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Making Music

Dora A. Hanninen

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[2.1] John Cage might be described as a "maker of music." This characterization downplays his personal agency as "composer" and suggests an affinity with craftsmen and creators of traditional Buddhist art, such as sand mandala and thangka paintings—people who make art, but often according to a prescribed plan, within precise constraints, with a sense of discipline directed beyond the artistic result.(1) Recasting Cage from "composer" to a "maker" of music also allies him with performers and listeners, in a blurring or plurality of roles that Cage himself recognized, and played. Whereas Cage provides the impetus that brings a piece of music into being, the performer makes the score into sound. The performer's role is an active one: the performer *does* something, inevitably *adds* something, to what is notated. Listeners also "make music," and so too music analysts. To listen to or analyze music is to enter a sound world with full attention, in a spirit of active engagement. Listening and analysis are not merely receptive, a matter of accurate perception and representation. They are also creative: we *make* music, through acts of apperception and interpretation. Drawing on the ethic of analysis articulated in "Asking Questions," this paper explores how two pianists and one reflective listener-analyst (me) "make music" of the first system from the sixth piece of Cage's *Etudes Australes* (1974), in two recordings by Grete Sultan (1978) and Sabine Liebner (2011).

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[2.2] In his visual art, Cage uses chance to create "improbable" compositions—prints, drawings, and watercolors in which proportions, placement, shape, weight, and color operate independently of one another and outside conventional compositional principles.(2) In the *Etudes Australes*, star charts introduce the element of chance into music composition.(3)

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Of course, the distribution of stars represented in the *Atlas Australis* is not actually random; it is governed by the laws of physics. But the mapping of points from three-dimensional space onto a plane, then points in a plane to musical pitches (different sorts of objects with radically different principles for interaction), all filtered through and altered by the proclivities of human perception and cognition, *is* essentially random.(4) "Random" does not mean "uniform," however. The "tables of random numbers" to which Cage refers approach an even distribution at the scale of infinity. But music perception is local. Psychologists estimate the size of the window of working memory at 2–3 seconds and say that we tend to chunk events into groups of "seven, plus or minus two."(5) Heard through this moving window of the perceptual present, "randomness" in music becomes a font of immense diversity; chance, infinitely, and improbably, creative—especially when we recognize that we tend to hear musical sounds not in isolation but in context, as shaped by one another and by their unique, serendipitous, circumstances.

[2.3] The use of chance also has an important psychological effect. The challenge it poses for the listener, and the music analyst, is not too little information, but too much. As chance tends to minimize repetition, it thwarts our ability to chunk, categorize, predict, and remember; it stymies our use of language, from basic semantics (attaching labels to things) through

to complex description. Instead of focusing on what we *cannot* do in this environment, I'm more interested in what the music, in its superabundant particularity, *does* do, what it makes *us* do. Information overload has a way of forcing us into the present, where with muted memory we remain, taking in each new sound as it touches, then enters, awareness. To hear in this way is to be in a state of music-consciousness; it is to experience listening in its manner of operation.

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[2.4] In "Asking Questions," I developed an ethic for the analysis of Cage's music around three ideas: that analysis be nonreductive; it be based on open (relatively non-intentional) listening; and it emphasize process over product. Music analysis tends toward reduction to the extent that it assumes a prescribed repertoire of sound-objects, conflates repetitions as if they were interchangeable, and surrenders the particularity of individual sounds to their place in a group. In contrast, nonreductive analysis construes musical sounds as fundamentally interactive: "sounds" become inseparable from "relations," shaped by their influence on one another. Open listening indicates a state of aural engagement, of acute and directed attention (approximately "intentionality" in a philosopher's sense), largely without expectation.[(6)] It is a kind of listening that largely escapes the well-worn habits I call "pre-emptive perception" (of things or relations) and "pre-perception" (off-the-shelf interpretations, often shaped by particular music theories). When we listen in this way, we indicate a willingness to re-open fundamental questions about the nature of musical sound. What *is* a musical "sound"? Is it a note? A note soaked in resonance? Two or more notes? Must these be struck at the same time, or just close together? How far can one sound reach into other sounds just heard, heard with, or to come? When is a sound fully formed? And *where* is a sound? Can we point to it in a score? Or are sounds more diffuse sorts of things, dispersed in time and the web of contexts that embed them? Once we stop listening for our own expectations, we become more attuned to the strange richness of musical experience. Listening becomes a state of awareness poised in not knowing. The nature of analysis shifts, from an attempt to describe or define music as something outside of ourselves to a more personal and interactive exploration of one's own hearing.

[2.5] If we shift the focus from analytic product to process, how might we proceed for a piece like *Etudes Australes* VI, composed with chance? What do we *do*? I cannot say what one *should* do; only describe, what I did do, more or less, with multiple changes of course. Recognizing the indeterminacy of the score with respect to dynamics and articulation, I began with an exercise in observation: I created an *annotated score* for Sultan's (and Liebner's) performance, in which I recorded aspects of dynamics, articulation, resonance, and timing, as well as a few gestures. As I worked, I noticed a certain consistency in the way I heard specific notes as colored or refracted by one another, and moments as having certain qualities —qualities that seemed to sit just beyond my horizon of verbalization.

[2.6] To get some of my impressions into a form I could work with, I developed an *aural score* for the first system of Sultan's performance in which I copied some markings from the annotated score, but tried to clarify, through my imperfect attempts at representation, my own evolving sense of what I heard. I noted salient repetitions, transfers, and voice-leading in pitch or pitch-class. I marked gestural or other groupings and tried to put qualities into words. These could be individual words or short phrases, nouns or adjectives, verbs or adverbs. But many turned out to be verbs: "absorb," "accrue," "adjust," "capture," "counter," "extend," "fracture," "grate," "nestle," "project," "revive," "strike." My only concern was that the language be concise and apt to my experience.[(7)] The point was not to assign labels, nor to connect words or sounds into a narrative, but to frame analytical questions: What *is* the impression I have, and what might have given rise to it? What am I hearing subconsciously? What else might I hear, if I transformed subconscious impressions into conscious ones, and then listened again?

[2.7] The aural score was a working document. A memory trace and visual aid, it helped me to stabilize some aspects of my hearing just enough to probe my impressions further. I began to ask different questions, about the constitution and formative context for individual sounds. I examined the score's raw potential with respect to voice leading in pitch and pitch-class, and pitch-class distribution, then brought this information into dialogue with my impressions, using it to "key out" some of the musical contingencies at work, much as one might "key out" an unfamiliar mushroom with a series of questions about its appearance and environment.[(8)] As I did this, the metaphoric language seemed to reposition itself in my thinking, to become a sort of shorthand for an analytical statement about the complex relations between a sound and its musical context. I then took my hearing in the direction of comparative analysis, repeating the process for the first system of Liebner's performance.

[2.8] To summarize, then, analysis proceeded in roughly four stages: listening; limited transcription (in an annotated score, of dynamics, articulation, etc.); interpretation (in an aural score, of pitch connections, groupings, actions, and verbalizations); and comparative analysis, both against the raw potential of the score (pitch-class voice leading and distributions) and across performances. The process involved a constant cycling and exchange among three kinds of activities: (1) an attempt to identify and partially stabilize impressions; (2) a redirection of attention, which prompted new observations; and (3) reinterpretation and continual transformation of my hearing.

[**SLIDE 8**]

[2.9] We begin as a listener does, with some music: in this case, two recordings of the same notated passage from the opening

of Etude VI, in performances first by Grete Sultan, then by Sabine Liebner (**Audio Examples 1a** and **1b**). **Slide 9** provides a score for the first two systems of Etude VI. Cage thought of the *Etudes Australes* as a duet for piano solo, notated on two grand staffs, one for the right hand and one for the left. The score is determinate with respect to pitch (in staff notation) and rhythm (proportional notation), and indeterminate with respect to tempo, dynamics, articulation, and gestural shaping. With the right hand reaching down to A2 (a tenth below middle C) and the left hand up to C6 (two octaves above it), hand crossings are frequent.

[**SLIDE 9**]

[2.10] Before we proceed to analysis, I need to say a few things about Cage's pitch notation and how it relates to the music one hears. Cage uses three types of noteheads. Diamond noteheads (in the low bass at the very start of each etude) indicate keys depressed by rubber wedges throughout (e.g., in Etude VI, D1, F1, and C2); these generate sympathetic resonance as other notes are struck. I call this "permanent sympathetic resonance," not because the resonance is always the same (on the contrary, its composition in frequency and amplitude is in constant flux), but because the *potential* for resonance remains constant. Open noteheads indicate pitches that are to be sustained by finger pedal as long as physically possible, that is, until the hand must move to reach another note; in most cases, Cage uses horizontal "pedal" brackets to show the actual duration. Pitches written in open noteheads also generate sympathetic resonance as black noteheads or other white noteheads are struck; I call this "temporary resonance." Finally, black noteheads are generally played short. They do not, themselves, provide resonance, but excite most of the sympathetic resonance associated with upper partials of diamond or open noteheads. Note that sympathetic resonance can introduce shadow pitches, with no notational correlate. For example, coincidence between the fifth partial of a struck note (black or open notehead) and the sixth partial of a sustained one (open or diamond notehead) can generate a shadow pitch in the third octave above the fundamentals (striking C2, with E♭2 held, produces G5). Thus sympathetic resonance can be activated in seven ways. The fundamental or harmonic of an open notehead can activate permanent sympathetic resonance from partials of a diamond notehead (two ways); so too can the fundamental or harmonic of a black notehead (two more, 1–4). The fundamental or harmonic of a black notehead can activate temporary sympathetic resonance from an open notehead (5–6). And finally, because there are no dampers above E6, the fundamental or a harmonic of an open or black notehead can activate permanent sympathetic resonance from any higher note (7). The result is unpredictable and complex (even chaotic), a wondrous veil of sound that I will refer to collectively as "the sympathetic haze."

[2.11] The sympathetic haze is an integral part of the listener's experience of the *Etudes Australes*, but it eludes standard musical notation. Overtone trails and shadow notes emerge, speak, and retreat below the threshold of audibility; at times there is only a hazy backdrop of inharmonic vibration. Pitches separated by white space in the score sound not only in relation to one another but within a shadow world of resonance where individual partials rise and evolve at different times, at different amplitudes, in response to the performer's tempo, dynamics (strike speed), details of timing, register (string thickness), acoustics of the piano, and microphone placement. Whether or not one focuses on the sympathetic haze, one listens through it, as a spectral environment that envelops and colors the sound of every new note.

[2.12] The care with which Sultan prepared her performance of the *Etudes* is apparent from her marked score (see **Slide 10**).[(9)] Although Cage's proportional notation for rhythm is precise, it is hard to read, requiring very fine judgments in spatial position, often between notes too far apart on the page to grasp in a single visual fixation. To improve visual clarity, Sultan attaches a long stem to each note. The stems settle questions of simultaneity, succession, and precedence; they also better convey a sense of attack rhythm, which in turn inspires interpretive decisions for physical and musical gestures.[(10)] These are represented in Sultan's score as patterns of arsis and thesis, slurs, arrows, and hand choreography (fingerings, and hand crossings with indications of "over" and "under"). Here and there throughout the etudes she adds character descriptions, such as "floating," "clear," and "birds." Slurs suggest groupings of notes into constellations or audible gestures. Lines in red pencil trace a number of "pitch-class channels" as a note is repeated or a pc travels from one octave to another. Interestingly, her representation of these pitch-class channels is selective: accounting for only sixty percent of those available, she omits some of the most audible connections, but shows some of the most obscure.[(11)] Did she think of these pitch-class channels as lines of musical continuity, or were they a mnemonic device? Whatever they meant to her, what might we, as listeners and analysts, make of them?

[**SLIDE 10**]

[2.13] **Slide 11** shows the first two systems of my annotated score for Sultan's performance. Working first from the recording, I later compared my draft with her performance score and added some of her markings. Six colors (red, orange, yellow, green, blue, violet) represent six levels of loudness from *fortissimo* to *pianissimo*. (There is no red, for *ff*, in this excerpt.) Dynamics enclosed in boxes are Sultan's, as are all brown markings: these include some articulations, gestures (arsis and thesis units), words (which here indicate dynamics or aspects of rhythm), and numerals at the end of each system (reflecting Cage's proportional notation, these indicate, in minutes and seconds, Sultan's projected timings for the end of each system). In deep red, I've added some articulations taken from the recording, as well as breaks between "phrases" and the first set of timings, which indicate actual timings in Sultan's 1978 recording. Connecting noteheads, solid magenta lines highlight some pc channels; solid cyan (bright light blue) lines, show strong pitch voice-leading. Brown slurs or lines represent a few gestures

formed by succession or connection.

[SLIDE 11]

[2.14] **Slide 12** is my aural score for the first system of Sultan's performance. I've rearranged Cage's notation in a more traditional layout of four staves distinguished by register: 8va treble, treble, bass, 8vb bass. The rearranged score better represents aural stream segregation by register and so is easier to follow. While I've reproduced a few markings for dynamics and articulations, for the most part the aural score focuses on different kinds of things—not facts about the performance but aspects of interpretation, such as voice-leading, harmonies, musical segments, and local repetitions. Brown text conveys my impressions of certain moments; black text uses standard technical language to make analytic points. Magenta lines connect pitch repetitions within the same register; maroon lines, pitch-class repetitions in different registers.[(12)] Cyan lines highlight pitch voice leading by semitone, within register.

[SLIDE 12]

[2.15] Sultan's performance begins with a cat's leap from a broken chord in the high register down to middle C (C4). Even a soft landing in this spot is enough to excite permanent resonance from C2 (shown by a gray shaded horizontal bar), which is enhanced by Sultan's anapestic gesture to a marked attack. From C4 as a base, the minor tenth C4–E♭5 projects up two octaves: C6 nestles in as overtone of C4 (which is still sounding, as resonance). A quick leap in the right hand down to a marked attack on G4 activates another partial of C2 before the extreme high register returns with an "open" notehead F7 and a flicker of a gesture (<F7, G7, A6>). All three of these notes have the potential to excite permanent resonance, but they are quick, high, and soon overcome. "Against" this opening comes a jab at D♭3, then B♭1, followed by a jump to an "open" G7 in the right hand and "open" trichord {C♯5, D5, A5} in the left, sustained by finger pedal until about three-quarters of the way through the system. After the initial flurry of activity, the sense of a "wait" is palpable. Activity resumes with a high G♯7, followed by A4, which I hear as a point of elision, as it both recalls the A in the previous chord by octave transfer and reactivates the middle register originally occupied by the prominent overtones C4 and G4. Way up, *pianissimo*, a chromatic line slinks into space; in the middle register, A presses down to G♯ in a sort of counterpoint, then slowly falls to C♯. That the line should find its way down to this C♯ is interesting for two reasons. First, pitch-class channels connect A and C♯ in the "open" trichord (still sounding) to their octave transpositions in the slow-moving line. And, in a curious coincidence (remember, this is music composed by chance), the line <A4, G♯4, C♯4> unfolds the exact pitch inversion of the "open" trichord <C♯5, D5, A5> (semitone, perfect fifth).

[2.16] A loud interjection from a whole-tone tetrachord ({FGAB}) opens up the low register; strong contrast between this whole-tone harmony and the prevailing chromatic counterpoint creates a sense of "spread." But activity in the main register quickly resumes: the falling fifth <G♯4, C♯4> finds a partner in the next two notes, the fifth <A4, D4>. The semitone move from G♯4 to A4 makes these paired fifths easy to hear. Three quick descending notes (<A4, D4, A2>) form a segment (for Sultan, a dactyl). All three excite permanent sympathetic resonance; A4 also reaches forward, falling by semitone to an unsettling G♯4. Beneath this G♯, finger pedal joins D3 to F3; heard against the G♯, the D sounds "odd," forming a "crossed fifth" that binds the top pitch-class in one paired fifth with the bottom pitch-class from the other. As I take in this odd thing, a high B enters, followed by a chromatic jolt in the middle register ({D♯, E, F♯}) and a new anchor in the low bass (<E, B♭>) that create a rift in surface coherence. While the ensuing move from A5 to D6 might be heard as a sort of projection from notes in the A–D–A segment, I find it too weak to bridge the gap. More, I hear the A–D motion connect forward, first to a "botched fourth" (<G3, C♯4>), which is then "corrected" and transposed up three octaves to <G♯6, C♯7>, in a sort of inverted recollection of the paired fifths idea, using the same four pitch-classes.

[2.17] Over the course of the first system in Sultan's performance, then, I hear many lines of local continuity, and one strong break just before the chromatic trichord {D♯, E, F♯} about three-fourths of the way through. My impression of a "rift" is supported by a change in dynamics, a sharp attack, entry of the low bass, and the release of the "open" trichord {C♯5, D5, A5} that has been the sonorous backdrop for the "paired fifths" (and enriched three of its four pitch-classes with octave overtones). Still, there seemed to be more to it. These are all features of the sonic surface; a "rift" implies a deeper break in continuity. But what lines of continuity might I have been following?

[2.18] It was then that I started to ask different questions, to look more closely at pitch-class channels, voice leading, distributions, and their lines of potential continuity and disjunction within the first system—at force fields created by repetition and voice leading in pitch and pitch-class, that are implicit with the score but may, or may not, be projected or heard in a given (or any) performance.

[2.19] A comprehensive study of the score's raw potential for pitch and pitch-class voice leading and comparison with my own hearing proved instructive. **Slide 13** uses a combination of color coding and solid versus dashed lines to highlight repetitions and voice leading in pitch and pitch-class. Solid raspberry lines indicate the strongest relation: a pitch repeated, in register. Solid maroon lines connect a pitch class with its repetition in a different octave. Together these constitute the complete network of pc channels described earlier.[(13)] Cyan (bright blue) lines show pitch voice leading by semitone. Solid dark blue lines represent pitch-class voice leading by 9 or 11 semitones (i.e., a semitone displaced by one octave).[(14)] Dashed dark blue lines indicate the weakest type of connection: pc motions by interval class 1 that are displaced by two or more

octaves. The strength of the force field of repetitions and voice leading that a listener *perceives* at any given moment depends on details of performance, as well as each listener's proclivities and focus of attention. Dynamics, timing, and articulation can bring notes into contact with one another or force them apart, perhaps outside the window of working memory. An interesting aspect of this representation is the way notes seem to group into constellations: some parts of the piece look tighter than others. Significantly, the nexus of relatively strong connections in pitch and pitch-class that bind much of the first system into force fields largely dissolves around the rift. From the "open" trichord through the "paired fifths" stretch, pitch repetitions, pc octave transfers, and semitone voice leading create a fairly tight weave. But only a few tenuous threads reach across the rift, three by pitch-class voice leading with octave displacement (D3–D♯4, F3–F♯4, G♯4–A5), and one semitone motion (B♭6–B6), which is very weak due to temporal distance and the extreme high register.

[**SLIDE 13**]

[2.20] Continuing along these lines, I then mapped out the distribution of the twelve pitch-classes throughout Etude VI, assigning each pc a color swatch: beige for C (pc 0), chocolate brown for C♯/D♭ (pc 1), maroon for D, and so on to gray for B♮ (wrapping around to beige for C).[(15)] (See **Slide 14**.) In a sense, this representation complements that for pitch and pc force fields: instead of showing a network of connections, it shows the identity of points—which pcs are present, and the degree of pc turnover at different temporal scales. Color mapping makes it easy to see pockets of repeated pcs; it also suggests something about set-class type, as chromatic pc sets concentrate within a region of the color spectrum (e.g., the reds, yellow-green, blue-violet, or gray-beige-brown). One of the things I find interesting about this image is the way pc distribution (a pretty raw representation of the musical surface and one which, given the compositional process, is random) conveys something of the individuality of each moment: the distribution of the twelve pcs is in constant flux, not only in its particulars (which pcs, and in which proportions) but in the kind of distribution (concentrated or even). Extending from the "open" trichord {C♯, D, A}, plus "open" G-natural, through the "paired fifths" passage (on slide 12) to the point of the rift, there is an emphasis on the five pcs {12789}, a member of SC 5-7[01267]. The harmony is fairly easy to hear, and easier to see on the rearranged aural score that groups notes by register, since the pc repetitions cluster in the two middle registers. The same pc set occurs after the high B, "jolt," and "new anchor" that create the rift. It turns out that these five pcs are relatively common at the level of the system as a whole. In contrast, the three pcs of the chromatic "jolt" (D♯, E, F♯), plus B-natural, hardly occur until then. Seven of the thirty-five notes before the "rift" are A-naturals (pc 9). But only five belong to one of the four pitch-classes 3, 4, 6, or B. Pc 3 is confined to the opening "cat's leap" and the following projection; pc 4 doesn't occur at all.[(16)] So I think that my sense of "rift" derives, in part, from pc turnover and differences in the relative frequency of pcs within the first system. The notes of the "jolt" trichord, high B, and low E are all fresh, and appear in concentrated opposition to what comes before and after.

[**SLIDE 14**]

[2.21] It's interesting to reflect on the fact that so many lovely connections arise by chance in this first system. Or do they? As a performer, Sultan "makes music" from Cage's notation, through a series of choices for dynamics, articulation, and gesture. Her choices in turn shaped my hearing, the way I "made music" of the passage, strengthening some lines of pitch or pitch-class voice leading over others'. I assume that each of us will notice different things and express our impressions in different words. The point is not to assert my hearing over others but to characterize it well enough to be able to share it. I expect that we will find some common ground in basic principles for music perception, including pitch repetition, octave equivalence, pitch proximity, pitch-class voice leading, grouping based on temporal proximity, and chunking supported by repetition. Each performer also makes his or her own choices: these can encourage us to hear the "same" passage differently—to make different music from the same notes.

[2.22] To date, there are four commercial recordings of Book I of the *Etudes*, by Grete Sultan, Stephen Drury, Steffen Schleiermacher, and Sabine Liebner. While all eight etudes in Book I (and 32 etudes in Books I–IV) have the same notated length (eight systems on a two-page spread, four systems per page), in accordance with the degree of freedom Cage's indeterminate notation affords, the four performances differ in tempo and overall character, as well as in numerous details of dynamics, articulations, timing, and gesture. **Slide 15** graphs the length of each of the eight etudes in Book I across these four recordings. Length is in seconds; the slower the tempo, the higher the point on the graph. Sultan, Drury, and Liebner choose tempi that are fairly consistent from one etude to another. Schleiermacher's tempi vary the most; Liebner's performance is consistently the slowest, roughly half the speed of Sultan's and Drury's. Each performance is a unique encounter among the score, a pianist, a specific piano, and a recording engineer. Liebner balances a much slower tempo with a tendency toward louder dynamics and sharper attacks. Her slow tempo tends to weaken voice leading, as notes move beyond one another's reach. But it also gives the piano's sympathetic resonance time to speak and decay, and the listener time to hear it. Whereas in Sultan's performance most audible interactions are between two notated pitches, in Liebner's performance notated pitches often interact with sound shadows—overtone trails, shadow pitches, and the sympathetic haze. While Sultan also makes good use of resonance and Liebner of voice leading within and across registers, the two performances create different sound worlds, with implications for the listener and analyst.

[**SLIDE 15**]

[2.23] **Slide 16** provides an annotated score for Liebner's performance of the first two systems. Five colors again represent the spectrum of dynamics from red (*ff*) to light blue (*p*). (No violet, for *pp*, appears in this excerpt.) All articulations (maroon) are based on the recording. With sympathetic resonance so prominent throughout Liebner's recording, I've added a number of brown bars to represent strong overtones; these "overtone trails" are only approximate in length and do not represent decay (nor are they comprehensive). **Slide 17** provides an aural score for the first system. Now using black for sympathetic resonance, shading suggests the gradual decay in amplitude. The piece begins with a *fortissimo* "strike!" followed by a five-second fade. A strong overtone trail from C4 reaches past and absorbs the C6 that begins a "continuation" gesture. The right hand dives to G4, which also leaves a strong trail; at this slow tempo, the last note of the "continuation" figure, A6, does as well. Five seconds pass before a deliberate stomp in the bass from D♭3 down to B♭1, both *forte*. (The angled double-headed arrow indicates temporal expansion relative to Cage's notation.) Emerging in the space that follows (indicated by a second double-headed arrow) is F3, a strong shadow pitch that joins B♭ and D♭ to form a diatonic trichord (an [037]). Notes emphasized by resonance (C, G, A, F) or attack (B♭, D♭) give the music thus far mostly a diatonic cast. Before F3 dies out, it is overtaken by a broken tetrachord, *forte*, in the high register (G, plus the "open" trichord {C♯, D, A}). The chord hovers for about five seconds, sustained by finger pedal through and past the next note, a *forte* G♯7.

[**SLIDE 16**]
[**SLIDE 17**]

[2.24] I hear this high G♯ as a point of elision, a late addition to the tetrachord (that completes a member of SC 5–7[01267]) and the start of a new passage in which high and middle registers alternate in chromatic imitative counterpoint. The sense of elision depends on a nuance of timing: Liebner places the "open" trichord just about equidistant between the "deliberate" <D♭3, B♭2> (4.2 seconds) and high G♯ (4.6 seconds). Instead of the long "wait" in Sultan's performance, there is slow and steady progress.[(17)] G♯7 eventually falls to A4, three octaves lower and more than two seconds later, in a reluctant pitch-class voice leading that strains against the note's decay. Five semitone dyads then unfold, interleaving motions down and up across multiple registers (in cyan, <A4, G♯4>, <G6, F♯6> and <A6, B♭6>, then later <C♯4, D4> and <G♯4, A4>). In all but the last of these, finger pedal or a prominent overtone trail from the first note supports segment formation despite the slow tempo. At first the harmonic accretion is chromatic (SC 5-1[01234]), but the fall to C♯ changes things. The overtone trail from C♯ is interrupted by a whole-tone tetrachord in the bass, which it then joins to form a member of the whole-tone pentachord SC 5-33[02468], without surrendering the link to its semitone partner, D4. Dotted black lines indicate these overlapping segments in the middle and low register.[(18)]

[2.25] Coming in quick succession, the three *forte* notes <A4, D4, A2> sound like a confirmation, an exclamation point. But the punctuation seems unwarranted: drawn in by the overtone trails on A4, C♯4, D4, and G♯4, I've been following the semitone voice leading replicated across registers and have not quite registered the precursor fifth <G♯, C♯>, now supposedly, and weirdly emphatically, "confirmed" by <A, D>.[(19)] But no matter: the next *forte* G♯ calls the A into question. While it completes the fifth dyad of semitone voice leading, its strong overtone trail suggests another elision: it gives the slurred *piano* third <D3, F3> a place to nestle, dying out with the reach up to B6 and return to the middle register for the chromatic trichord {D♯, E, F♯}. Starting with the G♯, Liebner places these four events roughly equidistant in the time field, creating a sense of measured continuity (shown by the dotted lines across registers) that is reinforced by the "open" resonance of D3 and B6.

[2.26] Reintroducing a register long dormant, the next note, A5, easily reaches up to D6, a perfect fourth away. The low "open" E that comes in between may be from a different world, but it also contributes to the predominantly diatonic backdrop that accommodates and absorbs the entrance of G3 as a sort of lower fifth to D6. The move from D to G is slow, taking more than five seconds. Its compressed tritone transpose, <G♯5, C♯4>, sounds fast in comparison. Both of these notes leave strong overtone trails, which envelop an inverted, condensed projection of <G♯, C♯> in the highest register. In Liebner's slow tempo, toward the end of the system I hear a gradual unfolding of one diatonic trichord ({GAD}, an [027]), followed by a fifth (C♯–G♯) from its tritone transposition. Small groupings—dyads and trichords—dominate the surface, with larger sets formed only by implication, as extensions of, or contrasts between these.

[**SLIDE 18**]
[**SLIDE 19**]

[2.27] Liebner's choice of a slower tempo, often coordinated with choices for dynamics, attack, and details of timing, lead me to hear this passage differently than in Sultan's recording. There are three main differences. First, I hear Sultan's performance as dividing into three parts, demarcated first by the high G♯ that follows the "open" tetrachord, and then the "rift." At the scale of the system as a whole, Liebner's performance is more continuous, largely due to her handling of temporal proportions around the high G♯ (compared to Sultan, proportionally much earlier), and around the high B-natural (also early) and chromatic trichord. Her louder attack on the G♯4 also contributes; the overtone trail it excites forms a bridge between the chromatic counterpoint and subsequent material. The second main difference is that, whereas in Sultan's performance I tend to focus on the paired fifths in the middle register, in Liebner's performance, stronger overtone trails in the mid register draw me to the semitone voice leading. My focus on the paired fifths in Sultan's performance provides the

context in which I hear the move from G♯ to D as "odd" or "crossed." Following the semitones in Liebner's performance, however, transforms my impression of these notes. Third, in Sultan's performance, the concentration of pcs {12789} in time has a synergistic effect, such that I tend to focus on the formation, dissolution, and re-formation of a single member of SC 5-7[01267] at the level of the system, and relate other notes and harmonies to it as "within" or "outside." In Liebner's performance, although the absolute distribution of the twelve pcs has not changed, their distribution in and over time *has*, especially when measured by the moving window of the perceptual present. There I hear more of a balance among the twelve pcs and motion among different types of harmonies, first diatonic, then chromatic and whole-tone, and finally contrasting diatonic sets that, by implication rather than assertion, reconstitute the pcset that provided the harmonic environment for the chromatic voice leading mid-system.

[2.28] At this point, one might wish to revisit the two performances of the opening passage one more time, in sequence, first by Sultan (**Sound Example 2a**), then by Liebner (**Sound Example 2b**).

[**SLIDE 20**]

[2.29] It is well known that Cage didn't like recordings; he found them too much the same, a flattening of musical experience. While I understand this point of view, and agree that there is an important difference between the fixity of text in a recording and the variability and unpredictability of live performance, I don't think that listening to a recording necessarily reduces our multiple encounters with a piece to a single experience, repeatable in all its detail. Instead of finding each hearing of Sultan's, or Liebner's, recording to be the same, I continually noticed new things and heard other things differently.[(20)] My hearing of these passages was, and remains, in process. The attempt to fix some aspects of my hearing transforms others. Listening, and analysis, move in a dance of attending and being led "astray," of fixing and pointing, of setting out to answer, but ending up asking, questions. In the *Etudes Australes* Cage's use of chance creates a surface of crystalline particularity. There is always something to hear. With no path laid out by the composer, the listener cannot become complacent. We must remain engaged; we are each responsible for, to an extent make, the music in our own ears. If Cage's intention in using chance was to explore unthought-of possibilities, to create unique musical situations, I found that concerted hearing helped me to explore and enter into these more deeply. Must the input to consciousness be "new," must it be unprecedented, to have a new experience? Or is our experience inevitably new ("no such thing as repetition") if we enter into it, if we open our eyes, our ears, our minds, enough?

[**SLIDE 21**]
[**SLIDE 22**]
[**SLIDE 23**]
[**SLIDE 24**]

Dora A. Hanninen
2110 Clarice Smith Performing Arts Center
School of Music
University of Maryland
College Park, MD 20742
301-405-5467
dhann@umd.edu

Appendix: Image Sources

- Slide 5. John Cage, "River Rocks and Smoke, 4/11/90."
- Slide 6. Image of NGC 6397. NASA and the Hubble Heritage Team.
- All other photographs are by the author.

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Footnotes

1. Detaching ego from the finished product, they also often remain anonymous.
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2. On the visual art of John Cage, see Brown 2001 and 2002, Cage 2010, and Kass 2011.
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3. Cage describes the compositional process of the *Etudes Australes* in Cage 2000, 99–100 (reproduced in the liner notes to the premiere recording by Grete Sultan, John Cage Edition, Wergo 6152-2, 1992).
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4. Speaking about European serialism, Babbitt has said: "The methods of 'total organization' that must be assumed to be under discussion in this context are usually based on a numerical sequence associated with rules of correlation which are independent of the scales of measurement appropriate to the individual musical dimensions, and are thus as likely to produce musical 'randomness,' under the same criteria of randomness, as those procedures which are presumed to insure randomness by initially employing a randomizer" (Babbitt [1972] 2003, 290).
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5. See Snyder 2000 and Miller 1956.
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6. "In its philosophical usage, the meaning of the word 'intentionality' should not be confused with the ordinary meaning of the word 'intention.' As the Latin etymology of 'intentionality' indicates, the relevant idea of directedness or tension . . . arises from pointing towards or attending to some target" (Jacob 2010, accessed 1/9/13). Contrast this usage with meanings 1 and 3a from *Webster's Third Dictionary*: "1. A determination to act in a certain way. . . . 3a. What one intends to do or bring about." See also Siewert 2006.
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7. I offer these "interpretive" terms along the lines charted by Guck 1996 and 1997. While metaphorical, these words are not merely figures of speech: they do, and can help one do, conceptual work.
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8. "Key out" refers to the process by which one identifies a specimen in the field using a prescribed series of questions about observed features. Cage was an expert mycologist and one of the founders of the New York Mycological Society.
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9. Sultan's original marked score for all four books of the *Etudes Australes*, along with a facsimile, are part of the Grete Sultan collection held by the International Piano Archives at Maryland (IPAM), at the University of Maryland.
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10. In a few places in Etude VI, and in others of the *Etudes Australes*, Sultan also adds a series of tick-marks that measure off lengths of one centimeter (= MM 60) or half a centimeter (= MM 120); these help her judge relatively long distances between attack points for accurate placement of rhythmic figures.
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11. For example, Sultan's omission of four pc connections between two consecutive clusters of notes in system 4 is puzzling, especially when she does show some channels that may be impossible to hear, as they connect notes buried in chords, separated by a wide distance, or masked by other events.
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12. Note that these are repetitions in pitch and pitch-class as *aspects* of a sound, not repetitions of the sound itself as a holistic phenomenon, which remains unique.

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13. While octave-related pitches mark off equal distances on the basilar membrane, psychologists have yet to determine whether or not the psychophysical evidence supports the view that octave equivalence is fundamental to music perception (Burns 1999, 253–255). In the *Etudes Australes*, however, it seems a reasonable part of a listening strategy, given most listeners' familiarity with the role of octave equivalence in much Western music.
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14. On the issue of balancing octave displacements with pitch-class proximity see Morris 1995 (reprinted in Morris 2010).
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15. I emphasize that here and throughout this essay my point is not to reduce complex sounding events to pc chroma (or any other aspect), but to recognize pc chroma as a facet of the music so that we can analyze how it may contribute to sound formation. As Jones has pointed out, analysis is different from, and does not necessarily imply, reduction: "All analysis involves abstracting 'parts' out of their total, complex situation in reality. . . . [N]ot every attempt to bring order or simplicity to a situation is a reduction: reduction involves a relation between levels. In a reduction, phenomena on one level or sublevel are explained in terms of realities on what is deemed a more basic level or sublevel. . . . Without this interlevel and explanatory relationship, there is no *reduction*" (Jones 2000, 21, emphasis in original).
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16. The distribution of pcs multiplicities in system 1 is:

pcs:	0	1	2	3	4	5	6	7	8	9	A	B
# of occurrences:	2	3	4	2	0	3	2	5	3	7	3	1

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17. Note that this interpretation contradicts Cage's proportional notation. Sultan, following the notated rhythm more closely, plays the "open" trichord much closer to <B♭, D♭> (1.06 seconds) and further from the high G♯ (3.58 seconds). (The free software "Audacity" enabled precision to within a few hundredths of a second.)
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18. As with the high G♯, the "whole-tone jolt" is relatively "early," much closer to the C♯ proportionally speaking than in Sultan's performance.
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19. Dotted lines also show a weak segment <C♯4, A4, D4>, which is an unordered pitch inversion of the preceding <A4, G♯4, C♯4>.
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20. The transformational experience Cage had upon listening to all 840 repetitions of Satie's *Vexations*, albeit in a live performance, is relevant here.
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Prepared by Michael McClimon, Editorial assistant