't think it would have been his cup of tea.
- Play בראשית (*B'rey'sheet*) excerpts.

Afterward

Some years ago I become interested in the work of Helen Hartness Flanders, Lydia Parish, and in particular, Helen Creighton. In researching Creighton, I came across, by chance, a recording of Cape Breton Island songs (which she did not collect). My favorite of these songs, and one that I hope you all take the trouble to listen to some day, is entitled (I won't try and pronounce the Gaelic) "She is Full of Patience." Sung by alternating singers, with a group chorus, each leader brings hisr own ideas to the tune. The approach of one of the singers especially delighted and fascinated me, and I have forced several composer friends to listen to him (including Michael Byron and David Mahler, who helped me to understand more about the song's harmony). I had the feeling that this particular singer was the one in the group I wanted to hear more of, get to know. Later, I read in the liner notes that: "One of the oldest and best singers, when his turn came as leader, wavered in with the flatted 4^{th} degree for a moment, hinting I thought at the rare Lydian mode; but from the firm way in which the strongest leader took over from for the next stanza, eliminating this tone, and from the general manner of the group, this seemed to be considered an unwelcome note of the scale." I thought to myself that whoever this guy was, he was perhaps the Cape Breton equivalent of Lou Harrison, John Cage, or Henry Cowell. Whether it's the introduction of the flat 4^{th} as a way of pushing the group to its next musical world, tempo melodies, dissonant counterpoint, or freestyle intonation, this is the way music moves. The liner notes in question, of course, were written by Sidney Robertson Cowell (and John Hughes) in 1955.