

WHAT SHOULD A CAGEAN DO ABOUT JUST INTONATION?:

INTRODUCTORY REMARKS TO MY WRITINGS ON JUST INTONATION

Douglas C. Wadle

The following reflections are rather personal in nature. Firstly, because they concern my own idiosyncratic approach to musical composition, particularly with respect to the use of extended just intonation. Secondly, because they are concerned with situating that approach within the context of the work and thought of the two composers who have had the greatest influence on my work: John Cage, whom I never met, and James Tenney, with whom it was my great privilege to study. Jim's influence, especially, will be felt here, and the influence of Cage might (at least in the present context) seem to be received through that of Jim. But, of course, the influence of Cage is the central point – rather, the ways in which Jim and I have dealt with the influence of Cage while developing approaches to the use of extended just intonation is the central point – of this essay.

While visiting Jim during his last summer, I showed him some sketches of a new work and explained an idea I had about developing the material – initially intended as a mensural cannon – into a fugue. The idea was clever and moved in the conceptual space I had opened up with my reframing procedure,¹ but – Jim rightly noted – making a fugue of the work added nothing to the idea behind it. It was gratuitous. As he spoke, he became inspired, and he was soon likening the urge that so many composers feel, on discovering just intonation, to compose fugues (and other revered contrapuntal forms of the past) to an animated toenail fungus from a

¹ See Wadle (2013) "Introduction to Reframing: Augmentation and Diminution of Extended Just Intonation Frequency Ratios" *The Open Space Magazine* No. 15/16.

then current television commercial:² it sneaks in under the surface, makes itself comfortable, and is really damned difficult to get rid of.

On a few earlier occasions, I had heard him express mystification with composers of music in just intonation who become preoccupied with either the beauty of their material (on some traditional construal of musical beauty) or traditional forms. The former preoccupation I won't bother to explain – the intuitive sense will do. (Roughly, it's what Mom likes.) Jim usually described the latter preoccupation as the application of just intonation to traditional dramatic and rhetorical musical forms. These forms are articulated by the skillful use of consonance and dissonance to prolong tension, during which the composer manipulates some initial material, on the way to a harmonic resolution, at which point the initial material returns in its original form. (The rhetorical basis of most musical forms is thus laid bare: state a thesis, develop the implications of that thesis, restate the original thesis.) The composers Jim objected to, on this latter count, see just intonation as providing an expanded consonance/dissonance palate (more consonant consonances and more dissonant dissonances) with which articulate these traditional forms.

Whether applied to just intonation composition or not, the preoccupation with traditional, rhetorical forms – especially when combined with an interest in (traditional notions of) beauty – is the basis of evaluations of music as, to borrow Jim's phrase, "good in the conservatory sense". So we can see his complaint as being primarily aimed at the attempt to write extended just intonation music that is good-in-the-conservatory-sense. Jim's compositional preoccupations, by contrast, were (i) the development of a theory of harmony based in a thorough understanding of

² A bit of internet research reveals that the product advertised is Lamisil and that the character is named Digger.

human pitch perception (this is where just intonation enters the picture) and (ii) a commitment to a Cagean aesthetic – an aesthetic that rejects traditional notions of good and bad music (in whatever sense) in favor of a receptivity to whatever sounds occur.

I share Jim’s mystification with good-in-the-conservatory-sense composers of just intonation music. But my mystification extends to those who transition from an initial fascination with the sounds of just intonation to an *aestheticization* of just intonation.³ By an aestheticization of just intonation, I mean the discovery of preferred justly tuned interval and chord progressions and other pitch-based gestures that would be repeated from work to work (regardless of whether or not these are used create good-in-the-conservatory-sense music). More generally, I have a complaint about those who – irrespective of their attitude toward form – become preoccupied with the beauty of the sonic surface of their works *even where this beauty is not beautiful according to any traditional sense of ‘beauty’*.

These composers attempt to establish a new idea of beauty against the (or, perhaps, a) traditional one. (At least they do this within the scope of their own work – i.e., with respect to their personal styles.) It doesn’t matter whether or not the composer is aware of having these favored elements or whether or not she consciously employs them. All that matters is that some preference has been given to certain sorts of things over others within the relevant domain of possibilities (i.e., the preferred elements are judged to be better – at least as compositional material – than the non-preferred ones). In such cases the relevant domain – in the present case, justly tuned intervals, chords, progressions, and gestures – has been aestheticized. And, since a

³ I don’t mean to suggest that Jim did or did not feel as I do about these composers. I have a suspicion that he did feel this way, but I am not at all certain about it. (And, of course, I would have reason to want to attribute that view to him, so my suspicions should be taken with a grain of salt.)

Cagean aesthetic is one in which evaluation based in such preferences is to be rejected, then such an aestheticization (of just intonation or anything else) is off the table for a Cagean.

Now obviously, if one is not a Cagean, then there is no problem with this project of aestheticizing just intonation. But I am a Cagean, and I do work with just intonation, so the problem is very real for me.⁴ So, what should a Cagean, like myself, do with just intonation, as a compositional resource?⁵ We get one answer from Jim Tenney. As stated above, Jim's project was the development of a theory of harmony based in the psychoacoustic realities of human perception of pitch and operating within a Cagean aesthetic. We can characterize this as a scientific approach to the question. I'd like to propose another answer, one based in the approach to just intonation I have been developing since my time studying with Jim. This approach is similarly concerned with the perception of just intonation intervals, but is more philosophical in nature. I am motivated by questions like "Could the qualitative character of hearing *that* pitch structure have been different than it is?" (or, similarly: "What would it be like to hear some pitch structure if we had some interval other than the octave as the interval of equivalence?"). This is precisely the question that led to my development of the reframing procedure (first described in "Introduction to Reframing"). The following is a brief description of that development. The idea, in relating this development, is twofold. First, it is intended to

⁴ I once – perhaps unwisely – made this point by saying that I do not find this kind of aestheticization to be interesting. While that claim is true, it offended some who took me to be claiming that the aestheticization of just intonation is not interesting (as opposed to it not being interesting *to me*). I hope to avoid any such confusion here, where the claim I am making is that, *if one is to be a Cagean*, then there doesn't seem to be any viable way of defending the interest of aestheticizing just intonation as I have described it. (And, of course, if one is a Cagean, then one would like to see more people doing things compatible with Cageanism.) But I harbor no pretension that this opinion should be shared by non-Cageans.

⁵ One will dismiss this project out of hand if one thinks the purpose of music just is this sort of aestheticization of sonic resources. That strikes me as both historically unsupportable and indefensibly narrow-minded, but I won't fight that fight here.

lay the groundwork for understanding the reframing procedure and its extensions – perhaps even to suggest further areas of exploration within the space that reframing has opened. Second – and more importantly – it is to offer an example of a more general approach to just intonation composition in which initial questions guide the use of just intonation in a given work or set of works.

Having formulated the question above (concerning the possibility of a given pitch structure having a different qualitative character than it does), it was necessary to find a way (e.g., reframing) to provide a different qualitative experience of the sort required while maintaining (at least at some level) the same structural relations among the constituent pitches of the pitch structure. The answer was to scale the relations between the frequencies of the original pitch structure against frames of differing sizes. Roughly, the pitch structure is rescaled to fit within these different frames, all proportional relations between a given pitch in the structure and all the others (and the frame) remaining fixed.

The resulting, reframed pitch structures were, in most cases, quite complex when considered without respect to their frame. That is, they were quite complex from the standpoint of our qualitative experience of them. In these cases (those that generate more complex frequency relations than those found in the original structure), our auditory system parses the structures resulting from the procedure and fits them into some simpler structure.⁶ Furthermore,

⁶ This is not to say that we will not hear precisely what is there but that (presumably) we will hear it *as an approximation of something else* (due to what Jim called tolerance), and this fact is (also presumably) what makes it possible for us to hear harmony in any tempered system, as postulated by Schoenberg in his *Harmonielehre*. These presumptions still need to be empirically verified, but I see no *prima facie* problem with them. There is good empirical evidence concerning the fusion of inharmonic partials, within a fairly liberal margin of error – i.e., tolerance – but this has not been systematically developed in an account of the perception of harmonic intervals emitting from distinct sound sources.

the most complex structures turn out to be unintelligible because a number of elements (or their upper partials) will fall within the critical band with respect to one another. (The critical band is a pitch span of a bit more than a whole step inside of which pitches create interference with one another – perceived as acoustical beats – and in which the sounding pitches are not (generally) resolvable into separate perceived pitches.)

This gave me three distinct layers of musical order with which to work – (a) the original structure to be manipulated, (b) the actual sounding structure of that manipulation, and (c) the sounding-as of that manipulation – all of which occupy places on a consonance/dissonance continuum (defined by its harmonic distance, aka, Tenney distance⁷) or – it amounts to the same thing, though the boundary marked by the “/” falls at a different point – a harmony/noise continuum. (a) is discoverable only through analysis. (b) is hearable through sustained exercise of attention. (c) is what is most immediately present to the listener.

Now, think about this in the light of another question, this one being the central epistemological question in the philosophy of perception (an area in which I also work): “Is perception a reliable source of justifications for our beliefs about the world?” This procedure and compositions that employ it cannot, by themselves, *answer* this question, but they can *address* it by highlighting some aspect of the question, or constraining the question to some limited domain. Such applications of the reframing procedure might produce works the audition of which leads to tangible answers to some of these more narrowly defined questions, or they might reveal to us the complexity of what we had thought were simple matters (with respect to pitch perception). (I take the realization of a distinction between (a), (b), and (c) as an instance

⁷ For any two pitches whose frequencies stand in the relation m/n , the harmonic distance between those two pitches will be $\log_2(m \cdot n)$.

of the latter case.) In other words, the procedure and its results become tools for thinking about and framing questions, and maybe even for arriving at narrowly focused answers. Perhaps we are concerned with the ability to hear the constancy of, or similarity between, structures of type (b) or (c) that are generated by successive reframings of a structure of type (a). If we can hear such constancy or similarity, what constraints on the manipulations make this possible (e.g., growing or shrinking frames in some small increment)? Perhaps we are concerned with the ability to perceive (or not) shifting structures of type (a) through manipulations of structures of type (c) by small degrees. If we can perceive shifts in structures of type (a) under by manipulations of structures of type (c), how great must the changes be? What are the relations of these variations in type (c) structures to type (b) structures? Perhaps we are interested to know how much and under what circumstances variations in type (b) structures will lead to a variation in type (c) structure.⁸ The possibilities are myriad. Each avenue we pursue might lead to new avenues to pursue, or they might bring us to a new problem that requires a new tool. Or, we might simply identify a new problem that requires a new tool. If the requisite tool employs just intonation, well, then we have a new, Cagean approach to just intonation.

So here is a way of approaching just intonation that is both Cagean⁹ – there is nothing at all in this that suggests aestheticization of just intervals – and distinct from Tenney’s approach

⁸ It is important to not here, that any given set of frequency ratios (or just intonation pitch structure) can be interpreted as a type (a), (b), or (c) structure. What I mean by saying, for instance, shifts in a type (a) structure generated by manipulations of a type (c) structure is changes in type (a) structures we can derive from manipulations of a pitch structure interpreted as a type (c) structure, holding the frame fixed. Hopefully this suffices to make clear what I am up to in this paragraph.

⁹ I don’t claim that this is Cagean through-and-through, in the sense of being consistent with everything Cage espoused. But neither is Cage Cagean through-and-through in this sense. I only mean that this is Cagean in the sense I have been using here. The procedure has the further Cagean benefit – not explicitly discussed here, but lurking in the background – of being too complex for the results of any reframing procedure to be predictable,

(though it is, of course, much indebted to Jim's approach and to the tools Jim developed). What is taken as the point of interest is the relationship of some just interval, chord, or progression and its possible interpretations as (a), (b), and (c). If one is not a Cagean, then this is all hogwash. And, if one thinks that the only thing that should concern a composer is the immediately apparent sonic surface, then it is also hogwash – at least no one should at all be concerned with anything other than (c) (i.e., how the pitch structures sound to us) and, perhaps, also (b) (what the pitch structures actually are). And this position is one that Cageans are welcome to hold. Certainly Jim's music is both Cagean and focused on the immediately apparent sonic surface. So, if one wants to reject my approach on these grounds, there remains Jim's model of how to work with just intonation as a Cagean, and I'm sure other models can be formulated.

For my part, though, I think the claim that things not audible are not among the artistic materials with which a composer is permitted to work is an unexamined (and problematic) dogma of music. Let me defuse the displeasure that I suspect this statements is likely to cause by attempting to forestall any possible misinterpretation. What I mean to say is that, while it is perfectly reasonable to create music that is focused only on the immediately perceivable sonic surface, it is also perfectly reasonable to create music that includes, in its focus, things other than what is immediately sonically perceivable. What I do not think is reasonable is to create (or to intend to create) music that does not include the immediately perceivable sonic surface as one of the things in its focus.

That seems to me to be a fairly modest claim. Here are a few reasons why I think it's one that most people will want to endorse: If we don't want to go along with it, then we have to

especially if one is operating on more than one level (e.g., if one isn't restricting oneself to considerations of only type (a)).

dismiss all program music, leitmotifs, coded messages in music, clever notational innovations like Ockeghem's *Missa Prolationum* or *Missa Cuiusvis Toni*, and (probably) any large scale structures that take more than a few minutes to unfold. This last item, especially, spells trouble for the traditionalist who wants to reject my claim. All those innovations in sonata form happening in the first movement of symphonies that took place in the Classical and Romantic periods would be off the table, and these works are *the* paradigm cases of good-in-the-conservatory-sense music. So, we probably should accept that the composer is free to treat elements of his or her composition that are not immediately sonically apparent as significant elements of the work. But then an objection to my approach to just intonation cannot be based on a rejection of that claim.¹⁰

Speaking of large-scale forms, what about my fugue, you ask? The fugue never became one. It stayed a mensural cannon (for the record, the piece is *Cognitive Congruence*), which is as it should be, though I do occasionally think it would have been nice to see how my clever idea would have played out – but nice in the conservatory sense. After his fungal infection riff, Jim paused and said to me, “I don’t think I have to worry about you, though.” I suppose he needn’t have, if the worry was that I would abandon my Cagean principles.

¹⁰ None of these examples will be much help in persuading the non-traditionalist that my claim is wrong. That is, someone who rejects good-in-the-conservatory-sense music will be happy to dismiss all of these examples, as well as my approach to just intonation, as misguided. But I think that this is a case in which the dogma is, in fact, examined and explicitly decided upon *as a matter of style*. And that opens up the response that my examples and my just intonation pieces are in other styles, so the rules of this style don’t matter. This is the same response that one could give to someone that wants to object to my approach to just intonation on the grounds that Cageanism is a wrong turn. These considerations get thorny rather quickly, see my “The Propriety of Evaluative Statements with Respect to Experimental Music” (MS) for a full treatment.