Effect of Serial Procedures on Fluency in Jazz Improvisation: Can Serial “Killing” Be Taught?

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Abstract

While jazz has been America's greatest musical contribution in the last century, there is another system that emerged contemporaneously in Europe and then in the United States, namely, serialism. Despite serialism's prominence in the American academy and the proliferation of jazz studies programs, the two realms have enjoyed few synergies. This study will examine adding other components of serialism such as rhythm and dynamics separately and, after a pre-test to establish the improviser's facility with standard material, asking the participant to improvise first with the pitch constraints and then adding the others one at a time under expert, double-blind panel adjudication. To what extent can the tenets of serialism be imposed and still permit accomplished jazz improvisers to execute with the fluency typical of their improvisations on traditional harmony-based music, executing idiomatically-sound ideas confidently and purposefully in time and with note selection appropriate for the prevailing harmony? In order to determine if the conditions impacted participants' improvisational fluency, a repeated measures ANOVA will be conducted. Descriptive statistics will be reported for participants across each condition. Principal among the expected findings are that (1) facility with jazz improvisation over standard material is highly correlative with serial improvisational fluency with pitch-class considerations, (2) serialization of dynamics and rhythm is impracticable in improvisation and, at best, enables only a stilted performance interfering with the swing feel, and (3) as such, the pedagogical approach would therefore be to first ensure students can improvise at high level on standard material and then, for only the best such students, extending the instruction to the serial pitch-class language.

Key terms: improvisational fluency, unordered collection

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This study is inspired by the work of America's greatest exponent of serialism, Milton Babbitt, who himself had a jazz background and whose *All Set* for jazz ensemble (1957) showed that the 12-tone language does not, in and of itself, diminish the visceral and emotive qualities of any music. Though fully scored, it is a *bona fide* jazz piece meant to be heard and not just seen on a score. This study is not an attempt to keep serialism alive in America but rather an exploration into how the serial language can be re-imagined in a contemporary and distinctly American fashion, translating the language of jazz to serialism rather than the other way around.

The literature on pedagogical methods for jazz improvisation in tonal music with functional harmony or over modal music is voluminous with method books emerging in the 1960s and 1970s (Aebersold, 1967; Baker, 1969; Coker, 1970; McGhee, 1974). While jazz has been America's greatest musical contribution in the last century, there is another system that emerged contemporaneously in Europe and then in the United States, namely, serialism. Despite serialism's prominence in the American academy and the proliferation of jazz studies programs, the two realms have enjoyed few synergies. In the few cases where this has occurred, the results have found favor with audiences of experts and laypersons alike (Garasa, 2017). It may be therefore advantageous for improvisers to develop this skill set to add to their arsenal. It is notable that even serialists such as Stockhausen embraced indeterminacy, introducing the unforeseeable outcome of improvisation as a reaction to the orthodoxy of rationally-conceived serial music, more in line with the American and German *avant garde* of John Cage, Christian Wolf, and Earle Brown (Kutschke, 1999).

The mathematical nature of research in the area of music theory has led to preponderance of highly technical literature in the academy especially with regard to serial organization. Mead (1994) has distilled these notions as they relate specifically to the music of Milton Babbitt including the aforementioned *All Set*. In that piece, written for the 1957 Brandeis Music Festival which that year was a jazz festival, Babbitt (1957) employed all six of the all-combinatorial hexachords, hence the title, and asks that the eighth notes be swung which gives the solos, albeit written, an improvisatory feel. Lest the reader posit that such pre-compositional design obviates the need for creative selection, Mailman (2010) showed that Babbitt's arrays, in fact, open up thousands of possibilities. Zepeda (1996) took the *All Set* idea one step further in his *I Care If You Listen* where there is actual jazz improvisation required. Just as Babbitt did in *All Set*, Zepeda used all six of the all-combinatorial source hexachords for this piece. During the swing section, players are called upon to improvise jazz over each hexachord and its complement (the entire aggregate). Each soloist takes six choruses, one over each aggregate, treating each trichord as an unordered collection. Furthermore, each aggregate employs a different trichord generator to create intervallic variety.

May (2003) has shown what factors in students' backgrounds correlate strongly to improvisation scores across seven dimensions on very standard jazz material, namely, F blues and *Satin Doll*, and found self-evaluation and aural imitation ability to be the two best predictors. Smith (2009) validated a 14-point rubric for evaluating jazz improvisation with high reliability, again on very standard material – Bb blues and *Killer Joe*. Ciorba (2009) studied 102 high school students measuring improvisational achievement (dependent variable) versus seven independent variables with Self-Assessment and Motivation leading the way. Again, that study

evaluated improvisation on very standard material, Bb blues and *Satin Doll*. O'Gallagher (2013) presented a comprehensive method specifically addressing the application of serial techniques to jazz improvisation using the trichord as the basis. Beato (2017) demonstrated how 12-tone rows can be expertly used in jazz improvisation, 'comping, and composition as lines, chords, or polychords. Like Zepeda (1996), these latter two focused solely on the pitch class aspect of serialism.

To what extent can the tenets of serialism be imposed and still permit accomplished jazz improvisers to execute with the fluency typical of their improvisations on traditional harmony-based music? Improvisational fluency is defined here as the degree to which the improviser executes idiomatically-sound ideas confidently and purposefully in time and with note selection appropriate for the prevailing harmony (May, 2003). For this study, improvisational fluency is taken to evaluate, with the rules of serialism imposed, the degree to which the improviser still maintains a melodic flow executing idiomatic jazz ideas in time and with good note choice at a level consistent with his/her competency in conventional (traditional harmony-based) jazz improvisation.

Rather than considering improvisation as a reaction to serialism as noted by Kutschke (1999), this study looks at the integration of improvisation adding other components of serialism such as rhythm, dynamics, and articulation separately and, after a pre-test to establish the improviser's facility with standard material, asking the improviser to improvise first with the pitch constraints and then adding the others one at a time under expert, double-blind panel adjudication. If "a skilled improviser in any tradition must be able to deal with the relevant elements of melody, rhythm, and harmony in a spontaneous and expressive manner" (Dobbins,

1980, pp. 38-39), why should serial jazz be excluded from the list of traditions? Unlike examples from the concert music world such as Stockhausen's *Zeitmasse (1956)* and Pierre Boulez's *Improvisations II sur Mallarme (1957)* wherein limited improvisation takes place within the context of strict composition (Hamilton, 1960), the tests in this study require full-blown jazz improvisation within a rigid serial context. The following research questions were therefore proposed:

1. Can fluency in serial improvisation be predicted by a known or established level of artistry in traditional jazz improvisation?
2. How much does the imposition of serial conditions impact improvisational fluency?
3. Is idiomatic jazz improvisation tenable with any number of serial conditions and, if so, what pedagogical methods are indicated?

Method

The experimental research method will permit various independent variables as treatments (pitch class organization consisting of whole aggregate, hexachord only, and unordered trichords; rhythm serialization, and dynamic serialization) with expert qualitative "measuring" of the resultant fluency as a dependent variable. A finite set of pitch classes to be played in no particular order is an unordered collection. Such a set, three for this study, may be employed by the improviser in any order, usually to generate interest for the listener via motivic development. Whereas pitch class serialization is commonplace, this study looks at adding other components of serialism such as rhythm and dynamics separately and, after a pre-test to establish the improviser's facility with standard material, asks the improviser to improvise first with the pitch constraints and then adding the others one at a time under expert double-blind panel adjudication.

An experimental methodology will be used. Performed improvisations of twelve participants will be recorded over several Saturday half-day sessions over a period of 4 months in a music studio in a large Western state in the U.S. Participants will be placed in separate rooms where the waiting soloists can be sequestered without hearing and being influenced by the soloist performing at the time, and where the engineer and judges can be in the control room which is not visible from the tracking room and *vice versa* thereby ensuring the anonymity required for the double-blind process. The same judges would adjudicate all of the performances.

Limitations likely to be encountered are studio availability and the availability of all three judges on the same days. Livestream, Facebook Live, or *in vitro* evaluation of the recordings

only on the judges' own time are the workarounds to be implemented. Each individual judge will be required however to experience every soloist the first time in the same fashion as hearing some performances on the large studio monitors and others on small built-in laptop speakers could bias a subjective perception. The judges will be given the evaluation sheets and the serial information in advance to allow them to become familiar with the sound of the rows so that they can evaluate whether the soloist is adhering to them in his/her improvisations. Judges will be permitted to take the evaluation sheets home and reference the recordings which will be password protected in Dropbox to further verify adherence using their home keyboards. Completed evaluations would be due in two months for statistical processing. Great care will be taken to ensure recordings of all performances are de-identified. The study shall include no minors or intermediate-level or vulnerable adults for whom a musical challenge of this difficulty could be unduly stressful.

Participants

The twelve participants shall be accomplished jazz soloists. A pre-recorded rhythm section performing an excerpt from *I Care If You Listen*, a 12-tone piece by Ray Zepeda from his *Re-Imagining Milton Babbitt* album, shall consist of the five players from the album. Participant soloists will range from 23 to 70 years old including 11 males and 1 female comprised of 1 African-American male (upper-middle class), 1 Hispanic male (upper-middle class), 1 White male (upper-middle class), 6 White males (middle class), 1 Asian male (middle-class), 1 White female (middle class), and 1 White male (lower-middle class). Among the participants will be 3 saxophonists, 3 pianists, 2 trumpeters, 1 trombonist, 1 guitarist, 1 vibraphonist, and 1 double-bassist. This is a convenience sampling of artists whose playing I know. Only those who had

proven facility with improvisation on standard material such that a baseline could be established with the pretest will be selected with a preference for those who at least had some knowledge of 12-tone music.

Instrumentation

The primary instrument used for this study is an observation scale adjudication questionnaire to be completed by known experts in the area of jazz improvisation that will be developed based on the 7-point and 14-point instruments employed by May (2003) and Smith (2009) respectively. Both instruments resulted in high reliability coefficients in their respective studies. My emendations and modifications tailored these criteria to what can reasonably be expected from an improviser operating under the restrictions of serialism. This instrument will assess improvisational mastery/artistry based on subjective ratings and will contain twelve (12) items including most of the May (2003) items plus some of my own related to adherence to the serial structure.

Table 1

Improvisation Evaluation Scale: Traditional/ Serial Jazz***

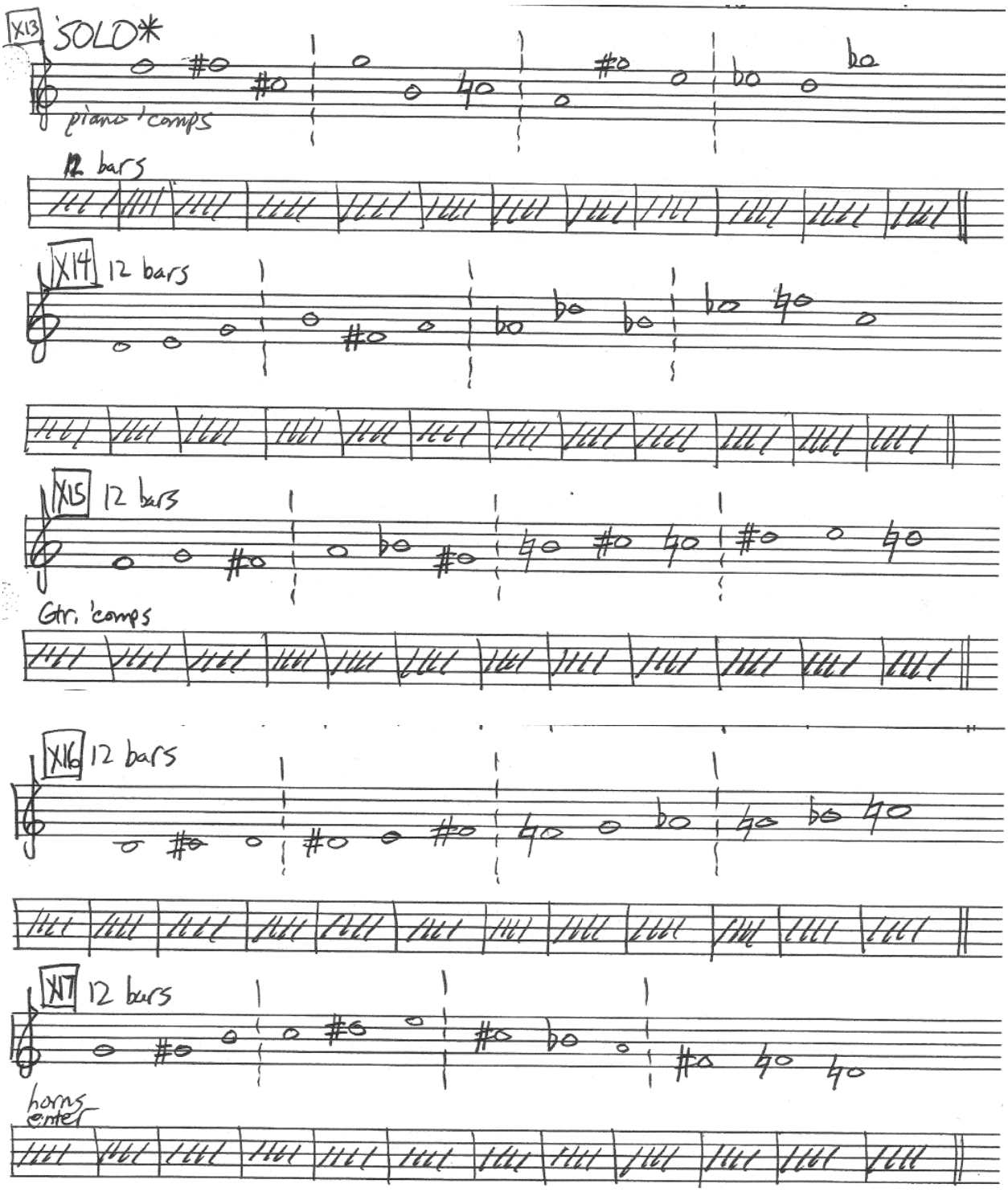
	Numerical Rating *(circle one)*									
	Test out of gradient		Student level			Level generally expected of a professional		Masterful, true artistry		Best ever heard
Variable										
1. Technical Execution/Fluidity	1	2	3	4	5	6	7	8	9	10
2. Time Feel	1	2	3	4	5	6	7	8	9	10
3. Sound/Tone Quality	1	2	3	4	5	6	7	8	9	10
4. Melodic/Rhythmic Development	1	2	3	4	5	6	7	8	9	10

5. Style	1	2	3	4	5	6	7	8	9	10
6. Note Selection*/ Hexachordal Adherence**	1	2	3	4	5	6	7	8	9	10
7. Expression/ Emotional Content	1	2	3	4	5	6	7	8	9	10
8. Melodic Construction	1	2	3	4	5	6	7	8	9	10
9. Intervallic Variety	1	2	3	4	5	6	7	8	9	10
10. Rhythmic Variety*/ Adherence**	1	2	3	4	5	6	7	8	9	10
11. Dynamic Variety*/ Adherence**	1	2	3	4	5	6	7	8	9	10
12. Creativity/ Hipness	1	2	3	4	5	6	7	8	9	10

Design

For each soloist: Pre-test of 3 choruses over 3 jazz standards of the soloist's own choosing with a live rhythm section or an Aebersold. Averaged scores on each dimension for each judge count. Solos over 72 measures (6 choruses) of the same pre-recorded excerpt from *I Care If You Listen* by Ray Zepeda (band with pre-recorded soloist muted): Serial improvisation considering pitch class only, 3 attempts, best scores from each judge count. Serial improvisation considering pitch class and dynamics and rhythm (attack point), 3 attempts, best scores from each judge count. Serial improvisation considering pitch class and dynamics, 3 attempts, best scores from each judge count.

In the context of the piece, the improvised solo section takes up the bulk of the time and occupies the entire middle and latter sections. After a slow introduction featuring virtuosic flute writing, a fast pointillistic section ensues before, just as in Babbitt's *All Set*, the percussion instruments enter as a "canon follower" playing the same rhythms as the composite ensemble rhythm for this section and leading into the solos. The soloists' instructions are to "Play idiomatically in a jazz style, either "straight-ahead" bebop or "OUT" (Dolphy, Cecil Taylor, Ornette, Braxton, Ayler, etc.) You may vary the ordering of the pitch classes within each trichord but please play all three before moving on to the next trichord. Although you should normally play each note once, you may repeat a note several times or loop a motivic cell (even if it traverses the trichord demarcation line) without destroying the essential nature of the row. You also have the option of staying within a trichord for awhile, exploring every possible permutation of it if you wish. You are not obligated to complete the entire row a whole number of times within the allotted 12 measures though you should try to loop through it at least once. When it is time to move on to the next 12-bar section, you must commence soloing over the aggregate for that section (in the manner described above) regardless of where you were in the aggregate for the previous section. Pitch classes, by definition, may be played in any octave. Multiphonics and chords/clusters are permissible." (Zepeda, 1996). The participant soloist's part for the serial improvisation test - an excerpt from the actual vibraphone part – is shown below in Figure 1. Transposing and bass clef instruments will be given appropriately transposed parts.


XIII
SOLO*
piano 'comps
12 bars
XIV
12 bars
XV
12 bars
Gtr. 'comps
XVI
12 bars
XVII
12 bars
horns enter

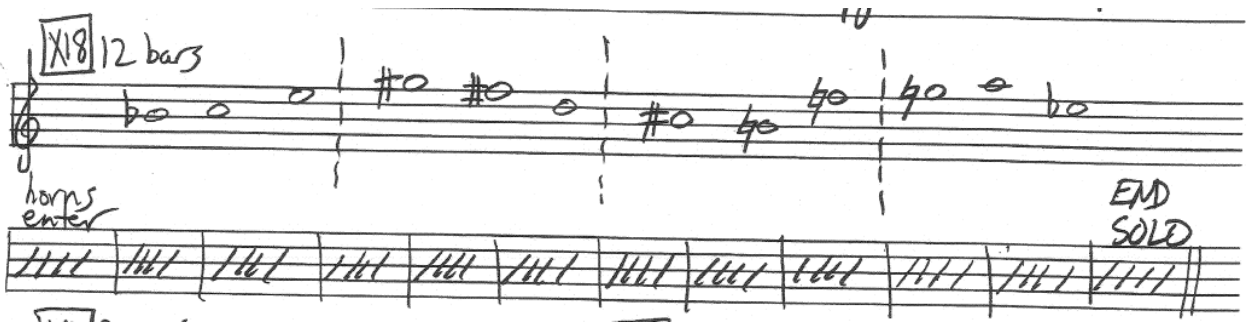


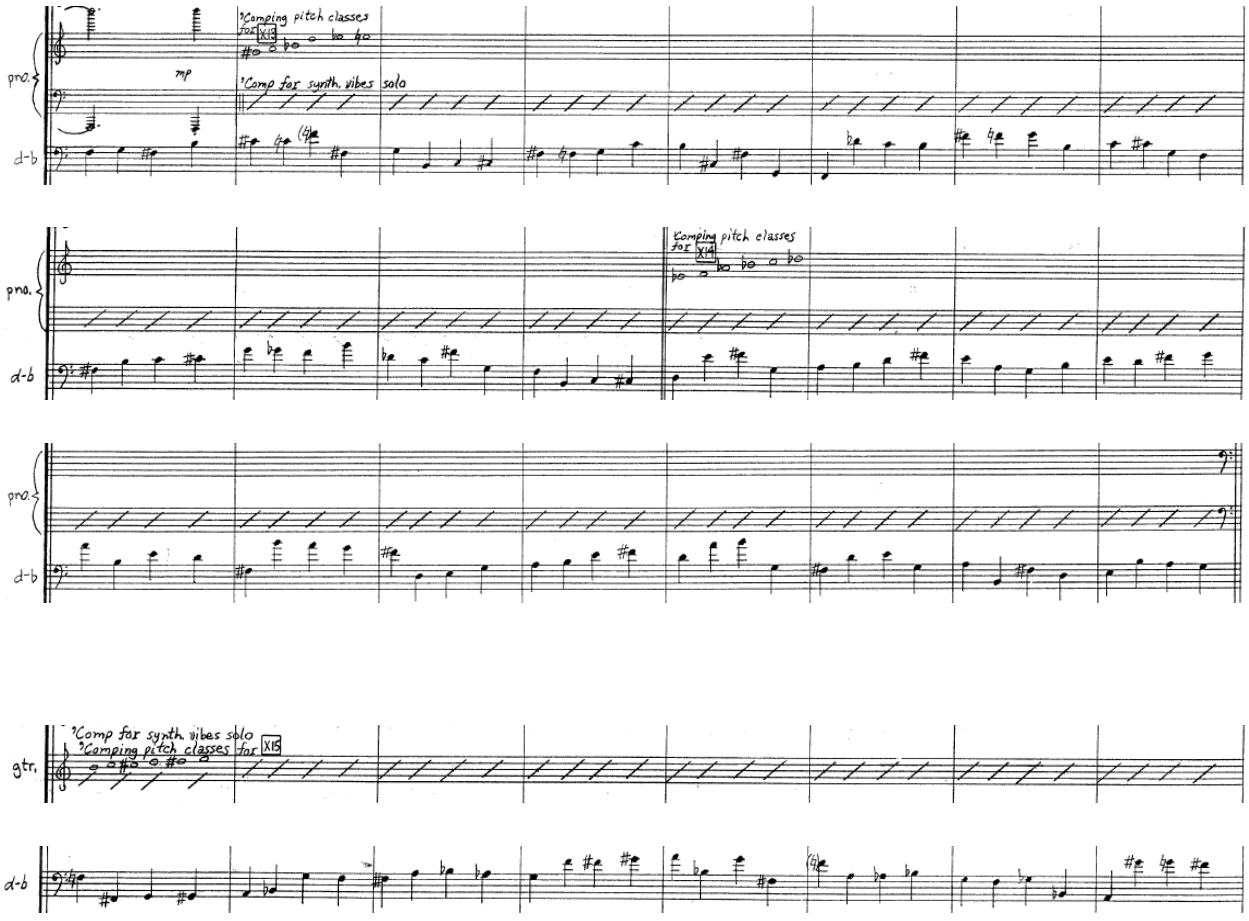
Figure 1. Participant pitch-class prompt for serial improvisation test. Adapted from "I Care If You Listen", by R. Zepeda, 1996, pp. 29-37. Copyright 1996 by Cambridge-West.

The 12 dynamic values to be considered by the participant in the pitch-class + dynamics test are 0) *ppppp*, 1) *pppp*, 2) *ppp*, 3) *pp*, 4) *p*, 5) *mp*, 6) *mf*, 7) *f*, 8) *ff*, 9) *fff*, 10) *ffff*, and 11) *fffff*.

For the rhythmic considerations, an idiomatic jazz approach is taken rather than the purely temporal duration or *attack point* method of organization characteristic of serious music. This accomplishes three things – (1) avoidance of the impossible mental task of executing the latter in a fast-tempo improvisational situation while (2) preserving serialism's core principal of "maximal diversity" and (3) improving the chances of a jazz-like outcome. To this end, twelve rhythmic cells of one to four beats commonplace in jazz were chosen roughly in descending order of attack point speed: 0) 16th-note sextuplet, 1) two 16ths or a 16th followed by a dotted 8th, 2) four 16th notes, 3) 8th-note triplet, 4) two or four 8th-notes, 5) 8th-note/quarter note/8th note or two 8th-notes/8th-rest/8th-note, 6) quarter-note, 7) dotted quarter-note, 8) quarter-note triplet, 9) half-note, 10) dotted half-note, and 11) whole note.

The pre-recorded "harmonic" milieu over which the improvisation will occur is given below in Fig. 2 showing the 'comping instrument pitch classes and the underlying bass line driven by a drummer playing contemporary jazz swing time punctuated with horn section

background figures (not shown). The bass line is a linear statement of the source hexachord while the 'comping instruments are limited to the pitch classes of its complement. The solo backgrounds too are limited to the prevailing aggregate. The instructions to the ‘comping instruments were simply that “’comping may incorporate chords/clusters and/or single notes. Formulate voicings and/or lines from the six pitch classes indicated for each section. Any octave is permitted for every note. The ordering is free but please play all six pitch classes before repeating any one.” (Zepeda, 1996).



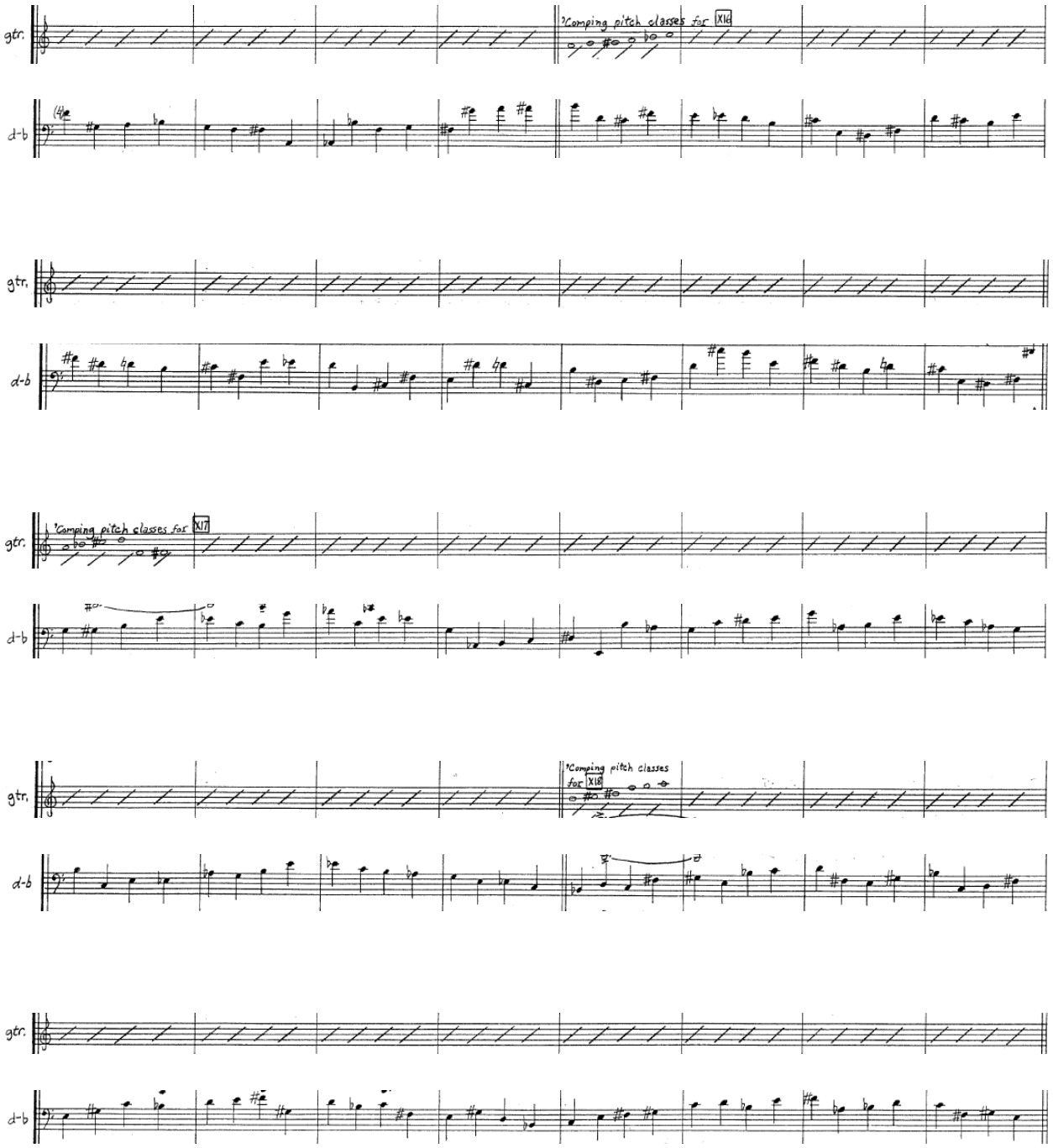


Figure 2. Rhythm section accompaniment for serial improvisation test. Adapted from "I Care If You Listen", by R. Zepeda, 1996, pp. 29-37. Copyright 1996 by Cambridge-West.

After the solos, the piece closes with a drum solo with flute accompaniment wherein the flutist is asked to improvise an accompaniment using the aforementioned six aggregates while interacting with the drummer.

Test Performance

In a double-blind process, three expert judges will score each soloist's improvisation over the same passage across ten dimensions on a scale from 1 to 10. Each soloist will get three attempts at each of the following: (1) pitch only, (2) pitch + dynamics, and (3) pitch + dynamics + rhythm. For each judge, the highest score of each dimension will be taken, even if the scores are from different attempts, for each of the three evaluations – (1), (2), and (3). Each soloist will therefore give nine performances over the same passage of 72 measures at 216 bpm. (The "practice" threat to internal validity is intentional here as the idea is to really gauge the player's maximum capability.) The mean and standard deviation from all of the judges for each condition will be tabulated and presented.

The major opportunities for risk mitigation include (1) soloist fatigue [9 choruses of standard jazz followed by 9 performances (6 choruses each) of progressively difficult serial jazz]. One possible mitigation would be to have players perform their standard set and then go back to the end of line while the others do theirs and then perform their serial set when their turn comes again. (2) Also, soloists' interaction with the rhythm section on the serial treatments will be one-way only since the excerpt is pre-recorded. (3) For the pre-test, the lack of availability of the same exact rhythm section for every soloist is an internal validity threat. The mitigation of using Aebersolds would also create a one-way situation with regard to rhythm section interaction. This proviso will be made clear in the interpretation of results wherein rhythm

section interaction is measured. One could raise the concern that each soloist having different pre-test material is an internal validity threat. This is by design, however, as the purpose is to establish the player's maximum potential with standard jazz. Judges routinely make adjustments in consideration of quality *vis a vis* degree of difficulty. (4) With regard to privacy, many soloists will be at a sufficiently high level so as to make their playing, by virtue of its quality and uniqueness, potentially identifiable to a judge with expertise in this area. A non-disclosure agreement is one suggested mitigation.

Data Analysis and Presentation Methodology

There are two principal components of this:

1.) Analysis of data to confirm or disprove that improvisational mastery over standard jazz is correlative of same in serial jazz.

2.) Analysis of data to show degradation in improvisation as more serial treatments are added.

For the baseline pre-tests over standard jazz, the scores across each of the 10 dimensions for all 3 tunes would be averaged for each judge. An average of all the judges' scores for that dimension would, in turn, be averaged but this time with the standard deviation (SD) reported. Each subject would therefore have 10 composite averages, one for each dimension. With each dimension equally weighted, these 10 composite averages can in turn be averaged to give a weighted average or a single-number reduction to that subject's standard jazz improvisation baseline.

The same would be done with the tests imposing the 3 serial conditions: x = pitch-class consideration only, y = pitch-class and dynamic consideration, and z = pitch-class and dynamic

and rhythm considerations consisting of 3 "takes" each, the only difference being that only the best scores for each dimension would be used regardless of which take that highest score was drawn from. For each treatment, each subject would therefore have their 10 high scores for each judge averaged to give a composite average for each dimension. With each dimension equally weighted, these 10 composite averages can in turn be averaged to give a weighted average or a single-number reduction to that subject's serial jazz improvisation for that treatment. All of this would be repeated for the other two treatments.

In order to determine if the conditions impacted participants' improvisational fluency, a repeated measures ANOVA will be conducted. Descriptive statistics will also be reported for participants across each condition.

Results

The baseline weighted average (also reporting SD) would then be compared to the weighted averages of x, y, and z (also reporting SD) and then using Pearson's *r* to illustrate how well serial improvisational fluency can be predicted by standard jazz improvisational mastery, the latter of which is generally acquired by well-established pedagogical and experiential methods. If x shows a strong correlation, this would suggest that the way to teach serial improvisation is to first ensure mastery in standard jazz improvisation. (It may turn out, however, that the bar for executing y and z is so high that there will be little or no correlation to the standard jazz improvisation baseline). Or, we may be surprised to find that the best serial improvisers happened to have the lower baselines because, unlike in standard jazz improvisation, the pitches in serial jazz are written out in order. (This, however, would not be the hypothesis going in!)

Within the serial realm, the composite averages of x, y, and z (also reporting SD) would be compared to see which dimensions are most affected, presumably adversely, in going from x to y to z. The weighted averages of x, y, and z would also be compared using a repeated-measures ANOVA and a conclusion could be drawn as to whether jazz improvisation considering more than x is even tenable assuming the desired result is a performance recognizable as "jazz". If not, then composers would be well served to refrain from such demands on professional performers let alone students. These data would be illustrated in several tables, graphs, and histograms.

Discussion and Implications

A conclusion would be drawn on how to best teach serial improvisation at the college or advanced high school level. Based on how these professionals perform, is it reasonable to add the restrictions of dynamics and rhythm or is even pitch too difficult for students? Is improvisational artistry on standard jazz material, as established by a pre-test, a reliable predictor of improvisational fluency under imposed serial treatments. To what extent do serial restrictions beyond pitch class organization affect fluency?

This study seeks to generalize the results to *avant garde* or contemporary straight-ahead jazz musicians and free jazz improvisers. This population would be well-served to adopt this skill set either to add flavor over chord changes or to add a measure of order to their improvisations which may appear random or solely gestural/textural. Further ecologically valid generalizations can extend to contemporary straight-ahead jazz or fusion where the chord changes are not so much functional as they are in a Great American Songbook standard but, rather, colors such that 12-tone shapes can be played without sounding “wrong”. It would also be generalizable to modal jazz where a strict adherence to the notes within the prevailing mode or to pentatonic patterns would grow tiresome over time (Beato, 2017).

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