American Music Research Center Journal

Volume 21 • 2012

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Serial Minimalist or Minimal Serialist? The Music of John McGuire

Of all the musical innovations by American composers, few have enjoyed a success comparable to minimalism, which began to make a recognizable appearance on the landscape in the 1960s. Minimalist works have resonated for decades in the American musical landscape, spawned an offshoot that has become known as "postminimalism," and influenced composers of art and popular music around the globe. Often portrayed as a reaction against the perceived hegemony of American academic serialism (which was itself—as the story goes—rooted in a peculiar mélange of European serialism and early twentieth-century American experimentalism), minimalism has left an indelible mark on world musical culture of the last fifty years.

In contrast to the often straightforwardly plain-worded creeds of early minimalist composers, critical reaction to their music is anything but simple. Initially encountering stiff resistance from established academic authorities but simultaneously enjoying surprising success among audiences, minimal music first aligned itself to anti-establishment forces. Over time, the landscape has changed and minimalism has more recently generated belated but genuine interest among several serious scholars and critics. If reactions to this music sometimes seem scattered, disorganized or confused, it is perhaps an accurate reflection of the complex relationship it has had with the public, the media, and the academy.

One area in particular that has proven problematic for critics and musicians has been negotiating the boundary between minimalist and serial music. This complicated relationship has generated starkly different views. While some have characterized serialism and minimalism as antitheses, others have noted parallels—if not in aesthetics, then at least in certain methods and

techniques. In general, the fault lines occur mostly between American and European critics, which is not surprising since European serial and minimal composers often took a different approach than their American counterparts. Correspondingly, American writers tend to emphasize the differences between minimal and serial music, while European writers often see similarities.

My goal in this essay is not to judge the validity of one musical aesthetic over another, nor to take anything away from the notably successful artistic projects of minimalist, postminimalist or any other "newly accessible" composers. Rather, I hope to draw attention to the permeability of the categories "minimal" and "serial" by exploring the work of a New York-based American composer, John McGuire (b. 1942). McGuire's music, unequivocally branded "postminimal" by one of the most ardent critics in the literature,[1] is little known outside a small circle of enthusiasts, a condition not so unusual for a serious composer today. Yet his international career is emblematic of the opportunities musicians have to absorb ideas from different cultures and therefore relevant to the experiences many American composers negotiate today. McGuire's approach crosses between the minimalist and serial worlds in many unusual and unexpected ways, as we shall see. By analyzing two of his works in some depth, I will locate more concretely some areas where "minimal" and "serial" music(s) might intersect, and suggest that there is perhaps a more porous boundary between American and European art music than is generally portrayed.

1.

Most scholars agree that La Monte Young played a pivotal role in the formation of the American minimalist style.[2] While Michael Nyman first aligned the composer's interest in music as performance art with the Fluxus movement,[3] Young's radical handling of temporality—as amply demonstrated in his much-cited *Trio* (1958)—initially placed him in a category all by himself. While Riley's *In C* (1964) served as another exemplary minimalist work, Young was the movement's "father figure" to a certain extent.[4] The term "minimalism," of course, derives from an earlier trend in the visual arts that was appropriated by writers on music, often to the dismay of the composers themselves.[5] Often Nyman is credited again as one of the first to connect the word "minimal" with music.[6] Most scholars group the music of Steve Reich and Philip Glass with Young and Riley, and their oeuvres have become the core repertoire in the early minimalist movement of the 1960s and '70s.

When exploring the literature documenting minimalist history, one inevitably encounters a thread that contrasts its musical aesthetics against a particular perception of 1950s and '60s academic serial music.

> Like Cageian indeterminacy, [the early phases of American musical minimalism] represent an American reaction to the serial models of modernism offered by European composers such as Pierre Boulez and Karlheinz Stockhausen, and by American serialists such as Milton Babbitt. [Young, Reilly, Reich and Glass] have criticized serialism, in particular, as irrelevant not only to their own concerns but also as a musical, and cultural, mistake.[7]

> The Minimalist painting of Newman, Reinhardt and others arose amid the proliferating and fetishized complexity of Abstract Expressionist gesturalism. The Minimalist music of Young and others arose during the hegemony of serialism, in which they had been trained and were assumed, as "serious" rather than "popular" composers, to continue.[8]

> For years, devotees of contemporary music had been forced to accept the "uptown sound" as the only legitimate path for progressive music in the classical tradition . . . But with minimalism, the tables turned.[9]

> No longer can [minimalism] simply be considered a musical knickknack created to counter complex abstract music.[10]

> Serialism and Cage gave me something to push *against*.[11]

What was it that set minimal music apart from American serial music? According to Johnson, the minimalist *style* can be described as formally continuous, bright in timbre, harmonically simple, slow in harmonic rhythm, and favoring brief melodic passages. However, Johnson preferred to describe minimalism as a *technique* or *methodology*.[12] Along these same lines, Warburton proposed a toolbox of techniques that he contends can be used to describe minimalist music.[13] In addition to these writers' observations, one of the central tenets of early minimalist composers is the idea that musical processes should be easily understandable by listeners.[14] This stands in contrast to the perception that serial composers were not as willing to allow the listener to discover aurally the engine driving the musical structure.[15] But at least one commentator seems skeptical that merely listing a series of traits or techniques can adequately define minimalism at all: "No list of 'typical characteristics' can serve as a foolproof test of what is minimal and what is not."[16]

Like minimalism, scholars differ in their views of serialism. Marcus Bandur poetically stated that it is simply "a philosophy of life."[17] Another has written that serialism is "a method of composition in which a fixed permutation, or series, of elements is referential (i.e., the handling of those elements in the composition is governed, to some extent and in some manner, by the series)."[18] The general understanding in America is that the serial umbrella

embraces twelve-tone works of the second Viennese school as well as post-war works that were influenced by that repertoire. But in Europe, the term usually refers only to music composed after World War II. Delaere is representative of the most common European train of thought when he writes that serialism is a synthesis of Webern's row technique and Messiaen's parametric thinking.[19] According to Straus, few American composers serialized musical domains other than pitch, and therefore serialism in the United States was much more focused on ordering pitch structures than it was in Europe.[20]

The ideas associated with the first wave of minimalism were enough to sustain considerable interest for some time. But the sound of simple melodic patterns repeated over and over again may have engendered some sense that there was nowhere left to go.[21] At least for one writer, Glass's aggressive arpeggiations appeared as "grandiose pretentions propped up by materials too weak to support the ambition".[22] Several critics noticed a second stylistic shift occurring around 1980: ". . . *something* has happened to the movement originally known as minimalism."[23] The new sound was soon dubbed "postminimalism."[24] The loose-knit group of composers associated with this style—chief among them John Adams—did not achieve as high a degree of stylistic homogeneity as the original quartet of minimalists, but the roots of their aesthetics undoubtedly lie with their predecessors. Again, the term "postminimalism" originated in the art world long before it was applied to music.[25] According to Gann, postminimalist music relies "on minimalism's steady beat, diatonic tonality, and even formal archetypes," but also invites an "inclusiveness bringing together ideas from a daunting array of musical sources."[26] This "big-tent" definition leaves the possibility open for many composers' music to fall into the postminimalist camp.

Curiously, Gann also defined postminimalist aesthetics as yet another response to the serialist sound: ". . . postminimalism is also...a continuing reaction against the ugly discontinuity and fragmentation of academic music of the twelve-tone school."[27] Was the first wave of minimalism not powerful enough to efface the supposed serial "cancer"? The politics of categorization have led to the use of even stronger terms to assess the situation.[28] Postminimalism and minimalism have been linked to a discernable trend toward "accessibility"[29]—and, at one extreme, writers have even gone so far as to read the alleged historical discontinuity that gave rise to minimalism in evangelical or scatological terms. According to one critic, the great majority of serious composers have "defected from their Modernist training," thereby being "converted in reverse";[30] another states that the deliberate "lack of meaning" in minimalism is a "much needed detergent for new music's soiled linen."[31]

To what degree, then, were the minimalists really initiating a musical "reboot"? While it is clear that some practioners—especially Glass—expressed a vivid revulsion to the widely held perception of serialism that was common at the time,[32] a number of writers have viewed the first spectacular flowering of minimalism not so much as a Kuhnian paradigm shift, but more as a reorientation of musical style.

Joseph Straus's historical narrative calls into question the reading of minimalism as entirely discontinuous from the music of the past. In his recent study of American serial music, Straus writes, ". . . our standard accounts of American music since World War II have favored a linear narrative within which each new approach effectively effaces whatever came before. The reality is messier."[33] He argues that even if one returns to consonance, linearity, regular rhythmic pulse, and other musical elements thought of as traditional, ". . . it is hard to imagine the recent work of, for example, John Corigliano, Christopher Rouse, Joan Tower, or John Harbison, without sensing the impact of generations of atonal and twelve-tone composition."[34]

While acknowledging their aesthetic differences, Straus identifies three aspects in which minimal and serial music often share methodology: the "use of precompositional plans, the propensity towards systematic exploration of a musical domain, and the maintenance of serial ordering."[35] Other critics have arrived at similar conclusions. Potter writes that

> Just as Boulez and Cage found common ground in the late 1940s and early 1950s with their use of procedures the details of which were generated by forces outside their conscious control, so it is possible to make connections between integral serialism and minimalism: a commitment to the consequences of rigorous application of processes independent, to a significant degree, of the composer's note-to-note control is evidently the key here.[36]

Even Gann, whose enthusiasm for postminimalist and "totalist" music is never in any doubt, surprisingly asserted that

> . . . minimalism and serialism are but opposite sides of the same coin, as notable for their similarities as for their differences. One can imagine some 22nd century musicologist lumping them together as part of the same phenomenon . . .[37]

Along the same lines, Reich wrote that "the distinctive thing about musical processes is that they determine all the note-to-note details and the over all form simultaneously."[38] Substitute the words "a series" for "musical processes," and one can transform Reich's statement into something sounding like an orthodox serialist manifesto. Whittall suggested that Reich's attempts to

"simplify—or subvert" serialism could be understood within the orbit of serialism itself, and simply include techniques such as the avoidance of traditional twelve-tone operations and the repetition of a row over and over again.[39] In Grimshaw's provocative account of Young's early work, the author suggests that invariant pitch relationships created by serial operations might be a point of contact between serial music and the development of the minimalist aesthetic.[40] These citations lend credence to the notion that at least to a certain extent, conscious or not, minimalist composers were perhaps "enrich[ing] or inflect[ing] an already existent language,"[41] but doing so in a way that countered the style or "sound" that had become associated with it in a musical culture.

If several writers in the Anglo-American tradition express the idea that history may be more continuous than it appears at first glance, those from the European continent have argued an even closer connection. The view of the situation from Europe is relevant to minimalist aesthetics for at least two reasons. First, some scholars boldly claim that European approaches to composition around 1951 actually contained the seeds of minimalism. Second, there has been significant cross-fertilization across the ocean: American minimalist works spread to Europe almost as quickly as European serialist music appeared in the United States a decade earlier.

Perhaps the strongest European arguments for a serial/minimal "goûts-réunis" can be found in studies of Karel Goeyvaerts's music. Goeyvaerts was one of the prime innovators of "total serialism," or "integral serialism" as it is sometimes known in America (and simply "serialism" as is generally referred to in Europe). The connection between the European version of serialism and American minimalism centers around Goeyvaerts's concept of "static music," revealed in his extensive correspondence with Stockhausen.[42] The following excerpt, taken from a letter to Stockhausen dated 9 September 1953, clarifies Goeyvaerts's view.

> My principle imagines a series of identical sounds, only proportionally enlarged and contracted in time and space . . . These expansions and contractions are merely a result of 'optical fields' of time and space. They have no independent existence. The full significance of this principle is that, without building a particular form, it is possible to propose an interpretation of space and time that is absolutely static.[43]

As Delaere, Beirens, and Staples argue, for Goeyvaerts "both techniques (i.e., serialism and minimalism) were merely subcategories of a 'static music.'"[44] The authors characterize Goeyvaerts as a composer who began as a "serialist" and then moved toward writing music that developed into a "personal, 'post-minimalist' variant."[45] Indeed, Goeyvaerts can come across as an innovator in both styles: his *Composition No. 2 for 13 Instruments* (1951) is often thought of as the first European serial work,[46] whereas his *Composition No. 4 for Dead Tones* (1952)—a piece which only uses four different tones—already inhabits a gray area between a kind of proto-minimalist aesthetic and recently established serial procedures.[47]

Nyman characterizes another European viewpoint when he summarizes Merten's interpretation of minimalism's history.

> . . . the conceptual, procedural, structural and temporal preoccupations of [minimalist] composers is [sic] not viewed as arising from a radical break with, and separation from recent European musical tradition, but simply as a logical continuation of that tradition.[48]

Mertens, along with other writers on the continent, has noted how the continuous, slowly changing nature of the structures in much minimalist music invite comparison with the sensation many feel of "frozen time" in some pre-war twelve-tone music, especially that of Webern. If one steps back from the glassy surface of works such as Webern's *Variations op. 27*, it is perhaps possible to hear that "the continuous discontinuity of the individual elements guarantees the indivisible continuity of the whole."[49] From this unusual perspective, some serial music seems aesthetically less distant from minimalist music than one might suppose.[50]

Did serialism, by containing the roots of its own demise,[51] abruptly give way to minimalism in the 1960s? Or is the serial method so open-ended—so general in its application—that some minimalist works can be said to be "special cases" of serialism, or even be heard as outgrowths of certain twelve-tone methods? Whatever the case, it should be clear from the analysis above that history is more complex than many have imagined, and that for many writers, serialism and minimalism are intertwined in subtle ways. The analyses offered below in sections 3 and 4 will examine two works of a composer who seems to have his feet firmly planted in *both* serial and minimal worlds—whose style and methods cross over the divide that some have erected. First, we shall examine McGuire's unique career, in order better to understand how his experiences may have shaped his approach.

2.

John McGuire was born in 1942 in California.[52] At an early age, McGuire saw the 1950 film *Young Man with a Horn* starring Kirk Douglas, Lauren Bacall, and Doris Day. The movie so inspired him that he, like the film's protagonist, desired to take up the trumpet. Soon he began studying the piano. His train-

ing was in the classical tradition, and in short order he was playing works by classical and early Romantic composers. At age twelve, McGuire picked up the French horn, a connection he maintained for many years. Later he featured the instrument in several mature compositions. Among the many works that made an impression on him in his youth, McGuire recalls Stravinsky's *Rite of Spring* as one of the most important.

After high school, McGuire enrolled at Occidental College in Los Angeles. Encouraged by one of his professors, Cora Burt Lauridsen (b. 1912), he soon gravitated toward a composition major. McGuire's principal composition teacher at this time was Robert Gross (1914–1983), a virtuoso violinist who, among other things, gave the first performance of Roger Sessions's violin concerto in 1940. At Occidental, McGuire proved himself to be unusually self-motivated, and steeped himself in as much music and literature as he could find in the library. Particularly influential were Hindemith's exercises in two-part writing from *The Craft of Musical Composition* and Saltzer's *Structural Hearing*. During the summers, McGuire studied at USC with Halsey Stephens (1908–1989) and Ingolf Dahl (1912–1970).

While at Occidental, McGuire happened one day to hear a piece that startled him. Lauridsen played Robert Craft's recording of Stockhausen's wind quintet *Zeitmasse* (1955–56) in class. At the time, he had never quite heard anything like it. Soon he started listening to other works by Stockhausen, including *Gesang der Jünglinge* (1955–56) and *Kontakte* (1958–60). McGuire's friends at nearby Pomona College were also listening to the European avant-garde, and they shared their discoveries with each other outside of class.

Most of McGuire's compositions as an undergraduate took the form of exercises derived from the techniques and styles of Bartok, Stravinsky, and Webern. He also read Henry Cowell's theories of composition, but his teachers often discouraged him from pursuing their implications much further. McGuire cites Dahl as particularly helpful in developing a facility with the 12-tone technique. On the other hand, Dahl persuaded McGuire to compose his only sonata form piece. Along with these lessons, McGuire studied Leopold Spinner's (1906–1980) short book on twelve-tone composition. As a senior, McGuire wrote a paper on Webern's *String Quartet op. 28*—a work analyzed by Spinner, but also by Stockhausen in his essay "Structure and Experiential Time."[53] By the time McGuire completed college in 1964, he was well acquainted with the music of Stockhausen and Boulez, but didn't quite know what to make of it all.

In fall 1964, McGuire continued his studies as a graduate student at the University of California, Berkeley with Seymour Shifrin. Shifrin himself was a

student of William Schuman. During his first year at Berkeley, McGuire composed a large orchestral piece which owed much of its language to Stravinsky, Webern, and Boulez. Wishing to augment the experience he was having at Berkeley, McGuire asked the charismatic Karl Kohn (b. 1926), a Viennese émigré who taught at Pomona College, for composition lessons. In summer 1965, McGuire drove to Claremont every week to meet with Kohn. The following year, McGuire wrote a piece called *Divergences* for two string trios and piano, which was composed under the influence of Kohn and Henryk Górecki (1933–2010).

The most valuable aspect of McGuire's education at Berkeley was his contact with other composers of similar interests. One friend in particular, Charles Boone, organized listening sessions in San Francisco where one person presented music he or she had discovered, and everyone would listen and comment. It was at one of these gatherings that McGuire heard the music of Krzysztof Penderecki (b. 1933), a discovery that would soon have great significance for the direction of his education.

Having been steeped in the sounds and theories of European avant-garde music that were available in the United States at the time, it was almost inevitable that McGuire became interested in the Darmstadt Vacation Courses for New Music in Germany. In order to study in Germany, he successfully applied for a Hertz scholarship. This allowed McGuire not only to participate in the 1966 Darmstadt courses but also to stay in Europe for a year to study composition.[54] He arrived two weeks early to study at the library in Darmstadt. Having been given a friendly reception by the administration, McGuire learned that Penderecki would be teaching at the Folkwang Hochschule in Essen. After the 1966 Darmstadt courses, which went by as something of a whirlwind for him (though he did attend lectures by Ligeti, Kagel, and Stockhausen), McGuire traveled briefly to Munich and Warsaw, returning to Essen to begin work with Penderecki.

In Essen, McGuire took two weekly one-hour composition lessons with Penderecki. Occasionally this time was extended for informal chats about new music over coffee. Work consisted of detailed practice of counterpoint and orchestration. In particular, McGuire became an expert in writing Bach style fugues, an idiom in which Penderecki was fluent. During these studies, McGuire composed a string quartet called *Cadenza* (1966), which came about owing to a suggestion by Penderecki. The concept was to write fifty short "musical sketches," spread them out on the floor, and "see how they would fit together." The motivation behind this exercise owes something to Stockhausen's "variable form" and ideas from tape composition. During this

time, McGuire had constructed a written study score of Stockhausen's *Gesang der Jünglinge* using his own graphic notation. The notation he used, along with his teacher's suggestions, appear in *Cadenza*.

McGuire returned to Darmstadt the following summer in 1967. Earlier that year, Stockhausen held a noteworthy seminar at the University of California, Davis,[55] but returned to Germany after the semester was over so he could teach at Darmstadt. That summer saw the creation of the work *Ensemble*, a piece collectively composed by the composition students of Stockhausen's studio under the master's guidance.[56] For three hours each day, the twelve composers in Stockhausen's seminar worked on an installation piece which included twelve tape samples and twelve live musicians. In a letter they received before the courses, students were encouraged to put anything they wanted to on their pre-recorded tape. The idea was somehow to integrate one's tape sounds with music from a live musician.[57] Then, the participants—with Stockhausen's guidance—took the project a step further, and integrated each duo with the other eleven, creating a "composition of compositions." During the four-hour performance, the audience came and went as they pleased. Unfortunately, McGuire became ill and couldn't participate in many of the seminars, but he did manage at the last minute to put together a contribution to the project.[58]

In graduate school, McGuire received three scholarships from Berkeley and a Fulbright (which he was unable to make use of since he was not allowed to receive funds from two sources simultaneously.) This generous income stream allowed him to study with Penderecki until 1968, and to participate a third time at Darmstadt. This time he was able to take part fully in Stockhausen's project, *Musik für ein Haus* ("Music for a House"). By this time, Stockhausen had moved on to creating "Intuitive Music"—that is, music without a score or even specific performing directions.[59] At least on the surface, the goal in 1968 was much the same as in 1967: to create a collaborative four-hour installation piece. The young composers in Stockhausen's seminar wrote their own "text pieces" based on the style of Stockhausen's *Aus den sieben Tagen* ("From the Seven Days," 1968). Small ensembles were arranged in the rooms of a house in Darmstadt. Each room had a kind of "musical window" into the others, since sounds from any space could be piped in or sent off to any other room. McGuire's short essay about the project and his role in it shows his evident enthusiasm.[60]

Upon completing his studies with Penderecki and at Darmstadt, McGuire returned to Berkeley in 1969. He had been working since 1966 on a piece called *Decay* for eight French horns. The piece—which features an impressive array of extended techniques unique to the horn—consists of a process which plays out in sixteen "frames." Periodic, synchronous, pitched events gradually decay into aperiodic, asynchronous noises. *Decay* was his final piece as a graduate student. After obtaining his master's degree from Berkeley in 1970, McGuire returned to Europe, this time for a much more extended stay.

Example 1. John McGuire at the 1968 Darmstadt Courses. McGuire is pictured on the far right (alone) while Stockhausen is in the white shirt at the lower left. Copyright ©Archive of the Stockhausen Foundation for Music, Kürten, Germany (www.stockhausen.org).

McGuire found his way back to Essen, but soon he was visiting Utrecht twice weekly. In the Netherlands he attended a course at the Institute of Sonology, where he studied Gottfried Michael Koenig's approach to composition. Most of Koenig's lectures centered around two subjects: voltage control electronics and algorithmic composition. Koenig's thinking reinforced the change that overtook McGuire's composition around 1970. When he was still living in Berkeley, McGuire worked with a friend, Alden Jenks, who built "electronic gadgets."[61] After these experiments with electronics, McGuire conceived of a piece dominated by repeating patterns. Thus, McGuire's composition *Frieze* for four pianos (1969–74), a 22-minute work which features continual dissonant, repeating shimmering patterns, was actually born in Berkeley, not in Europe. Koenig's understanding of voltage control reinforced McGuire's

aesthetic change. McGuire cites his experimentation with voltage control more than the sounds of minimalist music in the California air as the prime reason why his style changed.

Occasionally when McGuire played hooky from the lectures of Diderik Wagenaar (b. 1946) and Otto Laske (b. 1936), he experimented with the electronic equipment in a nearby open studio at the Institute of Sonology. Another opportunity to experiment with technology came at the Feedback Studio, a small independent electronic studio set up by his friends David Johnson, Rolf Gehlhaar, and Johannes Fritsch in Cologne.[62] A significant amount of music and literature came out of the Feedback Studio, which was formed by the three Stockhausen students after their monumental series of performances at the German Pavilion at the 1970 Osaka World's Fair.[63]

In order to facilitate his ability to compose an electronic piece, McGuire enrolled in a course at the Cologne Hochschule für Musik from 1975 to 1977.[64] Although his official teacher was the electronic composer Hans Ulrich Humpert, McGuire's "advisor" was hardly ever around. Instead, McGuire worked principally with Marcel Schmidt, the sound engineer at the Hochschule. The piece McGuire composed was *Pulse Music 1* (1975–76), a work in which his new aesthetic first appeared. *Pulse Music 1*, which lasts approximately twenty-one minutes, is a vigorous exploration in the combinational possibilities of different pulse streams and tempo relationships.[65] Its tonal centers slowly cycle through the circle of fifths, a practice that can be heard in McGuire's compositions to the present day. The vertical pitch material is also constructed from consonant intervals.[66] Tempo relationships correspond to simple whole-number ratios, which also organize the pitch domain. The repetitive patterns in *Pulse Music 1* were composed during a three-month period where McGuire sat at the keyboard improvising patterns and then working them out in loops at the Feedback Studio.

Pulse Music 2 (1975–77), written at about the same time as *Pulse Music 1*, is a work for small orchestra. Unfortunately, the recording of it was lost in McGuire's recent apartment fire. According to the composer, the piece is unique in his oeuvre as it "consists of a single, uncontradicted [sic] progression of durations." The object was to create something that was "simultaneously directional and cyclic." The third work in the set, *Pulse Music 3*, was realized in 1978 under significantly different circumstances, McGuire having received a commission from the West German Radio (WDR). The terms of the commission allowed McGuire to work on the Synthi 100, at that time one of the most advanced analog synthesizers of the day.[67] Volker Müller, a very able and accomplished studio technician and also a part the Stockhausen

circle, assisted McGuire. This quadrophonic piece brings a sense of spatial movement to the pulse streams that McGuire was becoming adept at manipulating. More analysis of *Pulse Music 3* will be offered in the following section.

Simultaneously with work on his *Pulse Music* series, McGuire composed *48 Variations for Two Pianos* (1976–80). Herbert Henck, another musician in the Stockhausen circle, commissioned the piece and later recorded it with Deborah Richards. An hour-long work that features many of the undulating repeating patterns McGuire earlier worked out while improvising on the piano, *48 Variations* exhibits McGuire's most complex multilayered time organization. As a result of the sixteen layers of temporal structure, the listener is invited to construct his or her own set of relationships. Since the sound-world is so complex, the listener is faced with a sort of "perceptual indeterminacy" in the composer's words. Yet like the *Pulse Music* set, *48 Variations* utilizes a pitch language derived mostly from consonant intervals.[68]

His next work, *Music for Horns, Pianos and Cymbals* (1981) was commissioned by the Ensemble Köln.[69] A thirteen-minute piece for mixed ensemble, McGuire wrote it in only six months, a greatly compressed schedule by his standards. The work translates his interest in exploring various complex overlapping pulse streams to an instrumental context. This experimentation led him to compose the chamber orchestra piece *Cadence Music* (1982–85, originally titled *Crossfades and Cadences*), which catalogues his experience handling complex pulse streams and orchestration up to that time. Another commission from the WDR soon materialized for the electronic work *Vanishing Points* (1985–88). The most obvious feature of *Vanishing Points* is its complex sequence of accellerandi and ritardandi, something McGuire had not systematically explored up to that point. The goal was to create various perceptible audible "perspectives," the way a painter might do when expressing the three-dimensional world on a flat canvas. McGuire was able once again to work with Volker Müller on the project. *Vanishing Points* was composed on new Yamaha digital equipment that was installed at the studio.

A third WDR commission allowed McGuire to compose his first "solo" and his first vocal piece, *A Cappella* (1990–97). Again he was able to work with Müller on the project. This piece was written for his wife, Beth Griffith, a singer and a native Texan who had moved to Munich in 1975, relocating to Cologne in 1976. Griffith impressed many composers, including Kagel, for her flexible and sonorous voice as well as her unusual willingness to try new music. In *A Cappella*, McGuire recorded Griffith singing a variety of vowel

sounds and then mixed the samples together in a vibrant, colorful panorama. Since there are many irregularities inherent in producing stable pitch when singing isolated vowel samples, McGuire worked fiendishly with Müller in "straightening out" the attack transients of the recorded samples, so that a more pure intonation might be audible. McGuire describes the work as like "bending a coat hanger with your bare hands to straighten it out." Software that might have made the work easier was not up to the artistic standards McGuire had set at the time.

With *A Cappella*, McGuire began to make more elaborate variations on his trademark harmonic progression through the circle of fifths. Already in *Cadence Music* the bass cycle of fifths that gives the work its fundamental structure is somewhat obscured by the addition of a stepwise series of passing tones that is inserted between each fifth. In *A Cappella*, each of the thirteen sections alternates between a pair of fifths in the circle.[70] The rhythmic structure is also—for the first time—derived from the Fibonacci series.[71] Shortly after completing *A Cappella* in 1998, the McGuires made a rather dramatic change in living circumstances, by moving to New York City in order to take advantage of educational opportunities for their children.

McGuire soon obtained a job teaching composition at Columbia University, holding a position as a faculty adjunct for five semesters. Among his duties were teaching courses on music composed after 1945 and guiding several composition students. In the same period, McGuire composed a work originally titled *Contradance*, later changed to *Exchanges* (1998–2002), for string quartet and soprano solo. In *Exchanges*, McGuire again used the Fibonacci series to derive time structures, but also discovered a way to make more sophisticated relationships in tempo changes. The recording, by Julia Rempe and the Pellegrini Quartet, bears witness to the kaleidoscopic effects McGuire was able to attain by rapid tempo changes.

In the years since he moved to New York City, McGuire has been active on a number of projects, including *Ordinary Measures* (2004–5) commissioned by the Norwegian ensemble "Nordic Voices," a vocal sextet affiliated with Dartmouth University. Another work, *Marking Time* (2009), was commissioned by the Arts Foundation of Nordrhein-Westfalen. McGuire has recently completed a new work for double string trio titled *Jump Cuts*. As with *A Cappella* and *Exchanges*, *Jump Cuts* again incorporates the Fibonacci series as a generator of rhythmic patterns.

Seen from the current perspective, McGuire's work seems to fall roughly into three stylistic periods. The first, extending from his graduate studies in California roughly to *Frieze*, was concerned with assimilating the language of

the European avant-garde. As he began experimenting with electronic composition and conceived the *Pulse Music* series, McGuire moved into a second stylistic period. In this group of works, his first designs for a piece were always temporal, and the predominant harmonic language consonant. Sections of these pieces might be described as "Moments," governed by a one-element series.[72] This period features most of his electronic compositions. As he explored this aesthetic, he began to experiment with a more nuanced approach to the basic circle-of-fifths progressions that provided the harmonic backbone of the piece, a procedure already evident in *Cadence Music* but coming through even more clearly in *A Cappella*. A more fluid, continuous sequence of musical sections gives his music the impression of greater freedom and subtlety in what might be called his third period. This span (c. 1982–present) also includes his only vocal works.

Having spent so many of his formative years either studying with European expatriates in California or working on the continent of Europe itself begs the question as to how "American" McGuire really is. While defining criteria for an "American" composer opens the door to many issues which are far too nettlesome for the present discussion, it would be false not to acknowledge McGuire's debt to European taste, especially that of the Darmstadt flavor.

Nevertheless, there are several aspects of McGuire's career and his music that would likely not have appeared without ties to the United States. Despite the rigorous plans he creates for each composition, he often cites the importance of experimentation, improvisation, and trial-and-error in deriving the fundamental musical matter. This orientation relates to several minimalist composers, such as Steve Reich, who composed much of his early music in the company of his ensemble, "as a group," and improvised patterns collectively before committing a work to paper.[73] Second, as we shall see, many ideas McGuire uses in composition (especially with regard to tempo) trace back to suggestions made by Henry Cowell in his book *New Musical Resources* (1930). Third, much of McGuire's music from 1975 onwards sounds to many listeners as distinctly minimal or postminimal. Critics, especially Gann, have invariably grouped his music together with American postminimal composers. Fourth, McGuire's extensive studies in Europe would not have been possible without the kick-start furnished by American institutions, such as the University of California. Fifth, McGuire has actually lived a majority of his life on American soil, in California and in New York City. Sixth, McGuire feels a strong connection to certain American visual artists: he cites Donald Judd (1928–1944) and Dan Flavin (1933–1996) as particularly influential. Finally, McGuire says he feels most at home in Los Angeles, where he grew up in the 1950s and '60s.

The techniques and methods McGuire uses to create his music are even less well known than the arch of his career, and considerably more difficult to do justice to. The next two sections are devoted to preliminary analyses of two significant works, *Pulse Music 3* and *Cadence Music*. These pieces were chosen for analysis because the only significant published material relates to them; furthermore, they seem to be pivotal works in the composer's oeuvre.

3.

Pulse Music 3 was the culmination of the series of three "Pulse" compositions where McGuire explored the idea of superimposed and interrelated pulse streams from different perspectives. The third piece in the set was composed at the electronic studio of the West German Radio (WDR) from July 1978 to January 1979. McGuire wrote an analysis of the work, which is available online and in print.[74] It originated as an aural image of pulse streams continuously moving at different speeds from left to right and front to rear from the listener's perspective.[75] Notably, McGuire's initial impression was not one of pitch, melody, or harmony, but rather of motion.

For those accustomed to works with a great deal of tonal variation, certain aspects of *Pulse Music 3* may initially strike one as naïve. The most basic large-scale pitch structure can be easily described. It simply consists of two counterclockwise cycles through the circle of fifths, beginning on F and ending one fifth shy of completing the second cycle (on C instead of F). There are 24 large formal blocks in the piece, which following McGuire, I call "sections."[76] There is no overt teleology in the work.[77] The internal pitch content of these sections—while quite active rhythmically—consists of rapidly alternating, shimmering sounds that are voiced in fourths or fifths, making for an open, consonant sound.

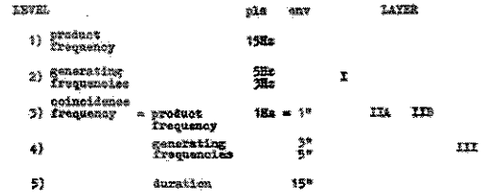
Beneath these surface observations lies a considerably more complex structure. The work is fundamentally constructed of three musical layers, which can be referred to as I, II, and III. Layer I, the highest and most rapidly sounding pitch layer, includes a pulse stream which moves from front to rear in the apparent spatial field. Two pitches alternate sounding in layer 1; they remain the same throughout each section, so the effect is something like a tremolo between two notes. Layer II is the most complex, and is divided into two sub-layers (IIa and IIb). These layers are melodically elaborated with a pattern that McGuire worked out in a lengthy experimental phase of composition. Unlike layers I and III, the sounds in layer II give the illusion that they move from left to right in physical space. Layer III is a slowed-down version of layer I, but with different pitches. This layer is difficult to hear, but it is

meant to create the impression that the entire texture is in a state of constant dynamic flux. Like layer I, layer III moves virtually through space from the front to the rear of the hall. The easily audible low bass sounds are part of a separate "drone package," and forms a kind of "sound wall" in the composer's words.

The three layers are related through a system of correspondences based on whole-number ratios. By taking the ratio 3:5 as a starting point, McGuire was able to derive a series of coincident and product frequencies.[78] The *product* of 3Hz and 5Hz (15Hz) generates the fastest-level pulse stream, whereas the *coincident* relationship (1Hz) produces the slowest-level stream. Thus, with any two generating frequencies, two more frequencies can be readily formed. Layer I contains the product pulse streams, layers IIa and IIb contain the generating streams, and layer III has the coincident streams.

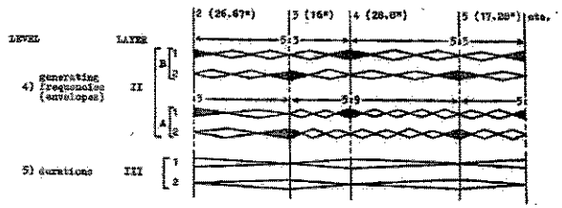
In each section, dynamic envelopes are applied to the pulse streams. McGuire's sketch, reproduced below, elucidates the calculation which necessitates a differentiation between *layers* and *levels*. As mentioned above, two generating frequencies, 3Hz and 5Hz, will produce a product relationship of 15Hz and a coincident relationship of 1 Hz. If this coincident relationship is then thought of *as a product frequency itself*, then it is generated by pulses at frequencies of 3 and 5 seconds.[79] Finally, the coincident frequency of the two new generating pulses is 15 seconds. These longer duration pulse streams define the longest dynamic envelopes. Since the two pairs of generating frequencies each count as only one level, we are left with a total of seven frequencies that produce five levels. The total set of seven frequencies and five levels, containing all the pulses and their envelopes, is called a "constellation." Each constellation contains the material for exactly one section.

With the internal temporal structure of each section now in order, McGuire turned to the question of how to make a logical succession from one constellation to the next. This was accomplished by holding over one pulse



Example 2. McGuire's calculations of the pulse durations in the various levels and layers in *Pulse Music 3*. Copyright ©John McGuire.

stream from each pair of envelopes from one section to the next. A new pulse stream in the following section then produces a different whole-number ratio with the one that was held over. In McGuire's sketch below, he shows how it is possible for a duration ration of 5:3 to overlap with a ratio of 5:9 (the 3 of 5:3 overlapping with the 5 of 5:9) so that both continuity and variation are achieved.[80]



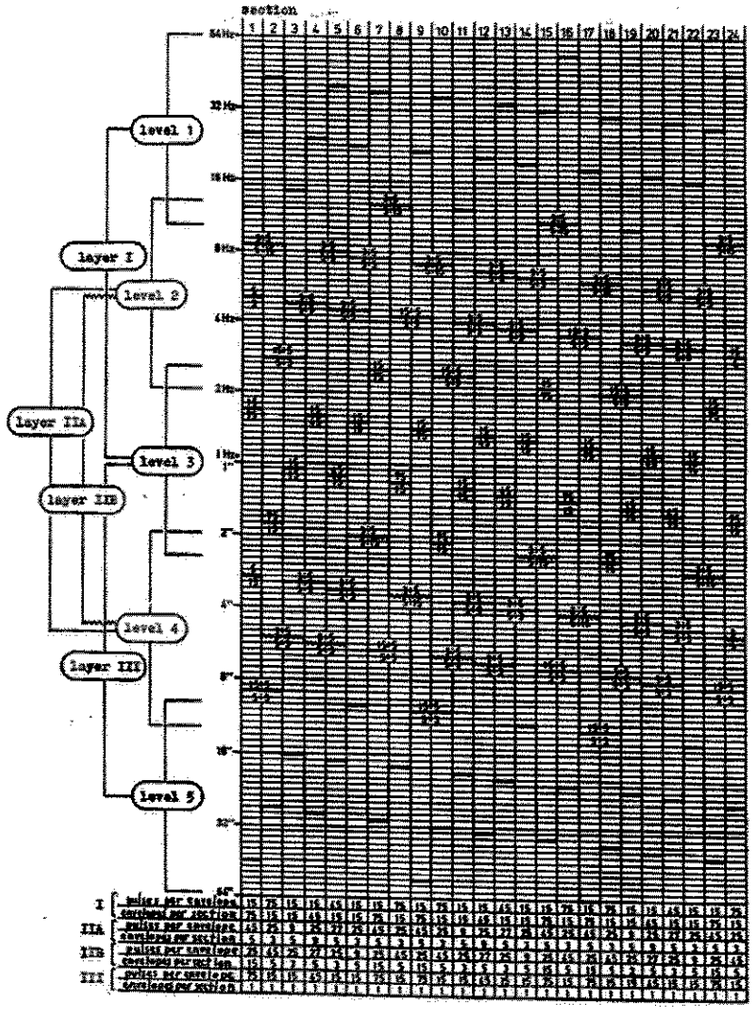
Example 3. McGuire's technique of connecting adjacent constellations by relating dynamic envelopes across formal boundaries. Copyright ©John McGuire.

It is important to understand that the durations of the sections in seconds, given at the top of Example 3, do not correspond with actual durations in the final, realized work. At the time he made the sketch, McGuire assumed that the highest product frequency would be 64 Hz. As he moved closer to production, he altered this to 72 Hz. So, instead of sections 2 through 5 having base durations 26.67, 16, 28.8, and 17.28 seconds, they are really about 23.6, 14.1, 25.2, and 15.2 seconds. These base durations are derived from a logarithmic scale of "steps" interspersed between a twelve-octave set of durations, from 72 Hz to 57 seconds.[81] The derivation process is illustrated in Table 1.

12 Octave Time Scale		Chromatic Time Scale	Used in Section(s)	Section	Measured Duration	Base Duration	Number of Times Repeated
In Hz	In Seconds	Lowest 4 Octaves			in seconds	in seconds	
72	0.014	**7.110**	–	1	118.6	40.22	3
36	0.028	7.533	–	2	70.7	23.92	3
18	0.056	7.981	13	3	42.3	14.22	3
9	0.111	8.455	–	4	75.6	25.34	3
4.5	0.222	8.958	6	5	44.9	15.07	3
2.25	0.444	9.491	–	6	44.4	8.958	5
1.125	0.889	10.06	–	7	26.6	26.84	1
0.563	1.778	10.65	14	8	78.9	15.96	5
0.281	3.55	11.29	–	9	47.0	47.83	1
0.141	7.11	11.96	–	10	84.3	28.44	3
0.070	14.22	12.67	22	11	16.5	16.91	1
0.035	28.44	13.42	–	12	90.2	30.13	3
0.018	56.88	**14.22**	3	13	17.8	17.92	1
		15.07	5,23	14	53.1	10.65	5
		15.96	8	15	31.4	31.92	1
		16.91	11	16	93.8	18.98	5
		17.91	–	17	56.1	56.88	1
		18.98	16	18	100.1	33.82	3
		20.11	19	19	20.0	20.11	1
		21.31	–	20	35.7	35.83	1
		22.57	24	21	21.2	21.31	1
		23.92	2	22	63.1	12.67	5
		25.34	4	23	75.3	15.07	5
		26.84	7	24	111.7	22.57	5
		28.44	10				
		30.13	12,15				
		31.92	–				
		33.82	18				
		35.83	20				
		37.96	–				
		40.22	1				
		42.61	–				
		45.15	–				
		47.83	9				
		50.67	–				
		53.69	–				
		56.88	17				

Table 1. Derivation of Section Durations and Time Structure in *Pulse Music 3.*

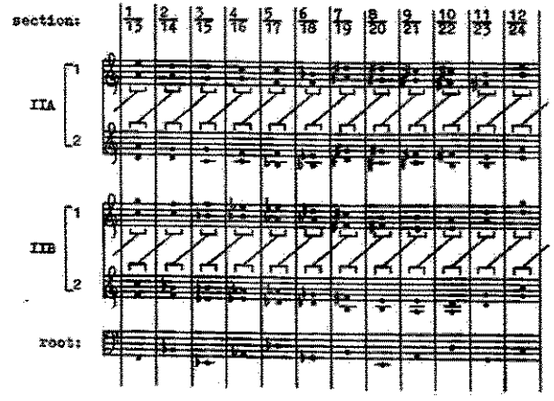
During the realization process in the studio, McGuire decided to repeat sections 1 through 5, 10, 12, and 18. Therefore, the base durations of those sections are multiplied by 3 yielding durations of 118.6, 70.7, 42.3, etc., seconds. These values are essentially the same as the measured values one can hear on the recording, as can be seen in the table above. Other sections are repeated as well, as shown. The entire system of pulse streams, along with the "modulations" that connect one constellation to the next, is shown in Example 4.



Example 4. Entire system of pulse streams in *Pulse Music 3*, including modulations. Copyright ©John McGuire.

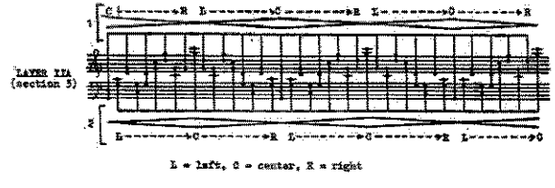
Lastly, McGuire turned his attention to the pitch structure. For each section, a diatonic hexachord serves as the source of the mix of overtones in each pitch, as well as the fundamental pitches for the mixtures themselves. To create enough separation between pulse streams, the notes of the hexachord—when realized as a pitch stream—are voiced in two pairs of fifths that lie a minor third apart. For example, section 1 (with a bass note of F) utilizes the source hexachord C—D—E—F—G—A, but the voicing is (from bottom to

top) D—A / F—C // A—E / C—G. Although there are five common tones between hexachords that are adjacent on the circle of fifths, McGuire decided to voice the constellations so that four of the notes in layer II continue from one section to the next, and four change. This is possible because of the parsimonious voice-leading that is so easily obtainable from juxtaposing two such hexachords, and simultaneously the large number of tones that can potentially be held in common. The process is illustrated by this example.



Example 5. Pitch material in the 24 sections of *Pulse Music 3*. Copyright ©John McGuire.

The greatest melodic elaboration within a constellation takes place in layers IIa and IIb. The added figuration takes the shape of a nine-element pulse wave pattern whose contour rises three times. When the retrograde of the pattern follows its original statement, the figuration returns to the register in which it originated. By splitting layers IIa and IIb each into two sub-layers, McGuire was able to interweave two vertical pairs of fifths (or fourths) together: for example in section 3, G—D // C—G.[82] Although the contour of the figuration never changes in any of the 24 sections, listeners can perceive variations on the pattern because of the differing way that it interacts with other pulse layers in each section.



Example 6. Pitch material in sub-layers IIa and IIb. Copyright ©John McGuire.

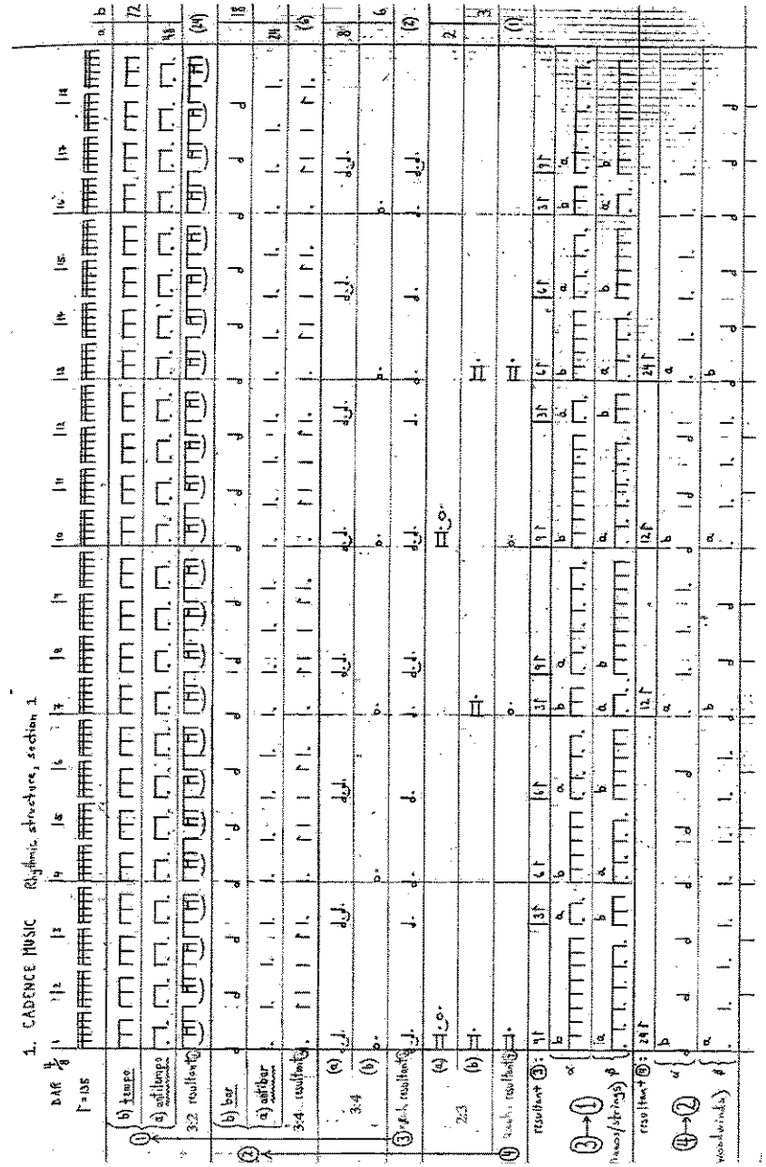
As my analysis shows, the compositional planning for *Pulse Music 3* was elaborate, yet it did not exclude the possibility for improvisation or alteration during the production process. The idea of basing both the pitch and time structures on the same numerical ratios is a surprisingly novel outgrowth of Stockhausen's techniques, most notably those used in his work *Gruppen* (1955–57).[83] Although their methods are closely related, the aesthetic gulf between *Gruppen* and *Pulse Music 3* could not be greater.

Despite McGuire's efforts to voice constellations so that each pulse stream is perceptible, one may speculate to what degree the individual coincident pulse streams fuse together, and produce the illusion of a single, composite rhythmic pattern. Such patterns often seem to arise spontaneously in repeated listening to the work. McGuire muses on this question in the last part of his analysis, and his continued interest in the phenomenon can be seen and heard in *Cadence Music*, to which we now turn our attention.

4.

Cadence Music (1982–85) is a chamber work for twenty-one instruments.[84] While it bears certain similarities to *Pulse Music 3*, a number of new features enter into the work.[85] As before, McGuire began with an aural "image" of pulse streams. In *Cadence Music*, McGuire devised a compositional system that would take advantage of the effect of "second generation phenomena" which arise naturally when hearing several simultaneous pulse streams. Fundamentally, *Cadence Music* consists of four main pulse levels. Levels 3 and 4, which serve as the generators, each contain two steady pulse streams (a) and (b). Coincident pulses of unequal duration form out of the composite structure of steady streams.[86] In *Cadence Music*, these resultant pulses produce the next set of pulse streams, which are expressed in levels 1 and 2. This is illustrated in Example 7.[87]

As can be seen in McGuire's sketch 1, level 4 contains the longest duration pulses. Layer 4(a) contains dotted double-whole notes tied to dotted whole notes, whereas layer 4(b) contains dotted double-whole notes. The rhythmic relationship of 4(a) and 4(b) is simply 2:3. But the composite pulse stream forms a pattern of 2:1:1:2. Divisions of this stream are used to produce the steady pulses on level 2. On level 2, the pulse streams consist of a bar (b) of three half notes and an antibar (a) of dotted quarter notes, producing the relationship 18:24 (or 3:4 in simplest terms). However, a set of three pulses (three half notes) in layer (b) equals the shortest resultant rhythmic value of level 4—the ":1" dotted whole note value. The same process is used to derive level 1 from level 3, except that the ratios are reversed: on level 3 the composite pulse ratio 8:6 (4:3) produces a 72:48 (3:2) ratio of pulses in level

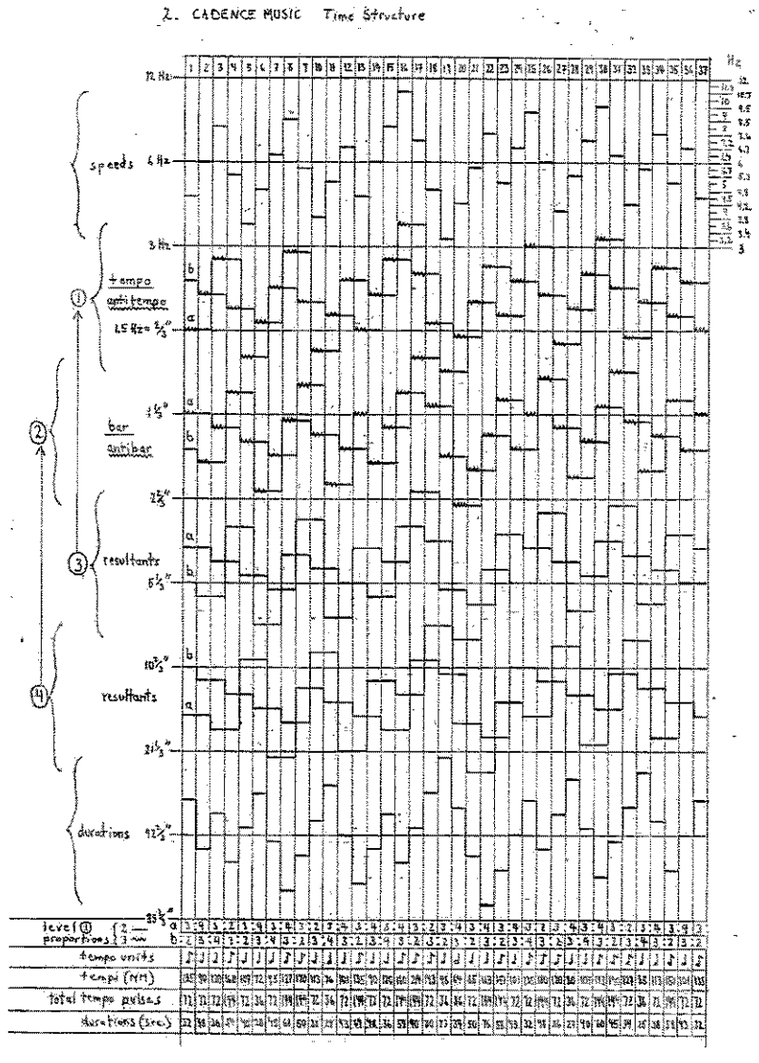


Example 7. Sketch for *Cadence Music* showing pulse streams in section 1. Copyright ©John Mcguire.

1. Since the pulses produced in level 1 are shorter in duration than those produced in level 2, McGuire referred to them as a *tempo*, whereas those in level 2 are called *bars*.[88] McGuire's method of deriving layers 1 and 2 from the composite pulse streams of higher-level structures differs considerably from *Pulse Music 3* because the resultant layers have unequal rhythmic values.

In order to enliven the foreground texture, McGuire turned back to where he started—levels 3 and 4. At the bottom of sketch 1, we note that the resultant rhythmic pattern of level 3 (3:1:2:2:1:3) generates the rate at which *pulses from levels 1 and 2 swap*. This means that the tempo and antitempo pulse streams from level 1 alternate, creating *mixed streams* α and β, following the pattern of composite pulses in layer 3. In the same way, the bar and antibar pulse streams of level 2 alternate (forming their own α and β) at the rate of the composite pulse streams of level 4. This results in a middleground-level metrical dissonance, since two repetitions of the resultant of level 3 (9:3:6:6:3:9, or simply 3:1:2:2:1:3) are simultaneously juxtaposed against one longer level 4 pattern of 24:12:12:24 (simply 2:1:1:2). The alteration of mixed streams α and β contributes much to the impression one may have of metrical ambiguity in *Cadence Music*. In fact, the pulse streams are steady, but because of the swapping, one stream may be momentarily perceived as more prominent than another.

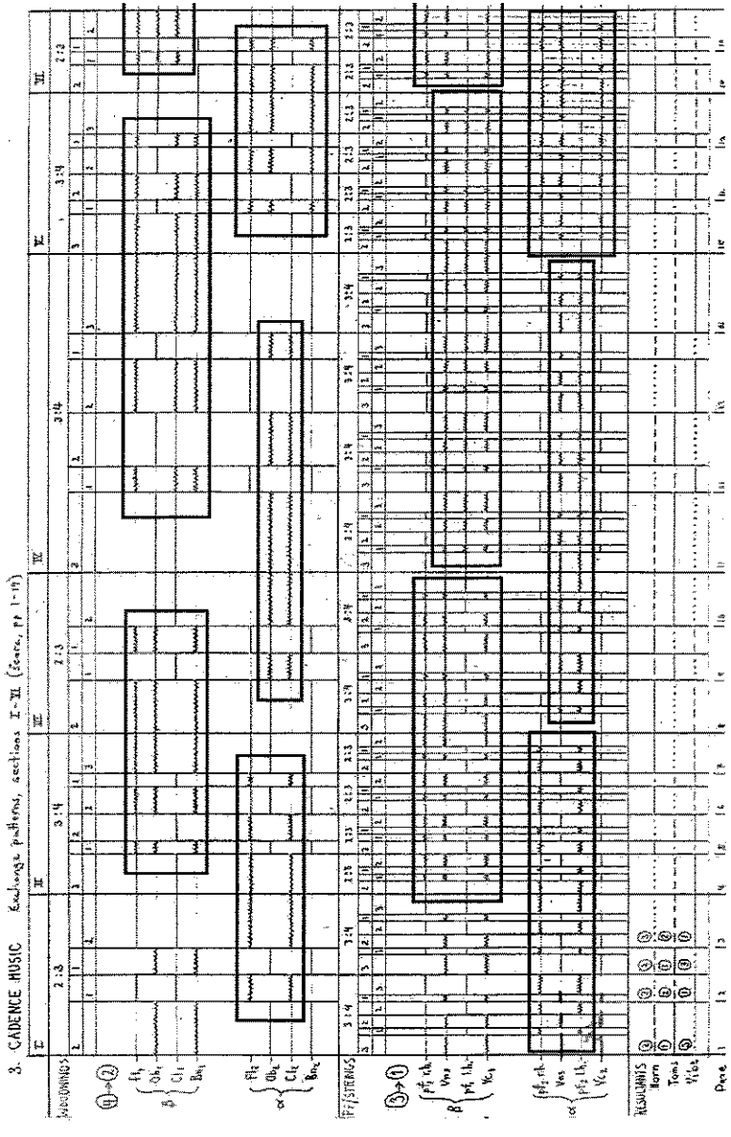
If we turn our attention to the section-to-section connections in *Cadence Music*, we find that they are an outgrowth of the techniques used in *Pulse Music 3*. Referring to McGuire's second sketch for *Cadence Music*, we find another grid at the bottom. Instead of relating sections by tempo proportions of 3:5, 5:9, etc., all of the tempo modulations in *Cadence Music* are either by 3:2 or 3:4 ratios. However, the counting pulse ("tempo unit") often changes between sections. The tempo change between sections 1 and 2 is shown as a 3:4 relationship, which would equal a modulation from M.M. 135 to 180 if the eighth-note tempo unit remained the same. However, the *tempo unit* changes from an eighth note to a quarter note, causing the tempo change to be from M.M. 135 to 90 instead. The choice to change the "tempo unit" emphasizes the tempo "octave" that the current section is in. So, tempos between M.M. 60 and 120 are always counted in quarter notes, whereas those between 121 and 240 are counted in eighths. In order to use a third tempo unit once, McGuire assigned the half-note unit to section 20, which has a tempo of 64 (rounded up from 63.5).[89] Together with the number of total tempo pulses (which are always either 36, 72, or 144), it is now simple to calculate the duration of each section in seconds.[90] The tempo scale, once again, is logarithmic.



Example 8. Sketch for the entire time structure of *Cadence Music*. Copyright ©John McGuire.

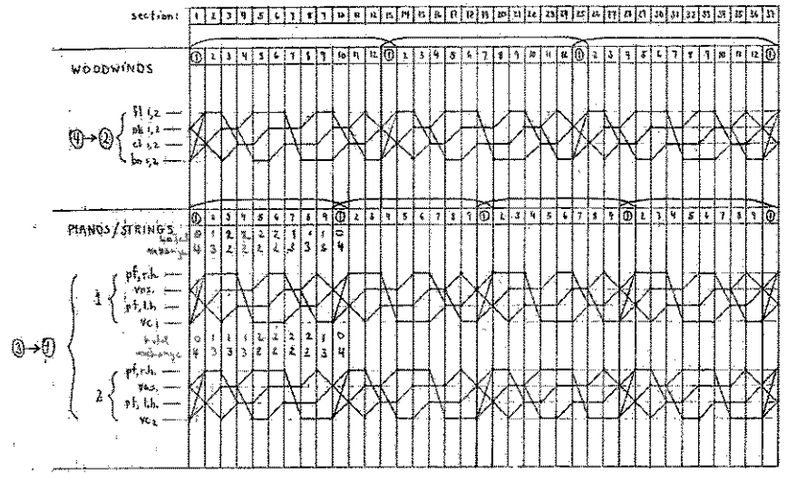
One of the more novel elements of *Cadence Music* is the system of "exchanges" that occurs. Each pulse swap in mixed streams α and β is coordinated with a change in orchestration. Additionally, exchanges in orchestration occur just the way that certain pulse streams change from section to section—that is, one instrumental combination stays the same while a new one enters in the next section. This technique of "fading in" and "fading out"

can best be seen by examining McGuire's third sketch. Instrumental combinations are highlighted in rectangles which were added to the sketch.



Example 9. Sketch for the orchestration of sections I through VI in *Cadence Music*. Instrumental combinations that cut across formal boundaries are highlighted in boxes, which have been added to the sketch. Copyright ©John McGuire.

The orchestration itself is subject to an elaborate pattern of instrumental swaps which allows the maximum amount of timbral change to occur at large-scale formal junctures. As shown in an excerpt from McGuire's fourth sketch, the entire span of 37 sections is divided into three cycles of twelve orchestration changes in the woodwind section, and four cycles of nine orchestration changes in the piano and string section. These cycles are shown with slurs over the small circled numbers that indicate sections. The changes in orchestration form the large-scale formal structure 3:4, as shown in the sketch.



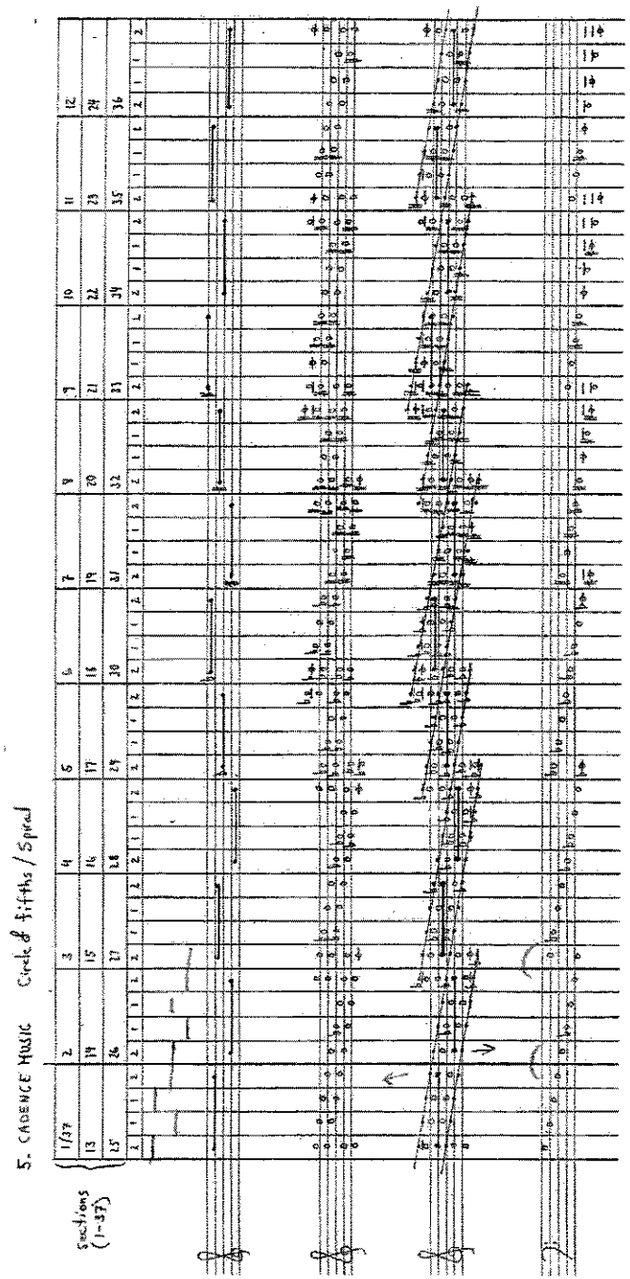
Example 10. Sketch of instrumental "color cycles" through *Cadence Music*. Copyright ©John McGuire.

The French horn, tom-toms, and vibraphone play a role together as a rhythm group. Their "rotational" deployment can be seen at the bottom of sketch 3. In each of the 37 sections, the woodwind structure (either 2:1:1:2 or 3:1:2:2:1:3) is enhanced by the rhythm group. The second "auxiliary" instrumental section—bass piano (one player plays the notes in the lowest octave of the piano), contrabass, and celeste—only articulate resultant rhythms on level 3 of the time structure.

McGuire's sketch for orchestration changes is again reminiscent of one of Stockhausen's sketches, notably *Kurzwellen*.[91] However, McGuire adapts this novel graphic notation for an entirely different purpose. Whereas Stockhausen's diagrams indicate the level of change between different parameters of sound such as volume, pitch, or number of formal structures, McGuire's related symbols indicate the cyclical change of orchestration.

Like *Pulse Music 3*, pitch material is treated last in the *Cadence Music* sketches. This turns out to be considerably simpler than *Pulse Music 3*. On the most fundamental level, three counterclockwise cycles through the circle of fifths serve as bass notes, with each section starting on one of those notes. But since there are 37 sections—not 36—the work ends with the same sequence of four bass notes on which it began: **G**—F—E—D. Either major or minor triads are voiced above the bass notes. The voicing of the chords changes in relation to the ability of the various instruments to carry the lines comfortably—analogous to a revolving barber shop pole—so one never notices a discontinuity in the descent.[92]

The bass motion of *Cadence Music* is unexpected and significant. Instead of simply leaping from one bass note to another directly, McGuire fills in the descending fifth with stepwise motion. As we saw above, the rhythmic group of instruments articulates either a 2:1:1:2 or 3:1:2:2:1:3 structure for each section, similar to the structure of the woodwind section. If this rhythmic structure is 2:1:1:2, McGuire fills in the gap of the perfect fifth between each section by stepwise motion. If, on the other hand, the structure is 3:1:2:2:1:3, there are six notes that need to be fit into the span of a fifth. This explains why occasionally there are "bumps" in the descent (e.g., C—B-flat—A—**B-flat**—**A**—G // F). On his fifth sketch (Example 11), McGuire only shows the 2:1:1:2 structure in each section which, when applied to the bass descent, appears to result only in a diatonic scale segment. Therefore, with regard to the bass line, this sketch shows a simplified version of what *Cadence Music* ultimately became.



Example 11. Sketch of the pitch material in *Cadence Music*. Copyright ©John McGuire.

Is there is a pattern to the insertion of bumps? My analysis, shown in Table 2, makes it clear that there is indeed a subtle, large-scale structure which results in a large-scale 4:3 relationship and a nearly symmetrical pattern of "bumps."

Segment	Sequence of Chords McGuire's Section Designations Given Above + or M = major triad; - or m = minor. Bumps indicated in small boxes	Number of Chord Changes Between Bumps
I	1 – 2:1:1:2 G+ F+ e- d- 2 – 3:1:2:2:1:3 C+ B♭+ a- [B♭+ a-] g-	[7]
II	3 F+ E♭+ d- c- 4 B♭+ A♭+ g- [A♭+ g-] f-	[8]
III	5 E♭+ D♭+ c- [D♭+ c-] b♭- 6 A♭+ G♭+ f- e♭-	4
IV	7 D♭+ B+ a♯- g♯- 8 F♯+ E+ d♯- [E+ d♯-] c♯-	12
V	9 B+ A+ g♯- [A+ g♯-] f♯- 10 E+ D+ c♯- [D+ c♯-] b-	4,4
VI	11 A+ G+ f♯- e- 12 D+ C+ b- a-	12
VII	13 G+ F+ e- [F+ e-] d- 14 C+ B♭+ a- [B♭+ a-] g-	4
VIII	15 F+ E♭+ d- c- 16 B♭+ A♭+ g- [A♭+ g-] f-	8
IX	17 E♭+ D♭+ c- [D♭+ c-] b♭- 18 A♭+ G♭+ f- [G♭+ f-] e♭-	4,4
X	19 C♯+ B+ a♯- g♯- 20 F♯+ E+ d♯- c♯-	16
XI	21 B+ A+ g♯- f♯- 22 E+ D+ c♯- [D+ c♯-] b-	
XII	23 A+ G+ f♯- [G+ f♯-] e- 24 D+ C+ b- [C+ b-] a-	4,4
XIII	25 G+ F+ e- d- 26 C+ B♭+ a- [B♭+ a-] g-	8
XIV	27 F+ E♭+ d- [E♭+ d-] c- 28 B♭+ A♭+ g- f-	4
XV	29 E♭+ D♭+ c- b♭- 30 A♭+ G♭+ f- [G♭+ f-] e♭-	12
XVI	31 C♯+ B+ a♯- [B+ a♯-] g♯- 32 F♯+ E+ d♯- [E+ d♯-] c♯-	4,4
XVII	33 B+ A+ g♯- f♯- 34 E+ D+ c♯- b-	12
XVIII	35 A+ G+ f♯- [G+ f♯-] e- 36 D+ C+ b- [C+ b-] a-	4
XIX	37 G+ F+ e- d-	[5]

Occurrence of G and C♯/D♭ segments is related by 4:3.	Number of times that there are 4 chord changes between bumps:	12
	" " 8 chord changes between bumps:	2
	" " 12 chord changes between bumps:	4
	" " 16 chord changes between bumps:	1

Table 2. Alternative Structural Reading of *Cadence Music*.

As my analysis suggests, it is possible to hear *Cadence Music* as a series of eighteen descending diatonic scales (and a nineteenth scale segment), each a whole step apart. In fact, my first impression of the work as a listener was along these lines. Further contributing to the plausibility of this alternate hearing, the bass notes in each descending scale always support the identical sequence of major and minor triads—i.e., (neglecting bumps) MMmmMMmm. If the piece is heard this way, the descending C-sharp/D-flat scale segments (IV, X, XVI)—which lie a tritone away from the G segments (I, VII, XIII, XIX)—articulate a more fundamental structure. Not only is there a 3:4 relationship between the segments starting on C-sharp/D-flat and those beginning on G, but also segment ten—which lies nearly at the middle of the composition—coincides almost exactly with the onset of the longest span where a stepwise bump is absent. Although McGuire evidently did not conceive of the work in this way, my analysis demonstrates how *Cadence Music* allows for this alternate hearing.

Finally, the question arises: why call this piece "Cadence Music"? If one hears stepwise bass motion dominating, then strictly speaking there are no cadences at all in the conventional sense of the term. On the other hand, if one hears each of the 37 sections dominated by one pitch—favoring McGuire's trademark circle of fifths progression—then the piece is made up of nothing but dominant-tonic cadences. In speaking of this matter, McGuire emphasizes that he doesn't intend to suggest a specific definition of cadence. For him, the work feels as though a cadence occurs each time the *last chord of one section moves to the first chord of the next*. But due to the lack of contextual markers, it is perhaps difficult for a novice listener to know whether sections are bounded by a change in the bass note, an insertion of a bass "bump," or the obvious modulation of rhythmic constellation. Regardless of how one wishes to hear *Cadence Music*, the stepwise descent that always occurs between the last chord of one section and the first of the next hardly provides the optimal conditions even for a nontraditional cadence to occur.

Perhaps it is most fruitful to consider McGuire's comment regarding cadences within the context of his basic approach to composition—that is, grounded in a fundamentally rhythmic "aural image." Through the course of any constellation, a certain amount of tension builds up thanks to the repetition of the pulse patterns. This is not entirely unlike the accretion of tension over a dominant-functioning pedal in more pitch-oriented music. Following terminology developed by Daniel Harrison,[93] this tension accumulates "charge" through the section, and ultimately leads to a kind of "discharge" into the next, where the tension dissipates as a result of the presentation of

a new constellation. If one understands the "McGuire cadence" as rooted in rhythmic perception, rather than in pitch, then the notion of cadences occurring at the end of each of his 36 internal sections does not seem at all far-fetched.[94]

5.

For an April 2012 performance of *Vanishing Points* and *A Cappella* at the Kunst-Station Sankt Peter in Cologne, McGuire wrote,

> My work is devoted entirely to the exploration and development of a synthesis between minimalism, as it was around 1960 where I grew up in California, and the general obligations of serial technique which I got to know during my studies in Germany.[95]

Understanding McGuire's project in this way allows one to view serialism as a flexible technique or process, from which a composer can derive a great variety of musical styles—including even minimalism. While the rigor of McGuire's compositional logic is as meticulous as his scores are notated, it is often easy to overlook how much improvisation and experimentation went into the ideas that form the basic building blocks of his compositions. Whereas McGuire's *methods* are serial, his *aesthetic* is firmly planted in American minimal music.

McGuire seems most concerned with giving a precise and perceptually interesting rhythmic character to a block of sound (i.e., constellation), and then negotiating the "transition" between one block and the next. It is not unlike the approach that an urban designer can take, when faced with the challenge of planning a block of houses. The façade of each house may be individual, but a great deal of attention must be given to the *edges* between each house. On the one hand the architect must create a certain flow that connects the houses together, but simultaneously he or she ought to respect each house's individuality. It is this balance of individuality and unity that allows the city block to exist as a single, harmonious whole. This is why the most eloquent moments in McGuire's compositions are perhaps not the sections, constellations, or blocks of sound themselves, but rather the subtlety and skill with which the composer negotiates the musical edges between them.

NOTES

1 Kyle Gann, "Minimal Music, Maximal Impact" (2001), *NewMusicBox*, www.newmusicbox.org/articles/minimal-music-maximal-impact (accessed 14 June 2012), 6.

2 Alex Ross, *The Rest is Noise: Listening to the Twentieth Century* (New York: Farrar, Straus and Giroux, 2007), 492; Timothy Johnson, "Minimalism: Aesthetic, Style or Technique?" *Musical Quarterly* 78, no. 4 (1994): 745; Jeremy Grimshaw, *Draw A Straight Line and Follow it: The Music and Mysticism of La Monte Young* (Oxford: Oxford University Press, 2011), 3; Keith Potter, *Four Musical Minimalists: La Monte Young, Terry Riley, Steve Reich, Philip Glass* (Cambridge: Cambridge University Press, 2000), 21.

3 Michael Nyman, *Experimental Music: Cage and Beyond* (Cambridge: Cambridge University Press, 1999. First ed. 1974), 82ff.

4 Grimshaw concludes that Young's influence was strongest in the realm of "cultural forces and trends," rather than through specific works, 45–46.

5 Robert Ashley offers an alternative viewpoint, locating the source of Glass's ideas in the theater in "Landscape with Philip Glass," from *Music with Roots in the Aether: Opera for Television*, vol. 2 (New York: Lovely Music, 1976.) Edward Strickland explores the origin of the term minimalism in detail. *Minimalism: Origins* (Bloomington and Indianapolis: Indiana University Press, 1993), 242–244. In Jonathan Bernard's 1993 essay "The Minimalist Aesthetic in the Plastic Arts and Music," he enumerates the many similarities between minimalist art and music. *Perspectives of New Music* 31/1: 86–132. Wim Mertens often uses the term "repetitive music" to describe minimalism. *American Minimal Music* (New York: Alexander Broude, Inc., 1983.) Dan Warburton catalogues a dizzying array of terminology that has been applied to minimal music; he prefers the terms "process music" and "systems music." "A Working Terminology for Minimal Music," *Intégral* 2 (1988): 139.

It is worth noting that in the art world, the ideas of minimalism and serialism are often overtly interconnected. As James Meyer writes, "The term Minimalism was coined to describe the work of a group of American artists who developed a new kind of whole or serial geometric abstraction during the 1960s," *Minimalism* (London: Phaidon Press Ltd.: 2000), frontispiece.

6 Nyman, *Experimental Music*, 82.

7 Potter, *Four Musical Minimalists*, 10.

8 Strickland, *Minimalism: Origins*, 120.

9 Robert Carl, "The Politics of Definition in New Music," *College Music Symposium* 29 (1989): 110–111.

10 Brent Heisinger, "American Minimalism in the 1980s," *American Music* 7/4 (1989): 431.

11 Steve Reich, *Writings About Music* (Halifax: The Press of the Nova Scotia College of Art and Design, 2002), 159.

12 Johnson, "Minimalism," 748. For Johnson, defining minimalism as a "style" is ultimately unsatisfactory. However, his proposal to describe minimalism as a "technique" encompassing five characteristics may be troubling for some, since he uses the same five stylistic elements enumerated earlier to enumerate minimalist techniques. (751) Perhaps Johnson's difficulty in hearing more recent minimalist works as related to earlier ones is due to the fact that he does not acknowledge a "post-minimalist" aesthetic; instead he tries to lump more recent works together with older ones, referring to pieces of the 1960s and '70s as "classic" minimalism. The stylistic aspects Johnson mentions are similar to Kyle Gann's perceptions: "Like the serialists, the postminimalists have striven to create a consistent and coherent musical language, though this language is usually as smooth and linear as the serialist language is abrupt and fragmented," *American Music in the Twentieth Century* (New York: Schirmer Books, 1997), 327.

[13] These include phasing, linear additive processes, block additive processes, overlapping pattern work, splicing and dovetailing, and textural additive processes (Warburton, 144–156).

[14] "I am interested in perceptible processes." Reich, *Writings About Music*, 9.

[15] In this respect it is easy to draw a contrast between Reich and Babbitt. But as Joseph Straus points out, it is often a mistake to cite Babbitt as representative of all—or even most—of the American serial project, despite his prominence as something of a spokesperson for the movement. *Twelve-Tone Music in America* (Cambridge: Cambridge University Press, 2009), 196–197.

[16] Jonathan Bernard, "Theory, Analysis, and the 'Problem' of Minimal Music," In *Concert Music, Rock and Jazz Since 1945: Essays and Analytical Studies*, ed. Elizabeth West Marvin and Richard Hermann (Rochester: University of Rochester Press, 1995): 261.

[17] Markus Bandur, *Aesthetics of Total Serialism* (Basel: Birkhäuser, 2001), 5.

[18] Paul Griffiths. "Serialism." In *Grove Music Online. Oxford Music Online*, www.oxfordmusiconline.com/subscriber/article/grove/music/25459, accessed 24 September 2012.

[19] Marc Delaere, "Auf der Such nach serieller Stimmigkeit. Goeyvaerts' Weg zur Komposition Nr. 2," (In *Die Anfänge der seriellen Musik*, edited by Orm Finnendahl, from the series *Kontexte: Beiträge zur zeitgenössischen Musik* 1. Hofheim: Wolke Verlag (1999): 14.)

[20] Straus, *Twelve-Tone Music in America*, 196–198.

[21] The historiography of serialism parallels minimalism and "postminimalism" in the sense that serial composers in Europe very soon abandoned "strict" serial techniques and moved toward integrating aleatoric ideas (via Cage) into their music—a particularly vivid example of transatlantic cross-fertilization. But instead of adopting the term "postserialism" most Europeans called their techniques "serial" even after incorporating Cage's ideas into their compositional toolbox.

[22] Carl, "The Politics of Definition," 112.

[23] Jonathan Bernard, "Minimalism, Postminimalism and the Resurgence of Tonality in Recent American Music," *American Music* 21/1 (2003): 113.

[24] Kyle Gann, "A Forest from the Seeds of Minimalism: An Essay on Postminimal and Totalist Music," www.kylegann.com/postminimalism.html (1998), accessed 14 June 2012.

[25] Robert Pincus-Witten, "Eva Hesse: Post-Minimalism into Sublime," *Artforum* (1971), 32–44. Importantly, Pincus-Witten believed that the term "post-minimalism" had particular advantages over other terms in describing the artwork he analyzes because, "like post-impressionism . . . [the term post-minimalism] covers a multitude of possibilities" (ibid., 34).

[26] Gann, "Minimal Music, Maximal Impact," 6. Note the similarities in Gann's definition to Pincus-Witten.

[27] Gann, *American Music in the Twentieth Century,* 326.

[28] Perceptions of serial music in academia and the public have been deeply problematized by Joseph N. Straus, "The Myth of Serial 'Tyranny' in the 1950s and 1960s," *Musical Quarterly* 83/3 (1999): 301–343.

[29] Peter Burkholder, Donald J. Grout and Claude V. Palisca, *A History of Western Music,* 8th ed. (New York: W. W. Norton, 2010), 975.

[30] Richard Taruskin and Christopher H. Gibbs, *The Oxford History of Western Music* (Oxford: Oxford University Press, 2013), 1102.

[31] Carl, "The Politics of Definition," 113.

[32] Glass remarked that he felt as if he ". . . was living in a wasteland dominated by these maniacs, these complete creeps, you know—who were trying to make everyone write this crazy, creepy music." Cited in Rob Haskins, "Another Look at Philip Glass: Aspects of Harmony and Formal Design in Early Works and *Einstein on the Beach*," *Journal of Experimental Music Studies*, www.users.waitrose.com/~chobbs/haskinsglass.html (2005), accessed 13 August 2012.

[33] Straus, *Twelve-Tone Music in America*, 205.

[34] Ibid., 241.

[35] Ibid., 240.

[36] Potter, 11.

[37] Kyle Gann, "Let X = X," *The Village Voice* (24 February 1987), 76.

[38] Reich, *Writings About Music*, 11.

[39] Arnold Whittall, *Serialism* (Cambridge: Cambridge University Press, 2008), 143.

[40] Grimshaw, *Draw a Straight Line*, 40–43.

[41] Carl, "The Politics of Definition," 112.

[42] Goeyvaerts described his work as "static music" at the Darmstadt courses in 1951. Mark Delaere, Maarten Beirens, and Hilary Stapels, "Minimal Music in the Low Countries," *Tijdschrift van de Koninklijke Vereniging voor Nederlandse Muziekgeschiedenes* 54/1 (2004), 32. The Goeyvaerts/Stockhausen correspondence can be found in Karel Goeyvaerts and Marc Delaere, *Selbstlose Musik: Texte, Briefe, Gespräche* (ed. Marc Delaere. Cologne: Musiktexte, 2010), 301–388.

[43] Ibid., 355. Unless otherwise noted, all translations in this article are by the author.

[44] Delaere, Beirens and Staples, "Minimal Music in the Low Countries," 33.

[45] Ibid., 31.

[46] Delaere, "Auf der Suche," 28. However, not all scholars agree that the earliest works by Goeyvaerts are, properly speaking, serial. Richard Toop, "Messiaen/Goeyvaerts, Fano/Stockhausen, Boulez," *Perspectives of New Music* 13/1 (1974): 142.

[47] Hermann Sabbe concludes that *Composition No. 4* is, "a good ten years 'before its time', a model of minimalist-repetitive modular composition." "Von Serialismus zum Minimalismus. Der Werdegang eines Manierismus. Der Fall Goeyvaerts, 'Minimalist avant la lettre'," in *Neuland Jahrbuch*, vol. 3, ed. Herbert Henck. (Bergisch Gladbach: Neuland Musikverlag Herbert Henck, 1982–83), 205.

[48] Nyman's preface to Mertens 1983, 8.

[49] Sabbe, 207.

[50] It is relevant to note how the European serialists soon found ways to disassociate their technique from any one particular style, whereas American serial com-

posers—often in the shadow of Babbitt—often tended to equate technique and style. In America, one of the most "European" style experiments with serial ordering comes from none other than Michael Torke, who, in a "postminimalist" context uses a serial permutation technique in his kaleidoscopic orchestral composition *Ecstatic Orange.* Straus, *Twelve-Tone Music in America*, 115–123.

[51] Seppo Heikenheimo, *The Electronic Music of Karlheinz Stockhausen* (Helsinki: Suomen Musiikkirieteellinen Suera Musikvetenskapliga Sällskapet (1972), 217.

[52] The following biographical sketch is a result of interviews I conducted with John McGuire in his New York City apartment from March 26 to 28, 2012. McGuire also provided a comprehensive series of corrections through email in July and August 2012. I am deeply grateful for the generosity of McGuire and his wife, Beth.

[53] *Die Reihe* 2 (Bryn Mawr: Theodore Presser, 1958).

[54] The Darmstadt seminars in 1966 focused on the subject of form, featuring lectures by Adorno, Ligeti, Kagel, Dahlhaus, and Earle Brown (Ernst Thomas, ed., *Form*, in the series *Darmstädter Beiträge zur Neuen Musik X* (Mainz: B. Schotts Söhne, 1966)).

[55] Kramer provides a memorable personal reminiscence of Stockhausen's California visit. Jonathan Kramer, "Karlheinz in California: A Personal Reminiscence," *Perspectives of New Music* 36/1 (1998): 247–260.

[56] Rolf Gehlhaar gives extensive details about the 1967 Darmstadt project in *Zur Komposition Ensemble: Kompositionsstudio Karlheinz Stockhausen, Internationale Ferienkurse für Neue Musik, Darmstadt 1967*, ed. Ernst Thomas. In the series *Darmstädter Beitrage zur Neuen Musik XI* (Mainz: B. Schott's Söhne, 1968) Stockhausen himself provided a set of notes and a score found in *Texte zur Musik*, vol. 3, ed. Dietrich Schnebel (Cologne: Verlag M. DuMont Schauberg, 1971), 212–215.

[57] The live musicians performed from scores that the composers notated, sometimes in a graphical style similar to Stockhausen's *Prozession* and *Kurzwellen*.

[58] Gelhaar writes, "McGuire wanted to develop a solo tendency, a tendency from clear pitches to noises, with various intermediate mixed steps. The function of the player would be to refine the material on tape, gradually to engage into discussions with it. The collective tendency was not yet conceived." *Zur Komposition Ensemble,* 53. McGuire's contribution is discussed further later in Gelhaar's report (70).

[59] Fred Ritzel details the seminar Stockhausen taught that summer in Darmstadt, *Musik für ein Haus. Kompositionsstudio Karlheinz Stockhausen/Internationale Ferienkurse für Neue Musik/Darmstadt 1968*. In the series *Darmstädter Beiträge zur Neue Musik XII* (Mainz: B. Schotts Söhne, 1970.)

[60] Ibid., 84–87.

[61] McGuire also cites the Canadian composer Martin Bartlett as another "kindred spirit." Bartlett built a large and very efficient synthesizer which was used in several concerts around the Bay area.

[62] Johnson was an American assistant to Stockhausen, perhaps most famous for his memorable recorded dialogue with the composer in the work *Hymnen* (1966–67, 1969).

[63] Stockhausen, *Texte zur Musik*, vol. 3, 153–187.

[64] This "course" allowed McGuire to use the electronic studio at the Hochschule. The arrangement was not unusual at European institutions. To support himself during this time, McGuire took on occasional performances as a pianist with the Saarbrücken Radio Symphony Orchestra (conducted by Hans Zender). He got the gig after agreeing to perform one of Gelhaar's pieces, which while not technically difficult was written in a graphic notation indecipherable by the regular orchestra pianist. About the same time, Stockhausen offered to make McGuire his teaching assistant at the Cologne Hochschule, a position that would have meant privileged contact with the German composer but also a considerable amount of tutoring and paperwork. At the time, Stockhausen decided to compile his teaching methods into book form, using Paul Klee's *Das bildnerische Denken* (1956) as a model. McGuire, who was to do much of the work, politely declined the offer and the musicologist Richard Toop took the job instead. Subsequent discussions with Toop reinforced McGuire's determination to compose a serious electronic work.

[65] McGuire first used the term "pulse stream" in connection to *Pulse Music 1*. It is a reference to the analog sequencing equipment he was using, which was ordinarily driven by clock pulses. The synthesizers of the time could not generate multiple layers of synchronous pulses. Marcel Schmidt, the sound engineer with whom McGuire was working, devised a way of recording a series of clock pulses on tape which were then fed back into the synthesizer to drive its sequencer externally. By recording different sequences of sounds on different tracks and then mixing them down, McGuire could now compose for multiple layers of pulse streams in the same piece. This "digital/analog" hybrid technique, as McGuire calls it, was also used in subsequent works.

[66] McGuire has described his approach to pitch as "fifths surrounded by neighboring tones derived from adjacent fifths . . . [combined with] characteristic retrograde inversions found in the music of Webern." While this method was perhaps conceptually born in Medieval music theory, it was more directly influenced by McGuire's study of Indian and Southeast Asian music. McGuire cites *The Ragas of North Indian Music* by Nazir Ali Jairazbhoy, *Music In Java* by Jaap Kunst, and *Music in Bali* by Colin McPhee as particularly influential.

[67] See Michael Custodis, *Die soziale Isolation der neuen Musik: Zum Kölner Musikleben nach 1945* (Stuttgart: Franz Steiner Verlag: 2004), 160; and Marietta Morawaska-Büngeler, *Schwingende Elektronen. Eine Dokumentation über das Studio für Elektronische Musik des Westdeutschen Rundfunks in Köln, 1951–1986* (Cologne: P. J. Tonger Musikverlag, 1988), 135ff. Stockhausen realized his epic 8-channel work *Sirius* (1975–77) on the Synthi 100. The terms of the commission were extremely favorable; McGuire could use anything at all in the studio and even build or acquire new technology.

[68] Thanks to Goeyvaerts' advocacy, *48 Variations* was included in the program of the 1985 ISCM Festival in Amsterdam, even though it was considerably longer than the entry guidelines allowed.

[69] During this time McGuire held a position as organist of a church in Rösrath. The job brought him into contact with a great deal of early music, much of which he played in organ arrangements.

[70] For example, section 1 alternates between the first and second fifths in the circle; section 2 alternates between the second and third fifths.

[71] The Fibonnaci series is a series where each term is the sum of the two previous integers (i.e., 1, 1, 2, 3, 5, 8, etc.). It is notable for its use in a great deal of music by Stockhausen. Scholars who have identified processes involving Fibonacci numbers

in the music of Bartók include Ernö Lendvai, *Béla Bartók: An Analysis of His Music* (London: Kahn and Averill, 1971); Ernö Lendvai, *The Workshop of Bartók and Kodály* (Budapest: Editio Musica, 1983); Tibor Bachman and Maria Bachman, *Studies in Bartók's Music*, 3 volumes (Media, PA: Bartók Society of America, 1983.)

72 Stockhausen details his concept of Moment form in his essay on the subject, *Texte zur Musik*, vol. 1, ed. Dieter Schnebel (Cologne: Verlag M. DuMont Schauberg, 1963), 189–210. The source for Stockhausen's suggestion of a 1-element (or 1-interval) series can perhaps be traced to an earlier work (Karlheinz Stockhausen, ". . . how time passes . . .,"*die Reihe* 3 (Bryn Mayr: Theodore Presser, 1959), 26.)

73 Reich, *Writings About Music*, 45ff.

74 John McGuire, "An Electronic Music Project: The Composition of Pulse Music III," www.kalvos.org/mcgess1.html, accessed 8 July 2012. See also John McGuire, "Über Pulse Musik III," *Neuland: Ansätze zur Musik der Gegenwart*, vol. 3 (Bergisch Gladbach: Neuland Musikverlag Herbert Henck, 1982–3), 252–268.

75 The work is quadrophonic, with loudspeakers ideally set up so that the left-right motion (layers IIa and b) and the front/rear motion (layers I and III) are as clear as possible to perceive.

76 It might also be possible to call these "moments." The sections have a certain affinity with the Stockhausenian moment in that they could conceivably exist in and of themselves. Like Stockhausen's concept, aspects of McGuire's sections influence structures in the next, forming a chain of relationships. Unfortunately, a thorough analysis of the relationship between McGuire's sections and Stockhausen's moments is beyond the scope of the current essay.

77 Mertens offers some context for understanding the lack of goal-directedness in much of McGuire's music: "Traditional dialectical music is representational: the musical form relates to an expressive content and is a means of creating a growing tension . . . but repetitive music . . . is non-representational and is no longer a medium for expression subjective feelings." *American Minimal Music*, 88.

78 The odd numbers were chosen so that the climax or nadir of a crescendo in each section would fall on one particular pulse.

79 Using a coincident frequency to generate what will become a product frequency is very reminiscent of nineteenth-century dualist theories of harmonic generation expressed by Helmholtz and Oettingen. See Daniel Harrison, *Harmonic Functions in Chromatic Music* (Chicago: University of Chicago Press, 1994), 244ff.

80 The method McGuire uses is superficially similar to Eliot Carter's concept of the metric modulation, but has more to do with the concept of destabilizing a texture so as to render changes seemingly inevitable. When cyclical higher-order periodicities that conflict with an original pattern return to coincidence with the original pattern, a change in the time structure can be triggered more naturally. In this way, coincidence points form the structural background in much of McGuire's music.

81 Stockhausen proposed the "octave tempo scale" in 1959, but it appears in similar form as early as Henry Cowell, *New Musical Resources* in 1930, 106–177.

82 The hexachord in section 3, of course, is Bb—**C**—**D**—Eb—F—**G**.

83 See Imke Misch, "On the Serial Shaping of Stockhausen's *Gruppen für drei Orchester*," tr. Frank Hentschel and Gerome Kohl, *Perspectives of New Music* 36/1 (1998): 143–187 and Jonathan Harvey, *The Music of Stockhausen: An Introduction* (Berkeley and Los Angeles: University of California Press, 1975.)

84 The twenty-one instruments require twenty-two players, since the pianos require two and three sets of hands.

85 McGuire prepared a series of handouts on *Cadence Music* for his students at Columbia University, which proved useful in constructing this analysis. The score is published by Breitkopf & Härtel (Wiesbaden, 1985); I am grateful to Mr. McGuire for putting a copy at my disposal. Other source material for the composition can be found in John McGuire, "Cadence Music: Skizzen und Partiturausschnitte," in *Neuland: Ansätze zur Musik der Gegenwart*, vol. 5 (Bergisch Gladbach: Neuland Musikverlag Herbert Henck, 198–5), 303–313.

86 Note that McGuire refers to the system of four fundamental pulse streams in *Cadence Music* as levels whereas in *Pulse Music 3* he called them *layers*. McGuire's nomenclature will be followed here.

87 In all, there are an astonishing 1,529 pages of sketches (Herbert Henck, "Skizzen zu John McGuires *CADENCE MUSIC*," in *Neuland: Ansätze zur Musik der Gegenwart*, vol. 5 (Bergisch Gladbach: Neuland Musikverlag Herbert Henck, 1984–85), 302.)

88 In the final score, McGuire filled in some of the longer notes on level 2 with sixteenths, in order to "make the piece more interesting and more fun to play."

89 Strictly speaking, section 20 should have a tempo unit of a quarter note. Using the duration of notes as tempo units again reflects back on the theories of Stockhausen 1959.

90 E.g., in section 1, 72 pulses at M.M. 135 equals 32 seconds, since 60 divided by 135 equals 0.44 (the duration of each individual pulse), and 0.44 times 72 equals 32. Note that sections are never repeated, as they were in *Pulse Music 3*.

91 Winrich Hopp, *Kurzwellen von Karlheinz Stockhausen: Konzeption und musikalische Poiesis*, in the series *Kölner Schriften zur Neuen Musik*, vol. 6, ed. Johannes Fritsch and Dietrich Kämper (Mainz: Schott, 1998), 46ff, and Stockhausen 1971, 120.

92 This is the familiar "Shepard tone" illusion appearing in an instrumental context.

93 Harrison, *Harmonic Functions in Chromatic Music*, 90–102.

94 Another take on the title relates to the article "Cadence Rhythm in Mozart." Karlheinz Stockhausen, *Texte zur Musik*, vol. 2, ed. Dieter Schnebel (Cologne: Verlag M. DuMong Schauberg, 1964), 170–205. According to Stockhausen, ". . . the principle of the cadence is that the progression from simple to more complicated proportions is experienced as tension, and the progression from more complicated proportions to simpler ones is experienced as resolution" [translation by Jerome Kohl]. The relatively simple ratios 2:3 and 3:4, of course, play an essential role across all levels of structure in *Cadence Music*.

95 From www.reihe-m.de/?p=1267, accessed 13 July 2012. Translation from the German by the author.