Points on the curve to find

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Analysis

I shall present my analysis of this piece in three sections. First I will discuss the construction of the solo piano part. In relation to the title of the work, this part signifies "the curve". Since the piano part is the formal backbone of the piece, I shall include my consideration of work's form in this section. Next I shall discuss the rest of the ensemble, i.e. "the points". Finally I will discuss the co-evolution of the solo piano and the ensemble.

The Curve

Berio began "Points on the curve to find…" by composing the solo piano part. Using the completed piano part as an underlying backbone, he composed the remaining parts above, beneath and around the piano. The formality of the solo piano part, as a cantus firmus is internally mirrored in its highly ordered construction scheme. The part is based on a constantly evolving 10 note ordered pitch row. While the scheme for the evolution of the pitch row is enacted quite strictly, Berio practices much greater freedom in the way each statement of the row is made. Statements are variably elongated by trills between adjacent diads in the row. The pitch choice for these diads as well as the trill's length is manipulated freely. The analysis of the solo piano part is divided into three sections: the pitch row's evolution scheme, the use of register, and the notion of harmony expressed in the piano part.

Evolution of the pitch row

Measures 1-4 of the piano part contain the first statement of the ordered pitch row in its original form. Example C1 shows the evolution of the row.

Example C1. This example shows the following: 1) the left-most measure in each system contains every version of the ordered pitch row (R0 to R10) and the measure number marking the registral collapse that cues the initial statement of the row. The notes contained in squares are the original first 10 pitches. The notes contained in circles are the pitches the undergo substitution in the evolution of the row. Starting with R3, the circled notes get replaced with the original 10 pitches of R0 (i.e. the squared notes). This choice imposes a recursiveness onto the evolution process that would ultimately result in the original row, R0. Berio stops the process at R8; R9 and R10 are never stated. Note the !'s in rows R7 and R8, they indicate exceptions to the rule. These rows contain chromatic exceptions to the pitches dictated by the row (the statement of R7 contains C1 naturals and F0 naturals as well as the row's C1# and F0#, while R8 contains D1 naturals as wells as the row's D1#). The introduction of these excursions into the pitch material appears to serve as a cue for the impending doom of the process at work, for R9 is never stated. 2) the middle measure of each system shows the two pitches missing from the present version of the row. At times, these pitches have important implications in the parts of the rest of the ensemble. 3) the right-most measure of each system shows—in order of occurence—the registral expansion of each row. Note that for rows R0 to R7, the register of exactly 10 pitches is shifted before the collapse to the C0-E1 major tenth that marks the introduction of the next version of the row. The large !'s indicate the break in the process. R8 gives way to R9 only after two registral shifts, while R10 allows for eleven.

Register

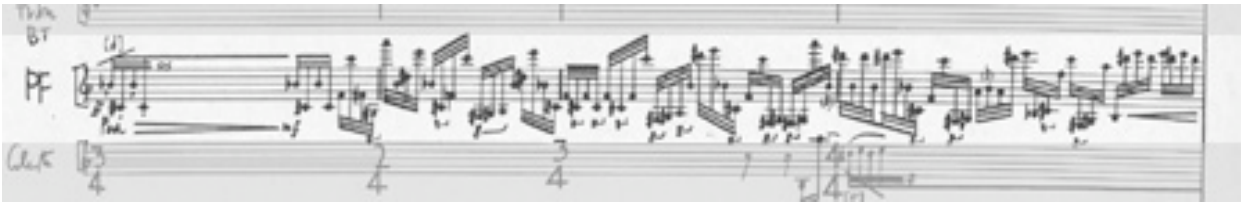
The first statement of the row in measures 1-4 define a registral span that remains significant for the remainder of the piece. The row spans the major 10th from C0 (middle C) to E1. The first statement of every new form of the row is made within this interva. Berio adheres strictly to this principle for the entire piece. Consider the transition from R0 to R1. As already mentioned, R0 is introduced within this register in measures 1-4. Beginning with the low F# in measure 10, pitches are registrally displaced one at a time: D# and F in measure12, low D natural in measure 16, low C and low G sharp in measure 18 and so on, until measure 23 where the register regains its original boundries of C0 to E1 and the piano states R1 for the first time. The pattern repeats again in the transition from R1 to R2. The register expands up and down until measure 47 where all pitches are collapsed onto the 10th from C0 to E1 and R2 is stated for the first time.

The order in which pitches from the row are registrally shifted appears less systematic. There is, however, a mysterious equivalence between the number of registrally displaced pitches in each statement of the row and the total number of pitches in the rows (10). As shown in example C1, the process breaks down after R0, leaving R9 and R10 unheard. Ironically, the recurring registral collapses that triggered the transformation of each row continue to take place (see measures 167, 215, 233, 248). This feature motivates the question, "what is the most perceptually significant part of the pitch row transformation process?" The pitches of the row go by at an astonishingly fast

rate. Also, the 10-pitch makeup of each pitch field creates a common grayness to all the rows that smoothly morphs one row into the next (a pitch substitution in a pentatonic row, for instance, would be much more perceptible). The feature that seems to be the strongest sonic cue of a new pitch row is in fact the registral collapse. By replacing the systematic scheme of the pitch row's transformation with seemingly free-style writing, and adding a second stream of 32nd notes, Berio in effect shows that these periodic returns to C0-E1 are the actual mark-off points in the movement of the piano line.

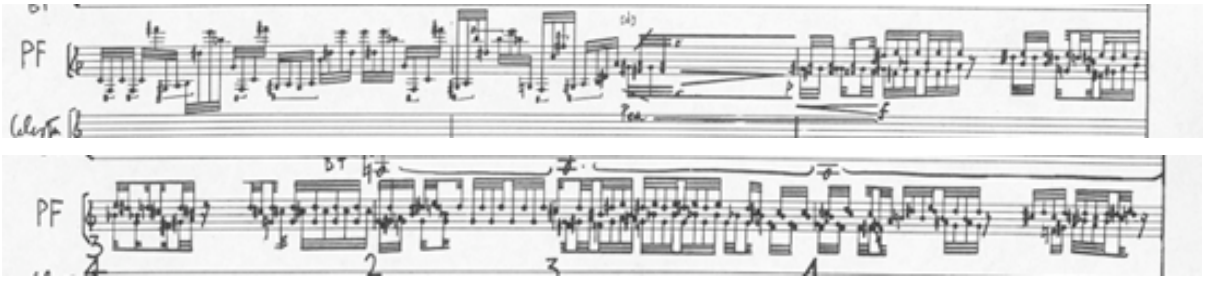
Form

The form of *Points of the curve to find* may be described as "A-B-A'-C". The characteristic sound of the piano in *Point on the Curve* is the monophonic stream of 32nd notes (see example C2) heard in the first formal section of the piece (measures 1-98, call it "A").



Example C2. Measures 42-46 show the characteristic stream of 32nd notes.

By the end of the piece this sounds evolves into two simultaneous streams (measure 208-end, call it "C" and see example C3). This transition occurs by way of two intermediate sections. The first, beginning in measure 98, is a section that finally exposes the long overdue polyphonic side of the instrument (call it "B"). The second intermediary section is a return to the single stream of 32nd notes (measures 114-208, call it "A' ").

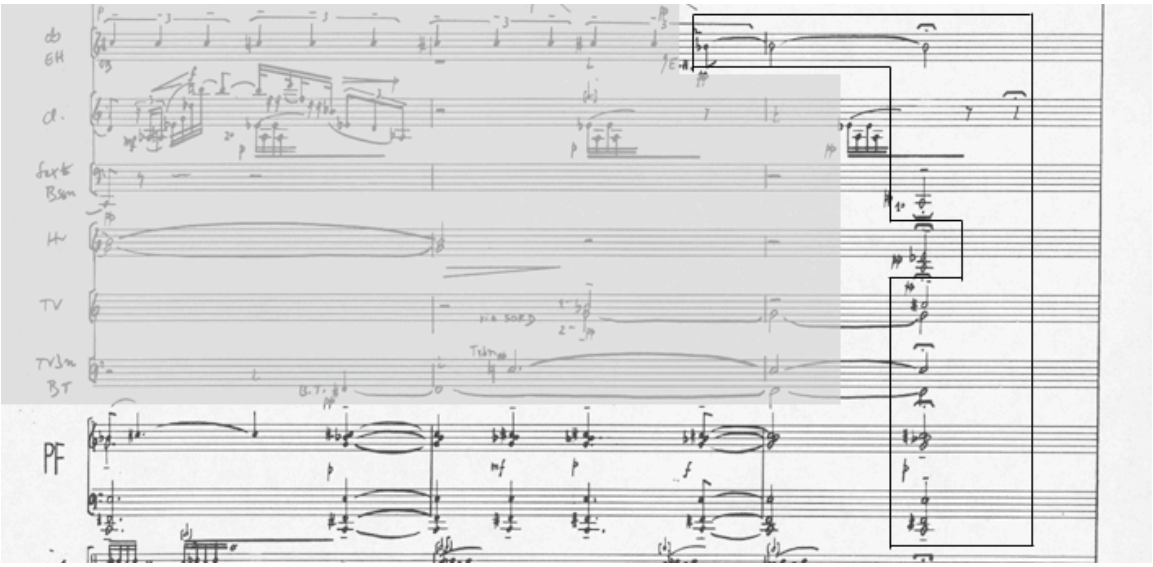


Example C2. Measures 231-236 show the doubled stream of 32nd notes characterizing the end of the work. The top system shows the transition from 1 to 2 streams.

In this section, the pitch row picks up from where it was interrupted by the polyphonic passage; section A' covers R0-R4 and section Bstarts with R5 and goes to R8. The close relationship between A and A' and the nested placement of the highly contrasting B section created an sense symmetry in the first 3 quarters of the work. Furthermore, the final section is in a sense a marriage of the previous two pianistic styles: stream of 32nd note (A/A') + polyphony (B) = 2 streams of 32nd notes (D)!

Harmony

The first three notes of R0 make up the pitch set 014 (C#, D and F). This triad plays a significant role in the piano's first harmonic outburst (section B, measures 98-114). The characteristic chord of this section is shown in example H1. This chord is itself the union of two 014 triads (see eacmple H1). In measures 100 to 103, the chord is sounded 7 times in the piano, and finally joined by the winds on the third beat of 103. In measure 104 the chord is passed to the strings in order to allow the piano to adopt the 2nd hexachord of the section, the cluster 012345 in measure105. Between 105 and 114 where the registral collapse triggers the statement of R5, the harmonic content is an overlap of the cluster sonority and the 014 triad.



Example H1. Measures 101-103. The 014+014 hexachord is sounded in the piano multiple times. The boxed sonority is an overlap of 2 pairs of 014 triads (i.e. one with C, C# and E, another with F#, G and Bb)

The Points

Points on the curve is a work of considerable length with a significant number of notes. In order to mange the ensemble writing in such a piece, the composer must utilize a manageable set of tools for creating musical textures. Allow an anecdote to illustrate this point: John Adams once said "People ask why is it that we no longer come across eight year old composers who have mastered the art? Are today's composers simply less capable than those of the previous centuries? No. The dfference is, there is no longer an accepted style in which to right. Every composer, therefore, must not only find his own voice, but must more or less create his own style." The complete malleability of the parameters of style has interesting implications on the means by which a composer can create textures. In the classical style for instance, a musical texture could be made of a I-V progression by way of harmonic expansion or elongation. One could expand the skeletal I-V progression to I-iii-vi-ii-V, thereby creating an extended harmonic framework from which to draw the individual parts of the ensemble. As Adams articulates, the modern day composer must devise his own scheme for elongating a skeletal concept into sustainable musical textures. The orchestration in *Points on the Curve* provides a prime example of a technique often used by Berio. Simply put, the technique relies on the use of a limited number of textural building blocks of highly differentiated musical characters. What follows is a description each of these building-block-types supported by examples from the score. It is worth noting that this piece serves as a desirable example for two reasons 1) sufficient sophistication: the ensemble of 23 instruments contains quite an extended timbral palette, and 2) clarity of the orchestrational goal: the orchestra signifies "the Points" on the piano's "curve".

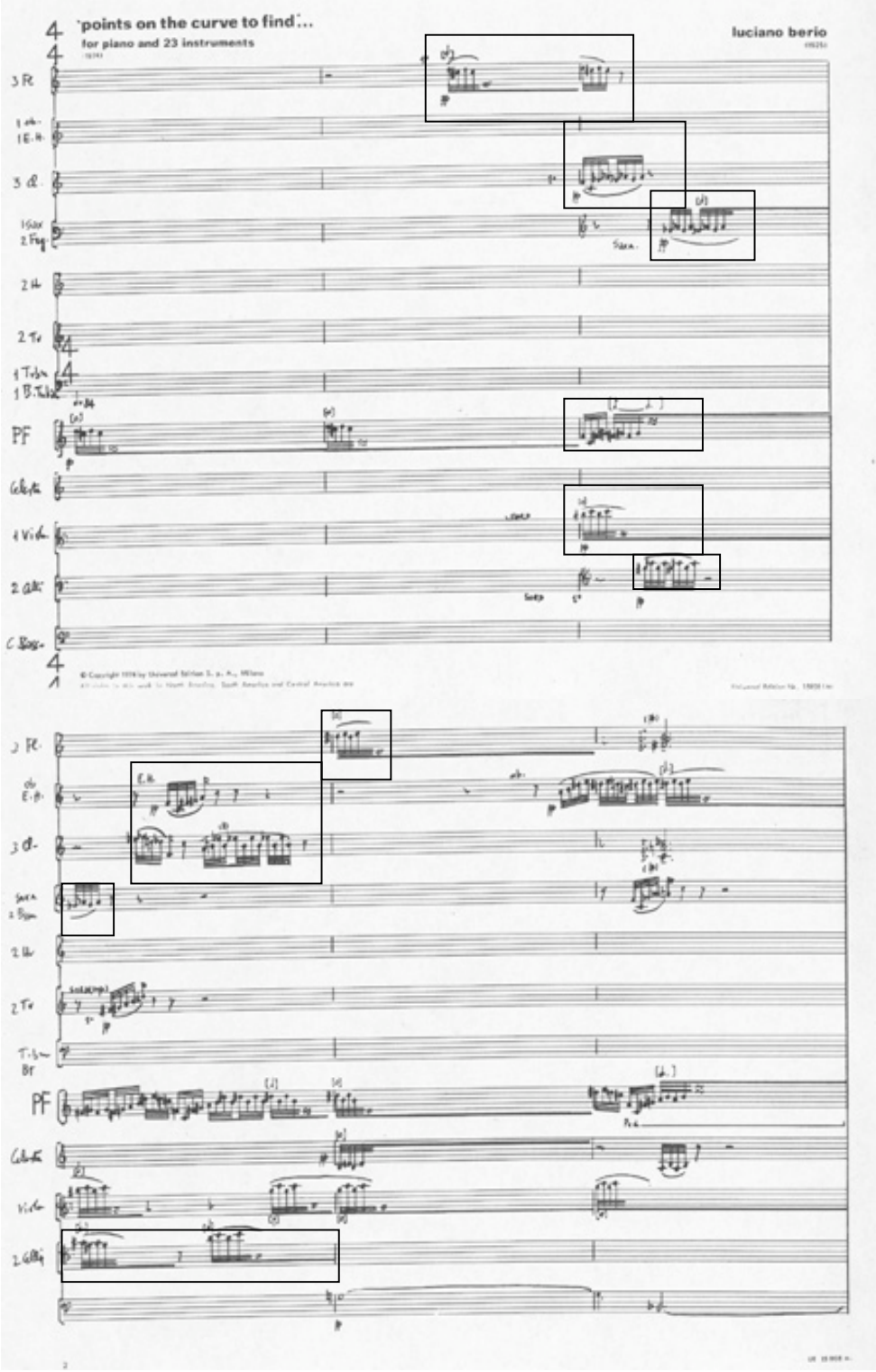
Material Supporting "the Curve"

In order to create sustainable musical textures motivated by a single line, a logical place to start is to double the primary line. Various forms of doublings are the first and simplest building blocks in Berio's scheme. However, for a composer of such high orchestrational ambition as Berio (think of works like *Epifanie* or the first and last movements of *Sinfonia*), each and every type of building block must also provide a high

degree of mutability. The mutability of this first textural type is in three areas: length of doubled segment, instrumentation and rhythmic correspondence.

As for length, the doublings are never sustained for more than a couple of measures. Instruments in the ensemble dip in and out of the piano part so to speak. The opening of the work shows this idea clearly (example P1).

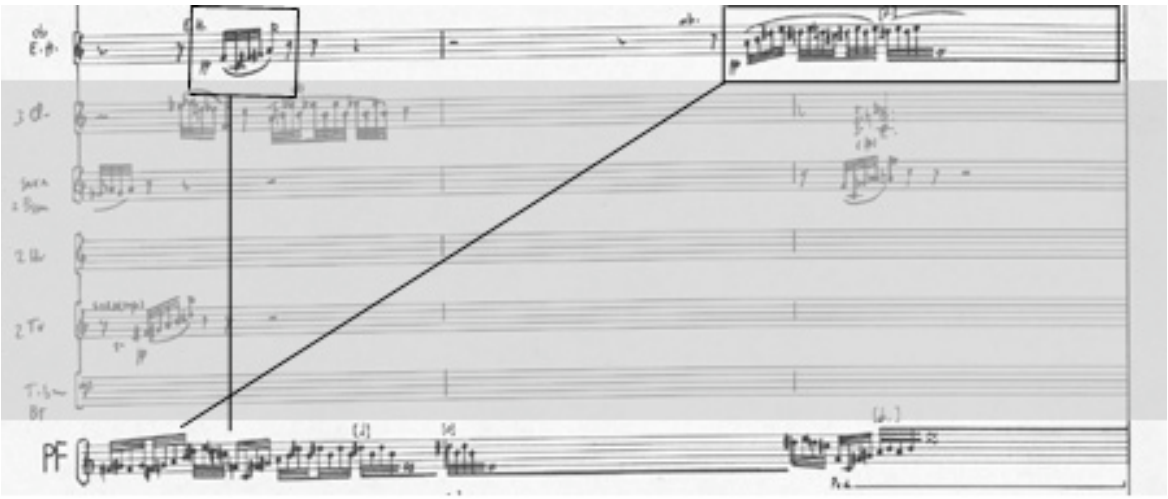
The technique of dipping in and out of the piano part for variable amounts of time persists throughout the work.



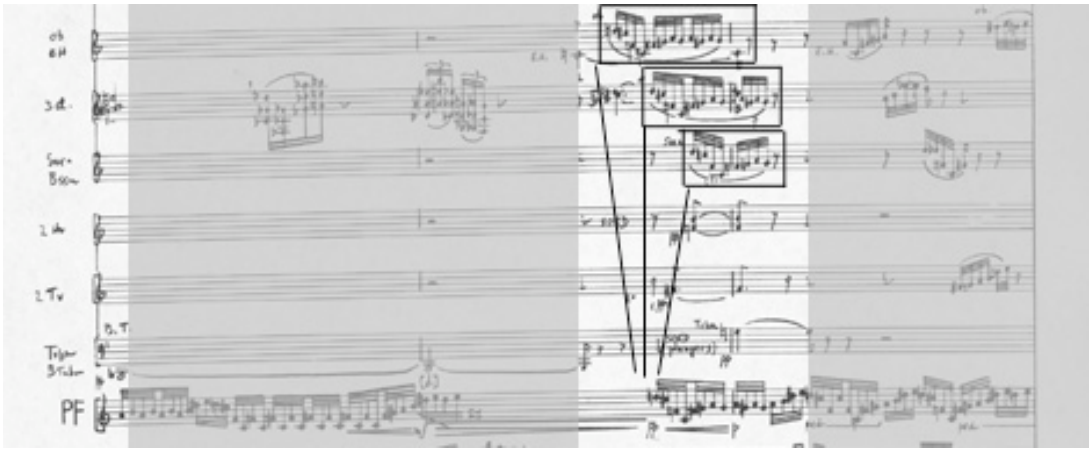
Example P1. In the second measure the 1st flute enters with the same trill as the piano for one beat and a bit. The 1st clarinet doubles the curve's chromatic figure in measure 3 for one beat, followed by soprano sax for three beats. The viola's doubling throughout measure 3 and into the first beat of measure 4 provides slightly more lasting support. Measure 4 introduces eighth-note long bursts of chromatic doublings from the soprano sax, the 1st clarinet as well as the english horn.

Except for the piccolo, the bass clarinet and the contrabass bassoon, every wind instrument of the standard post Beethoven orchestra is represented. All strings but the violin are also present. This richness provides strong grounds for highly differentiated doublings. As seen in example P1, by the end of the first 6 measures, doulbings of the piano part have been sounded by the flute, the clarinet, the oboe and the english horn, the soprano sax, trumpets, celesta, viola and the celli. Furthermore, the closely staggered arrangement of the doublings emphasize the high degree of timbral variety. Clearly, Berio is after finding a wide variety of sonic "points" on "the curve".

Along with timbre, the rhythmic structure of a musical texture is a most defining feature. In building textures through doublings of a primary line, one might assume that the world of rhythm is already accounted for: the doubling instruments would simply take on the rhythm of the primary line. This is not always the case *Points on the curve*. Berio uses two techniques of rhythmic distortion to created more complex textures which are still essentially rooted in doublings. Example P2 and P3 show the use of temporal displacement in the doubled parts.

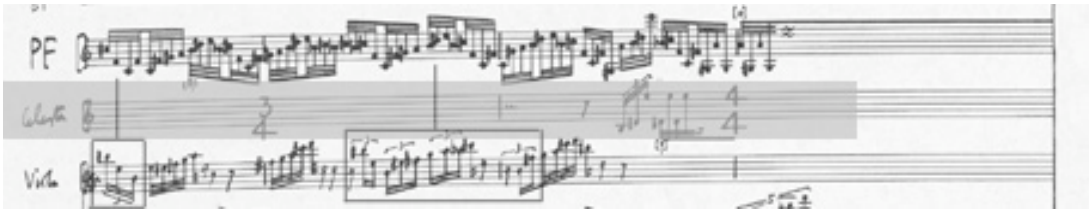


Example P2. In measure 5, the oboe enters with a displaced doubling of the piano part from 2 measure back.

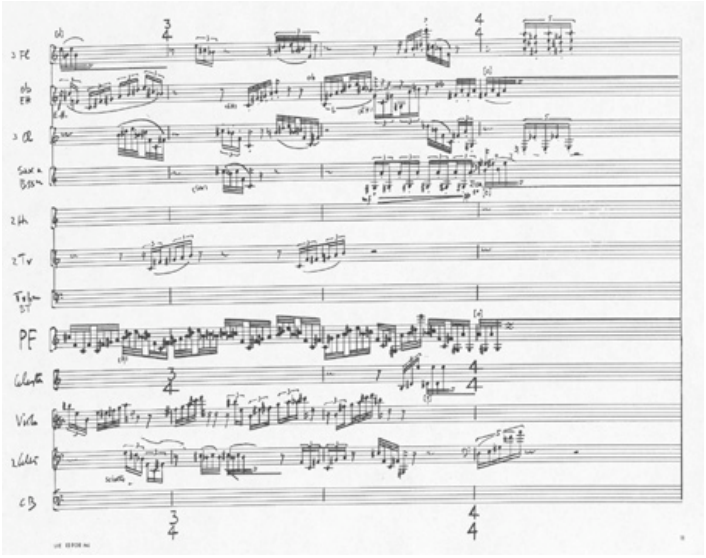


Example P3. In measure 8, the oboe, the 1st clarinet and the soprano sax enter sequentially, each one eight-note apart. The piano part corresponds rhythmically with the clarinet's entrance, while the oboe and soprano sax's displaced entrances rhythmically dilate the texture.

Example P4 show a form of rhythmic distortion based on the use of overlapping poly-rhythms.



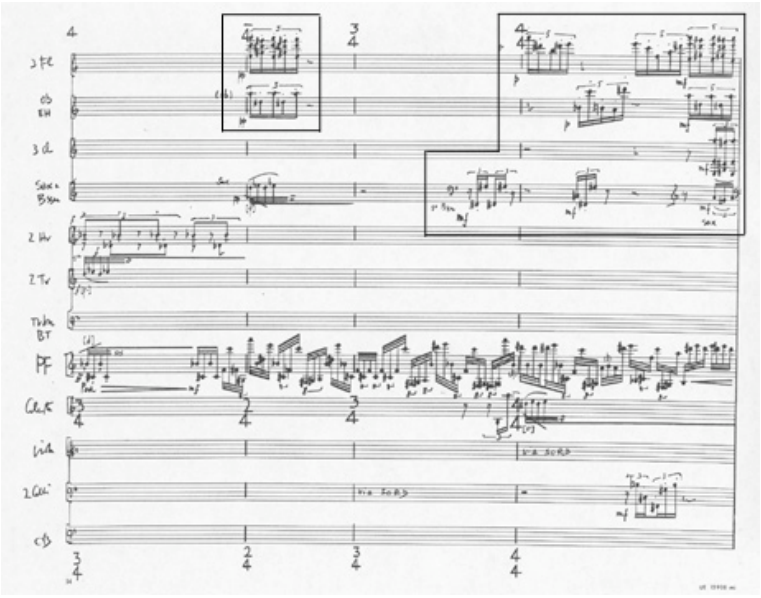
Example P4. Starting in measure 32, the viola doubles the piano's 32nd notes with a combination of 32nd notes and 16th note triplets. In order for the viola to keep up with the pitch row, some notes are skipped

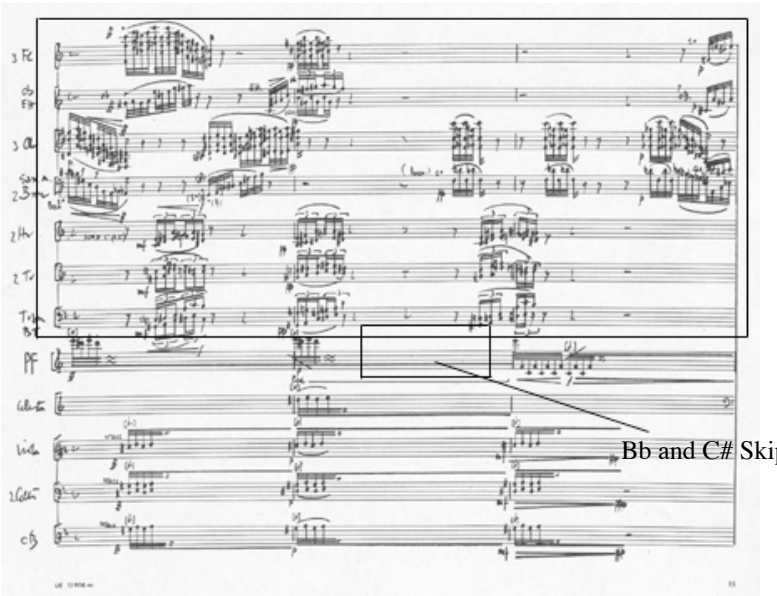


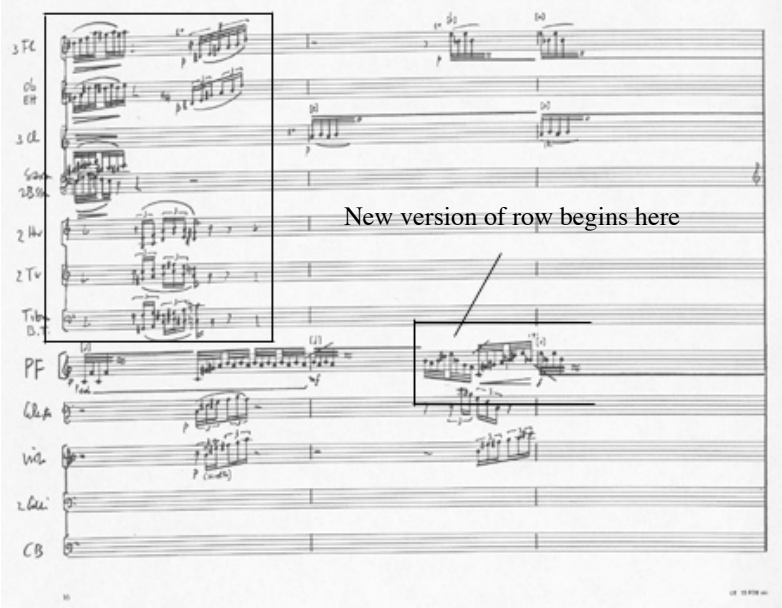
Example P5. This example shows a more sophisticated example of how Berio uses the three mentioned parameters of varying doublings (length, instrumentation and rhythmic distortion) to created complex musical textures.

Thickening material

In measure 7, the clarinet introduce a musical gesture that plays the opposite role of the above supporting material. The triple parallel fifths serve as thickeners that can build up, spread to the rest of the ensemble and at key moments of the piece overpower the piano's stream (see example P7). The build-up of thickening material often corresponds with the state of the order pitch row's process. The build-up in measures 46-49, for instance, triggers the transition from R1 to R2.



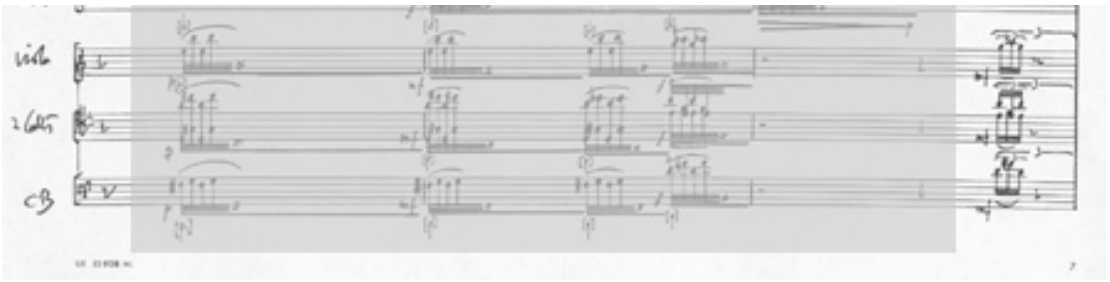




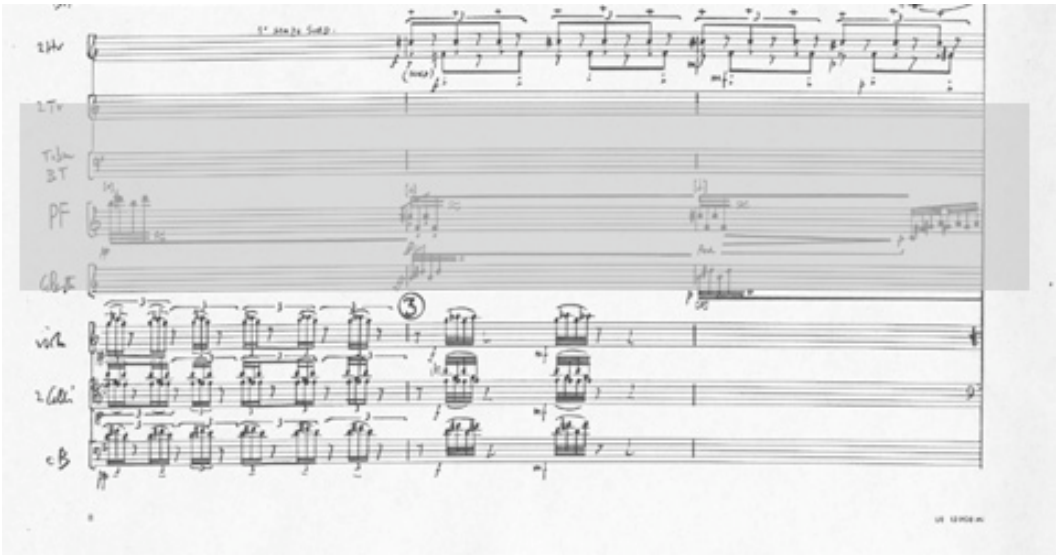
Example P7. Starting in measure 42, the thickening material in the winds (placed in a box) begins to take over the ensemble. When the density of the thickening material reaches its highest point (measure 47), the piano skips 2 notes of the row; two measures later G natural is substituted for C# and R2 in introduced.

Pulse

The extremely fast pace of the piano part together the short and staggered figures in the rest of the ensemble obliterate any notion of a pulse for in the openning 20 measures of the piece. The third textural building block in the ensemble writing fills this gap. A highly exposed figure is initiated in the strings in measures 21-22 and passed to the horns in measures 23-25 (see example P8).



Example P8. Measures 21-24: The introduction of the pulse as a textural element. Starting with the strings in measure 24, a "fuzzy" pulse in used as a textural building block and and then passed to the horns (see below).



Example P8. (continued)

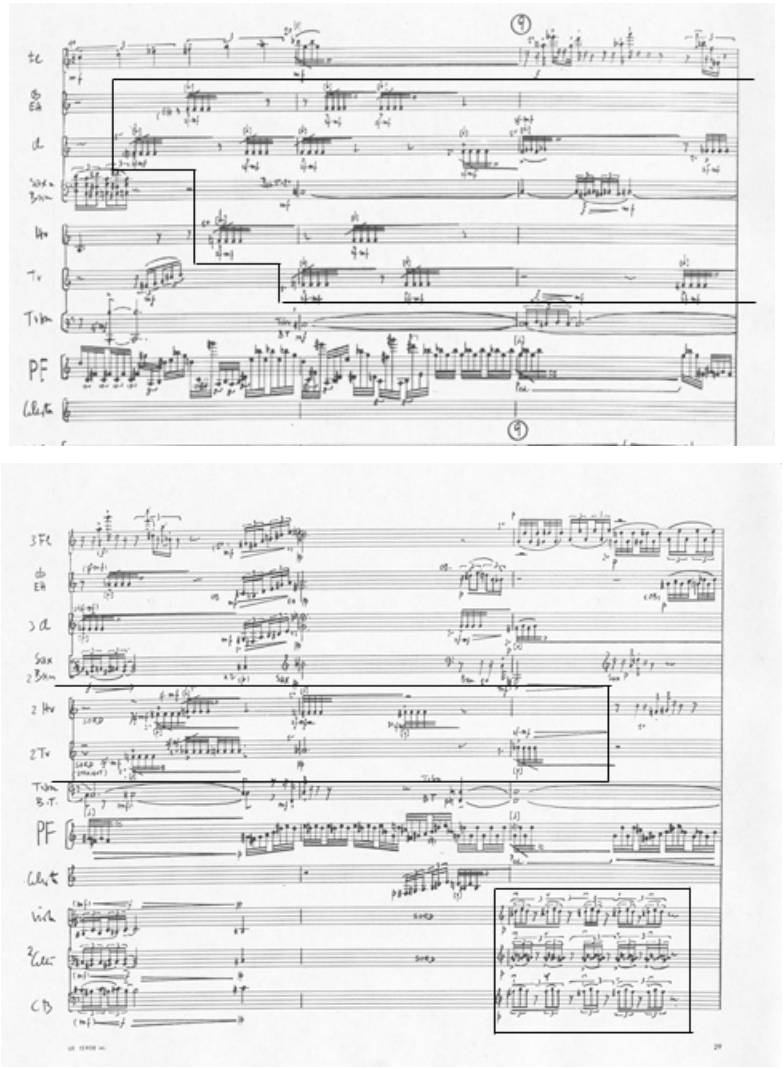
This figure clearly articulates the quarter note triplet pulse. The genius of the orchestration of this textural block is in the addition of rhythmic noise to the parts: the string parts are made up of 16th note triplets and an eighth note rest, which is in effect similar to having an ornamentation on every note of the quarter note triplet pulse. This ornamentation adds sonic interest to the pulse by rendering the string tutti "fuzzy". Similarly, the clean pulse of the 1st horn player is dosed with some rhythmic noise from the 2nd horn (in this case, every other note of a 4 against three figure with the 1st horn).

The pulsating figure is a perhaps an even better example of how Berio treats textural building blocks than the more general thickening material. The idea is simple: to create a texture made up of short periods of pulsation in the ensemble. The malleability is endless: 1) Varied instrumentation: horns in measures 42, 72-74, 77-78, 80-85 (here joined by first the english horn and then the 1st flute), 90-99 in the strings, and 101-122 in oboe, strings again in 130. 2) In combination with thickening material as in measures 80-86, 3) Used with ascending pitches as in the teamwork between the english horn and the flute in measures 84-86, 4) Longer periods of recurring interjection as in the strings parts in measures 91-98.

Repeated notes and sustained long notes

The role of the supporting material of section A (i.e. doublings of the piano line) is overtaken in the second half of the piece by series of repeated 32nd notes and long

sustained tones. The single note limitation of this textural building block gives it an unobtrusiveness that is more closely related to the doublings than to the thickening material. This figure is introduced for the first time in the celli in measure 77. Example P9 shows how this material is overlapped to saturate the texture.



Example P9. Measures 86-92: Orchestral texture built of repeated notes. This passage shows the gradual accumulation of the gesture in different sections of the ensemble, building up to the complete takeover by the end of the example. Note the recurrence of the pulsating texture in the strings in the last measure.

Through the course of the piece there is a tendency in the ensemble away from the doublings and thickening material (both having relatively spastic musical shapes in terms of pitch), towards repeated 32nd notes and long sustained notes (more static in terms of pitch). In fact, for the last 60 or so measure of the work, the ensemble's part is made up entirely of repeated notes and long sustained notes. The manner in which Berio's

musical textures are made up of overlapping, characteristic building-blocks lends itself perfectly to gradual shifts in the character of the texture.

The Ensemble

The interaction of the piano and the rest of the ensemble may be described as a series of coordinated accumulation and de-accumulation of activity. The changes in density occur in the orchestra and the piano reacts to them by moving along its pitch rotation scheme. Example P7 shows one of many passages with this tendency. Similar processes are responsible for the shift from R3 to R4 in measures 86-90. This time the accumulating textural components are the repeated 32nd notes. Similarly, the gradual accumulation of thickening material in measures 126 to 131 triggers the the piano to skip many of its rows pitches (measures 129-131) and step from R5 to R6. An overlap of thickening material and repeated 32nd notes triggers the shift from R6 to R7 around measure 143.

Orchestral Links

Orgianal Work	Recycled in…
Sequenza II (harp) ‘63	Chemins I ’64
Quaderni I	Epifanie ‘59-62
epifanie ‘59-62	Sinfonia ‘68-69
O King ’67	Sinfonia ‘68-69
Sequenza VI ’67	Chemins II ‘67
Sequenza VII ’69	Chemin IV ’75
Chmins V ‘80	Sequenze IX ‘80
Sequenza VIII ‘76-‘77	Chorale ‘80-‘81

Berio has always shown an interest in reusing material. In terms of references from one work to another, there is an overwhelming number of pieces that make blantant use of previous written material. The table to the right shows a few of these connections. *Points on the curve* itself was used later on in *Concerto II*.

Berio has also shown ample interest in use of reference within the same work. The final movement of *Sinfonia* is the ultimate example of this technique. There, the final movement is a working out and a synthesis of material from the previous 4 movements. In *Points on the curve*, the final section of the piece (previously called the “C” of the “ABA’C” form) is in a way a reference to sections A and A’. The multiple streams of 32nd notes which define the sound of the final section are an expansion of what came before. Measure 167 marks the end of the row evolution process; at this point the

piano breaks into 2 voices. The bottom voice begins to recapitulate R0 but the process of pitch row transformation now occurs at a much faster rate: R0 in measures 167-168, R1 in 169, and the process is interrupted by a sudden expansion in register. This occurs yet again in measure 216. This time, the top voice of the piano produces R0, two measures later in 218 the B flat is substituted for D resulting in R1; a quick shift in 219 produces R2, and yet another substitution in 220 moves the ordered row to R3. Here, once again the process breaks down. Nonetheless, the idea of self reference is clearly the motivation. In the first part of the work a process is set up, and the final part of the work comments on that process by reproducing a "Reader's Digest" version of the process in a only few measures.

The idea of making density of musical activity the primary parameter of control is very much reminiscent of the oboe sequenza. The expanded instrumentation of this work simply extends the limits of the timbral dimension. The very idea of using a continuous musical line as a cantus firmus is also an old Berio technique. The use of the Mahler 2nd 's scherzo in third movement of *Sinfonia's* is the most prominent example of this technique. The continuity of a single unfolding musical idea acts as a vehicle for the expression of sophisticated orchestral gestures. The tendency to find such a unifying idea attractive sets Berio apart from other orchestral-gesture masters like Boulez. Unlike Boulez, Berio is attracted to the notion of using a single running line (or entire movement in the case of the Mahler) as the internal glue of a piece.

As we have seen, the solo piano part is composed in a highly systematic manner. Using number grids to produce the pitch material of this "the curve" is reminiscent of works like *O'King*, where the entire work is the unfolding of a mathematical process at work. The propensity for working with ordered sets of numbers and transformational processes is prhaps a habit left over from Berio's serialist days. The sophistacated and highly free-form treatment of the orchestra that accompanies the underlying mathematical workings can only be the result of his innumerous experiments with large mixed ensembles.

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