

Research Article

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Graphic Notation, Indeterminacy and Improvisation: Implementing Choice Within a Compositional Framework

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Abstract: The aim of this paper is to examine the use of graphic notation in relation to improvisation and indeterminacy in practice. The paper opens with a background context around terms and ideas about improvisation and indeterminate music pioneered by composers in the 20th century. The techniques the author used in the pieces *Fluttering* (Brøndum 2015) and *Serpentine Line* (Brøndum 2010) are examined and discussed in informal interviews with four musicians. The paper closes with a discussion and conclusions gained from the interviews and from working with musicians in the context of using graphic notation as a bridge between improvisation and notated music. Documentation of the author's practice and research of these methodological and aesthetical issues may be of interest to composers and musicians that work with similar techniques. It may also add to theory by developing the understanding of a composer's own approach, and in extension, to ask questions on how to develop these theories further.

Keywords: composition, graphic notation, improvisation, indeterminacy, practice as research

Introduction

This paper presents the practice and research in the development of a personal aesthetic approach by implementing graphic notation in the author's compositions. The techniques of graphic notation are based on concepts from indeterminate music, electro-acoustic music and improvisation. The aim of this paper is to discuss the use of graphic notation in relation to improvisation and indeterminacy in practice. The paper opens with a brief background context around terms and ideas about improvisation and indeterminate music, pioneered by composers such as Cecil Taylor, Derek Bailey, John Cage, Karl-Heinz Stockhausen and Pauline Oliveros. The paper is thereafter divided into three sections. The section *Choices* is a presentation of the developments of different styles of graphic notation techniques that the author has experimented with: from open conceptual pieces to more complex pieces involving both traditional notation and graphic notation. The section *Techniques in Fluttering and Serpentine Line* is a more in-depth description of some of the techniques of graphic notation used in the pieces *Serpentine Line* (Brøndum 2015) and *Fluttering* (Brøndum 2010). The third section, *Questions*, is based on informal interviews with four improvising musicians regarding the graphic notation in the scores of *Serpentine Line* and *Fluttering*. The paper closes with a discussion and conclusions gained from the interviews and from working with musicians in the context of using graphic notation as a bridge between improvisation and notated music. Documentation of the author's practice and research of these methodological and aesthetical issues may be of interest to composers and musicians working with similar techniques. It may also add to theory by developing the

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understanding of a composer's own approach, and in extension, to ask questions on how to develop these theories further.

Background

The background included here is a short context to developments that have influenced me as a composer, as well as many other composers, and to introduce concepts that are relevant to my compositional aesthetical approach. There is a wide spectrum of ways to implement choice in a composition, from the techniques of free improvisation, graphic notation, indeterminacy to aleatory. According to Derek Bailey improvisation “pre-dates any other music—mankind's first musical performance couldn't have been anything other than a free improvisation” (Bailey 83). Bailey means that improvisation always has been a part of music. Written evidence of early improvisation in Europe can be traced to medieval scores and literature. In the translation of “The Art of Counterpoint” written 1477 by Tinctoris, Albert Seay notes that, “Tinctoris makes an allusion to an important but highly unappreciated aspect of early music: vast amounts of it were improvised by performers, both singers and instrumentalists, who had first memorized certain rules or procedures regulating the extempore production of unwritten music” (Seay 3). The improvised music is “most often ascribing to specific rules of the time. In other words, material is presented or improvised as a result of pre-established material, which provides structure” (Galey 1). In jazz and blues, improvisation was, and is, an integral part of the musical style. In the 1960's composers and musicians developed open structures in the use of improvisation in the context of jazz.

The late 60s and early 70s were a defining period when key musicians such as John Stevens, Derek Bailey, Tony Oxley, Evan Parker and Paul Rutherford took the music from infancy to maturity. In the process, they established *modus operandi* that has stood the test of time and continued to generate fine original music, even when employed by the next generation of improvisers. (Eyles 2005)

Experiments with modality by Coltrane and complex open structures by Anthony Braxton pushed the envelope for new ways to improvise in the 1960s and 70s. The free-form movement also embraced atonality, for example, Cecil Taylor, Ornette Coleman, Peter Brötzmann, and later with influences from rock music (and vice versa) via Fred Frith in Henry Cow and John Zorn's eclectic working methods with bands such as Naked City and in Zorn's solo works (Pressing 2001). Even though new approaches to improvisation developed over time, it might still be argued that it still follows genre specific rules. McGee writes, “improvisation is likewise conditioned by structural conventions which were at times codified into very precise rules” (McGee 18).

In classical music concepts of indeterminacy, aleatoric methods and graphic notation were developed in the 20th century. Umberto Eco calls the use of indeterminate concepts “The poetics of the ‘work in movement’ (and partly that of the “open work”) sets in motion a new cycle of relations between the artist and his audience, a new mechanics of aesthetic perception, a different status for the artistic product in contemporary society” (Eco 174). John Cage's relationship to composition was that he “began to question the notion of art as a statement of emotion and artistic self-expression” (Feisst 209). Cage avoided using the term “improvisation” in his compositions and favoured the term indeterminacy. Even though his techniques may be similar to those of improvisation, the intent was to remove oneself from the ego. “Cage wanted the combination of material to occur at random so that the accumulation of musical gestures would bring out previously unconsidered qualities of sound” (Whitney 49). Cage first used chance for writing the scores using, for example, *I Ching* (*Book of Changes*), but later rejected that way of composing and favoured the use of performance-based indeterminacy. Cage writes the following about composition that is “indeterminate with respect to its performance” (Cage 184).

An experimental action is one the outcome of which is not foreseen. Being unforeseen, this action is not concerned with its excuse. Like the land, like the air, it needs none. A performance of a composition which is indeterminate of its performance is necessarily unique. It cannot be repeated. When performed for the second time the outcome is other than it was. (Cage 184)

Pierre Boulez initially rejected Cage's use of indeterminacy. Boulez instead coined the term aleatory (derived from the word "alea"—to roll dice). In *Alea* Boulez writes about chance and indeterminacy and that he objected to certain forms of chance offered by Cage while embracing other forms. He did not like, for example, "abstract notation to increase the performer's role in interpreting material in performance" (Whitney 78). He did, however, favour "surface indeterminacy" offering performers "the opportunity to oscillate around a given tempo or allow them the freedom to play a particularly complicated passage at their own speed" (Whitney 83). Boulez himself used the terms "surface, structural, conceptual and 'sound-space' indeterminacy" (Whitney 91). La Monte Young, who was involved in the Cage inspired movement Fluxus, "explored improvisation in a 'static, modal, drone-style' fashion" (Feisst 213). Early on Young experimented with long drone composition. One such piece is *Composition 1960 #7*, where the musician plays a perfect fifth with the instructions "to be held a long time" (Young 1), thus giving the performer choice in the duration of the piece. In the 1960s Terry Riley stopped composing music for many years to devote himself to improvisation (Feisst 214). Pauline Oliveros gives us this definition of a difference between improvisation and composition: "improvisation is making music instantaneously without planning. Composition is constructing music. In improvisation you can't change your mind; in composition you can" (Oliveros 1).

Composers such as Krzysztof Penderecki, Morton Feldman and Cornelius Cardew early on developed techniques using graphic notation. Using graphic notation expands traditional notation and often allows the performer more choice in interpretation and sometimes inviting the musician to improvise. Cornelius Cardew worked with graphic notation early on and constructed the vast piece *Treatise* (Cardew 1963-1967). David Hall writes, "*Treatise* is a masterpiece of visual communication and a major achievement in any musical system. It contains 193 pages of beautifully rendered lines, symbols and shapes" (Hall). In *Treatise*, all that is left from traditional notation is an empty staff on the bottom of the score with abstract graphical symbols above. In *Threnody for the Victims of Hiroshima* (1960) Penderecki employs graphic notation techniques such as black horizontal bars that vary in thickness and in frequency. Thus letting the performer choose pitch within a certain range or scale. Other graphic symbols are employed for extended performance techniques as well. The durations of the sections are denoted in seconds.

Stockhausen used the term "intuitive music" for open music. He explains,

The term intuitive music is one I have purposely introduced. Not only in order to make it clear that I have something specific in mind, but also to rule out other things. For example, music played freely without a score is sometimes called free improvisation, like let's say free jazz, though making free jazz has its own rules: as the word says, it should still sound like jazz, otherwise, people would just call it free music. Then there is improvisation in folk music, in India for example. But there is very little actual freedom in this music. The system is very restricted... I try to avoid the word improvisation because it always means there are certain rules: of style, of rhythm, of harmony, of melody, of the order of the sections, and so on. (Stockhausen 113)

Stockhausen toured with a group in the 1960s and started to work out pieces with varying degree of instruction (Stockhausen 133). He started to experiment with "graphic material" to instruct his co-players (Stockhausen 133). In Stockhausen's *Prozession* (1967), graphic symbols are used, such as +, -, = signs in. In the score of *Aus den sieben Tagen* (1968), he gives only verbal instructions. For example, in one of the pieces from this collection, *Setz die Segel zur Sonne* (1968), Stockhausen gives the instructions to "play a tone for so long until you hear its individual vibrations" (Stockhausen 12). He further instructs that one should "hold the tone and listen to the others—to all of them together, not to individual ones—and slowly move your tone until you arrive at complete harmony and the whole sound turns to gold to pure, gently shimmering fire" (Stockhausen 12).

It should also be mentioned that "traditional notation" with five staves, notes, dynamics and so on, also offers a certain amount of freedom and interpretation. However, the developments of alternative notation and concept-based music of the 20th century has given the composer in the post-modern era many additional tools to develop further and to use to shape a personal aesthetic style or approach.

Towards a Personal Aesthetic Approach

Before I formally began studying music I played in several bands where we often used improvisation as a writing tool in the rehearsals. We would jam, and when something good came up, we memorised it, which is a working method used by many bands. This was often a collective effort, and some improvisation was only retained in soloing. Later, when I studied composition at Youngstown State University and at the University of Pittsburgh, my approach towards improvisation shifted from jazz and rock towards techniques found in contemporary classical music, such as, indeterminacy and electro-acoustic music. I also studied the techniques of serial music, set theory and a more formal approach to composition. In my years as a Masters and PhD student, I wrote mainly notated instrumental music. However, in the electronic music studio, I used a Serge modular system, and I manipulated tape and multi-track tape machines. This enabled experimentation with, for example, tape loops, micro-tonality and parts moving in different tempi. Using traditional notation in electroacoustic music was to me problematic here, but using graphic notation and verbal instructions or even patch diagrams were more useful. I eventually started adopting the graphic notation I used in my electro-acoustic music into my notated pieces. After completing my PhD in 1993, I moved back to Sweden, and I started working with electroacoustic music in the studios at EMS¹ (Elektronmusikstudion EMS) in Stockholm. In the 1990s my focus had shifted from analogue synthesisers and magnetic tape to computer-based composition, such as Max/MSP and C-sound. I wrote computer programs and experimented with letting the computer “improvise” according to algorithms, while the musician would play after notation and vice versa. This resulted in the piece *The Soul in The Machine* (Bröndum 2004) for piano and computer.

I did, however, feel that this was for me not an optimal way to work. Using a computer when composing, and for live processing in performance, was too slow and the “hands-on” part was missing. So I started to work more with live improvising musicians at Fylkingen² in Stockholm. I returned to using analogue synthesisers and created loop and feedback systems for guitar and effect pedals. The notated pieces I composed up to this point were very complex and difficult to perform, and it was hard to find musicians that wanted to put in the time and effort in learning the pieces. The musicians I started to work with in Stockholm in the 1990s were, and are, firstly improvisers but also read music well. I started to experiment with graphic notation techniques that can include both improvisation and notated music, or write music that includes musicians from different musical backgrounds to work together. I wanted to tap into their improvisational skills and still retain some classical structure of the compositions. I had to rethink how to notate the scores radically. So I developed the methods I had worked with earlier in the electronic music studio and began experimenting with composing graphic scores. In these early experiments, I let some musical elements be open-ended, while other elements were strictly notated. The pieces varied in degrees of difficulty to perform depending on which musical elements that was open. What follows is a short description of some of these techniques I have worked into my compositional aesthetic.

Choices

I use techniques that allow for some freedom of choice but within a composed framework. The amount of control varies from piece to piece. Some of the techniques I used are:

- Graphic notation—for example, arrows, lines, symbols (Figure 1, 8, 9, 15, 16, 17).
- Micro / Macro Concepts. This is, for example, the use of an object, shape or a word—from which a micro/macrostructure can be derived. (An example is the S-shape used in *Serpentine Line* as discussed later). See Figures 6, 7, 8
- Timeframes in which you perform according to instructions (Figure 14).

¹ EMS—Elektronmusik Studion is a studio and a national centre for electronic music and sound art in Sweden. EMS was founded in 1964. <http://elektronmusikstudion.se>

² Fylkingen is a member-run organisation and a venue that is committed to the contemporary experimental performing arts. Fylkingen was founded in 1933. <https://www.fylkingen.se/about>

- Free notes (no note heads or x-noteheads) (Figure 11, 12, 18, 19).
- Free rhythm (pitch sets, but without prescribed rhythm) (Figure 6).
- Free tempo (or independent tempo) (Figure 10).
- Recombination, or permutation, of pitch sets (Figures 4 and 6).
- Games, such as card games and computer games (Figure 3).

I experimented with different ways to write in order to be able to use the improvisational skills of the musicians I was playing with. An example of this can be found in the first movement of the suite *Ictus* (1997). I only composed the rhythms, and the musicians would fill in the pitches. In *Flux #1* (2003) I did the opposite, gave the musicians what pitch-sets to work around, and the rhythms were free. My experience from performing these two pieces was that *Ictus* was much more difficult to perform since the musicians had to figure out new melodic patterns each time. On the contrary, *Flux #1* left more room for musical interpretation. I found that the freedom in *Flux #1* opened up a dynamical dimension that was not present in *Ictus*. I developed this further in *Short Circuit* (2004) (also entitled *PCB*) for the ensemble ReSurge (see an excerpt in Figure 1). It is a piece where I extensively use graphic notation. The symbols, such as triangles vertical bars, switches for alternative routes, boxes with pitch sets to improvise solos on and so on, can be interpreted relatively freely. An example is the box with number 5 where the musicians improvise on the note set (0, 1, 3, 4, 6). The set can be freely transposed, inverted, and varied by diminution and augmentation. In later arrangements, I left out the pitch-sets and let the performer choose what group of notes to improvise on (in 2, 4 or 5 note groups). This piece has been performed several times and recorded by the ensemble ReSurge (bass, piano, violin and electronics). It has also been performed by GLO (Great Learning Orchestra), as a Trio for three Theremins and as a trio for bass clarinet, guitar and soprano sax, and finally as an arrangement for choir. The piece sounds surprisingly similar in the different ensemble settings, even though there is great room for how to interpret the piece. Even though the score is rather abstract, I experienced a more consistent result here than in my earlier piece *Ictus*. The musicians were in the *Short Circuit* more relaxed and were able to tap into their improvisational skill at a deeper level.

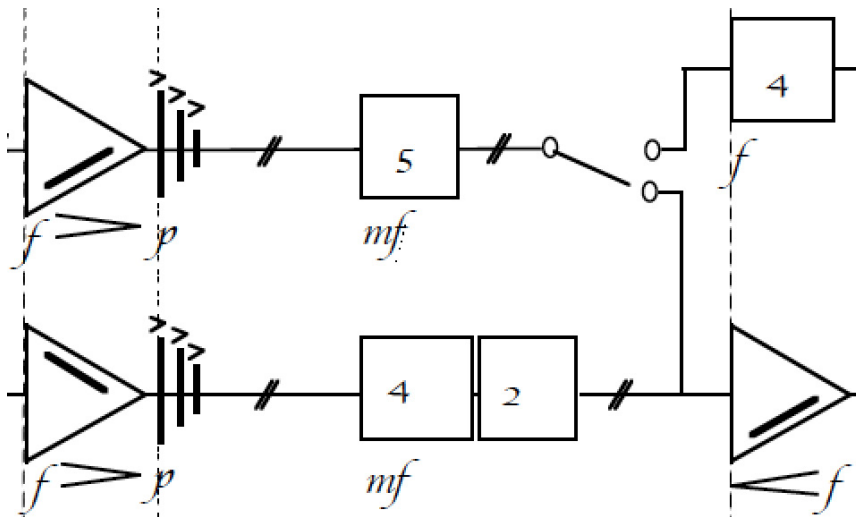


Figure 1. An excerpt from *Short Circuit*.

One of my more open scores is *5x5* (2015) where the score is a matrix (Figure 2) of five events in five layers. The duration of the linear rows are determined at the time of each performance, and performance instructions are penned into the boxes before the performance.

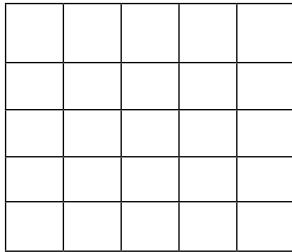


Figure 2. The Event Matrix in 5x5.

5x5 is a development from the piece *When the Sky is Low and Heavy* (Brøndum 2013/2018) which similarly is based on the matrix (Figure 2), but here each box is conceptually based on a strain of Baudelaire's *Flowers of Evil* (1857). The poem is in five sections:

- i. from the whole horizon's murky grid
- ii. the dome of stone
- iii. voiceless hordes of spiders
- iv. bells leap with rage
- v. long processions without fifes or drums

This piece can, of course, become many things depending on what is penned into the squares. It may also be tricky to determine who the composer is when used in an ensemble setting. I have only performed this piece as a solo piece and not yet as an ensemble piece. The 5x5 matrix (Figure 2) was used as a foundation for live-electronic solo improvisations I did on tour through Dalarna, Sweden in June 2015. The performance circumstance in this tour was rather rough with many different acts so that anything more complex would have been difficult to do. I found from improvising from this matrix that I slowed down as an improviser, and that I could keep tabs on time duration. (Free improvisations tend to become very long in duration.) It is also interesting that as an improviser, the matrix organised my playing into a musical structure that I could reshape depending on mood and venue.

When I compose, I sometimes use allegories, such as objects, words or concepts as the basis for the artistic idea of the work. These ideas or concepts are interpreted in form and content at several levels. An example of this is *Tarot de Marseille* (2016) where I used a Tarot card deck as a source for improvisation. The idea of using playing cards is of course nothing new. Brian Eno explored randomness in a card game in *Oblique Strategies* (1975) and many before him. John Zorn's describes his Game Pieces, as "complex systems harnessing improvisers in flexible compositional formats" (Zorn 444-476). Zorn explains that he worked with, "...form, not content, with relationships, not with sound. Instructions in these early game pieces do not have musicians on stage relating to sound. They have musicians on stage relating to *each other*. The improvisers on the stage were *themselves* the sound" (Zorn 199).

In *Tarot de Marseille* I wrote a Max/MSP (Max 7) patch that remotely controls four iPads with the app Mira (Max 7). In the game, the musicians press a button on the iPad, and the Max/MSP patch shuffles the Tarot cards on the iPad (see Figure 3). Each musician has an iPad with the same program. The Tarot card deck is shuffled, and four cards are dealt to each player. Each card has individual instructions written in the Tarot cards. Most instructions are of musical character, like "play short disjunctive melodies in a high register," or "play a quote from an ancient hymn" or "scrape something vigorously," while other instructions are more performance like "put your hands over your eyes," "disrupt a member of the ensemble" or "take a deep breath and think about something pleasant." The rules in the game are:

- Shuffle the deck by clicking the button.
- Each card lasts for approximately 10 seconds.
- Take a few seconds between each card.
- Shuffle four more cards by clicking the button
- The player that picks a "major" card—stand up!
- The ensemble decides how many deals are given before the performance.

- The player may skip a card

The piece premiered in Uppsala, Sweden 2016 by The Remin' Trio (a Theremin trio). It was also performed by a quartet consisting of flute, two bass clarinets and a Theremin at Fylkingen in Stockholm, Sweden 2017. My experience was that the piece worked much better in the quartet. Possibly because in the Theremin trio performance I had to supplement the fourth player with a fixed media part—which seemed to take something away from the openness of the piece. It was more difficult to interpret the non-musical performance aspects, such as “disrupt a member of the ensemble” while playing Theremin. The intonation and the pure sine wave sound of the Theremins also gave a less nuanced and dynamic quality. However, in the quartet (flute, two bass clarinets and a Theremin) there was a different experience. The musician's response was that it opened up for very lyrical playing with playful theatrical parts. I think the reason the second performance was different was that the musicians took their time, listened to the other musicians and approached each playing card with less haste and allowed for more space and that the instruments they played were better suited for the task.

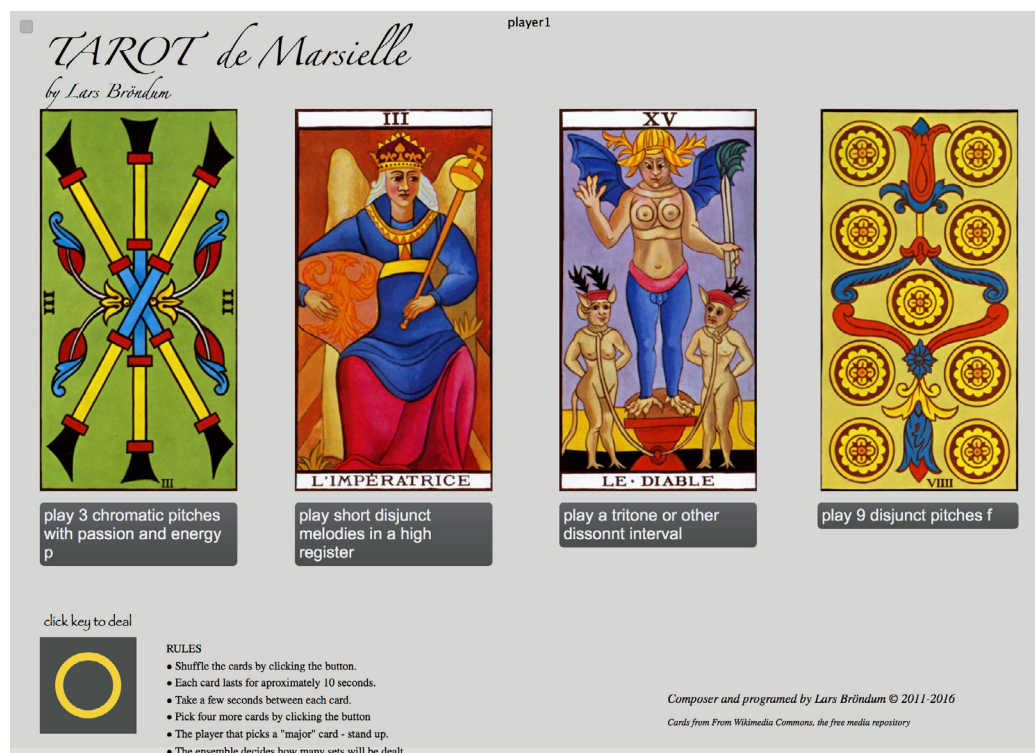


Figure 3. Tarot de Marseille—A Digital Music Card Game.

Techniques in *Fluttering* and *Serpentine Line*

This section is an in-depth look into some of the previously mentioned techniques of graphic notation applied in the pieces *Fluttering* (2010) and *Serpentine Line* (2015). The two pieces were chosen in this paper because they share similar traits, such as related compositional concepts and the use of graphic notation. The compositional concept in *Fluttering* is a prolonged ornament. In the score the musicians are instructed that the ornaments should be played as, “a nervous fluttering—slightly uneven and fluctuating in dynamics” (Bröndum 1). *Serpentine Line* is a term and a theory in art or aesthetics used to describe an S-shaped curved line that appears in an object, such as the boundary line of an object, or as a virtual boundary formed by the composition of multiple objects. The two pieces differ in their relation to time: *Serpentine Line* is fast and animated, quickly shifting moods while *Fluttering* is a static composition slowly moving between different textures. The two pieces also differ in the use of level of “openness”—in *Fluttering* the performers have more

choice on how to execute the score while in *Serpentine Line* the notation parameters offer less choice.

Fluttering for contrabass clarinet, guitar, piano, Theremin and two live electronic musicians—premiered October 18th, 2010 in a performance at Fylkingen in Stockholm by the Ensemble SFW. It has also been performed January 29th, 2011 at Västerås Konserthus. *Fluttering* has also been performed in a rearranged version for trombone, piano, found objects, and electronics (October 7th, 2011). It has also been rearranged, augmented and fitted with the new title, *Trembling Space* for three guitars and live-electronics. *Trembling Space* was performed by the Swedish Contemporary Guitar Ensemble at Fylkingen, April 8th, 2017 and in Berlin, Germany, September 21st, 2018. The *Serpentine Line* was composed for a “call for works” by the New York-based ensemble *Mise-En* in co-operation with FST (Swedish Composers Union). It was performed at the Scandinavian House in New York City, October 24th, at the House of Sweden, in Washington D.C., October 25th, and at the Sound of Stockholm festival at Kulturhuset Stadsteatern in Stockholm, November 10th 2016.

The aim of composing *The Serpentine Line* was to write an intense and animated piece that rapidly changes between different moods and textures. The graphic notation was intended to work in a more controlled environment. The piece, as earlier mentioned, consists of different expressions of S-shaped ornaments that exist in multiple layers and shapes and are continuously varied. The work explores *senza tempo* sections as well as free rhythmical sections with motifs that overlap in multi-layered cyclic processes. The work shifts between notated sections and sections with graphic notation. *The Serpentine Line* is an expansion of an earlier work entitled *Parabola* (2007). *Parabola* has previously been performed on several occasions by the ensemble ReSurge.

The piece is in a “Theme & Variation” form. It can be divided according to the theme, ten variations and a coda. The S-ornament appears in each variation in different guises. I used different styles of graphic notation to vary the theme. First, the S-line appears in conventional notation in mm. 2-5 in the bass clarinet and is imitated by the trombone.

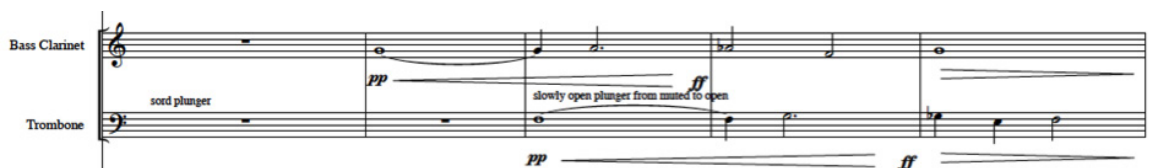


Figure 4. Exposition of the theme in traditional notation.

An improvised piano solo passage moves the piece towards a higher pitch range in measure 3-5 (Figure 5). Instructions are given to the pianist to mute the strings with the hand or cloth and play soft, random pitches, gradually moving to a higher pitch.

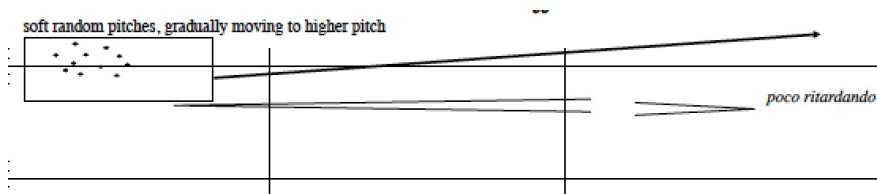


Figure 5. Alternative notation in the piano part, mm 3-5.

In measure 6 (Figure 6) the flute, piano and strings are instructed to play pitches as fast as possible and not to synchronise with other players. This unfolds in an imitative texture. The theme is a variant of the S-shape, and the players repeat the motive and vary the dynamics for 20 seconds.



Figure 6. *Senza Tempo* with free tempo.

The S-line appears in an augmented version in the strings as long slow oscillating drones moving up and down in glissandos while the flute is playing short semi-tone bends (mm. 31-33). The time for this section is 15 seconds (Figure 7).

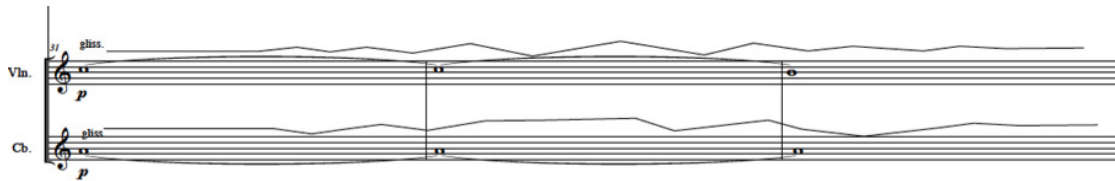


Figure 7. Free semitone bends.

In the flute solo in the D-section (mm. 36-37) a graphic outline is supplied for the flutist (Figure 8). In a sense, the musician can be within his/her comfort zone to create his/her own solo, like a cadenza or to choose to improvise over the contour. The outcome will change between who performs the piece, though retaining some elements.

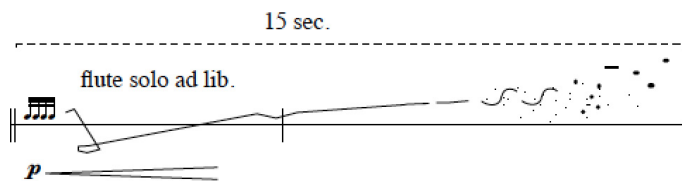


Figure 8. Graphic notation for the flute solo.

In rehearsal letter E (mm. 38-40) the strings play S-shaped glissandos (Figure 9).



Figure 9. S-shaped glissandos.

The S-shaped glissandos (Figure 9) are played over a complex rhythmical structure (Figure 10). The musicians are instructed not to duplicate their neighbour so that the rhythms move at different speeds. Boulez would have referred to this as “surface indeterminacy.”

Irregular tempi (don't duplicate neighbor) 25 sec.

E

38

38

38

38

dampen string(s) with finger

sfz

sfz

sfz

Figure 10. Complex rhythmical structure with free tempo, while flute is notated to play highest possible pitch with upwards arrow symbol.

In measure 52 arpeggios over rhythmical clusters in the piano and strings. The pitches are free to be chosen for a comfortable arpeggio.

24 sec.

f

Figure 11. No noteheads.

The clusters are also partially undefined—and are used first vertically and later horizontally in a climactic climb from low register to the highest possible pitch at the end of the piece.

secco

ascend slowly chromatically

f

Figure 12. Notation depicting horizontal and linear clusters.

The piece ends with highest and lowest pitches playable on the instruments, at the dynamic *fff* with tremolo and slowly morphing into a diatonic cluster, marked *ppp* in *Senza Tempo* (Figure 13)

Senza Tempo

Fl.

B. Cl.

fff

fff

Figure 13. Indeterminate pitch range, played *Senza Tempo*.

Fluttering

Fluttering is simpler in structure and is composed around eight static “states.” The states are sometimes interrupted by short 16th note “bursts” which moves the piece into a new state. The aim in composing this piece was to have a work that explored a greater sense of openness. The score is more “open” or “improvisational” in character than the *Serpentine Line*. Time frames are similar to those used in *Serpentine Line*, but here the sections are longer. Below are some examples of the graphic notation used.

The sections are guided by clock-based events. The musicians execute an action within a certain block of time. The musicians use a clock to keep track of time (Figure 14)

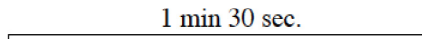


Figure 14. An example of timed duration of an event.

Since there are three musicians playing live electronics in this piece, those parts are only notated with graphic notation. Traditional notation would be hard to use here since the content is not “pitch-based” and it would push the piece towards an unwanted confined performance style (Figure 15).



Figure 15. An example of graphic notation for a live electronic musician.

Fluttering borrows some stylistic elements from jazz in that the performers get to do solos.

The difference is that the solos are based on the graphic figures, such as the guitar solo in Figure 16. The graphic notation in the guitar solo suggests bends, scales and a large pitch range. In the interview with Gärdin, he points out that “this solo may be retained completely note for note by the player or only in its contour. Some musicians may create their own solo, and some will improvise new solo each time. In my experience, it depends on the musician and how used he/she is to improvise.” (Gärdin)

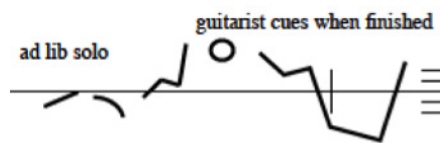


Figure 16. Guitar solo in bar 5.

In the contrabass clarinet solo measure 12 (Figure 17), the square disjunct symbols are often interpreted by the musician as multi-phonics, even though it is not explicitly noted in the score.

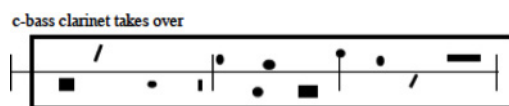


Figure 17. Contrabass clarinet solo in bar 12.

Free rhythms are provided for the pianist with indeterminate pitch, and slowly increasing in density. The pitches may be prepared or plucked inside the piano. (Figure 18)

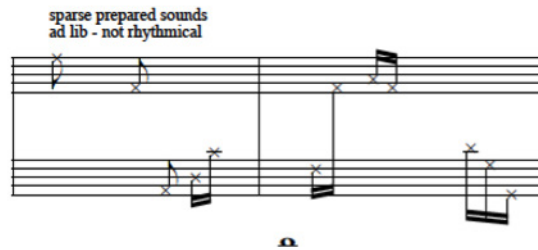


Figure 18. For prepared piano or played by plucking the strings inside the piano.

The sparse sounds played by the pianist are imitated by the guitar, both gradually increasing in density and speed (Figure 19).



Figure 19. Gradual increase in density and speed and indeterminate pitches.

I have compared recordings of the two pieces, and the interpretation of the graphic symbols differs to some degree. In *Fluttering* the improvisers did not seem to follow the graphic symbols to a great degree in the solos (Figure 15, 16 and 17), but improvised freely for the approximate time allotted. But in *Serpentine Line* (and *Parabolae*) the performers follow the outline and shape of the graphic symbol more exactly (Figure 5 and 8). It might also be noted that *Fluttering* did not need many rehearsals, while *Serpentine Line* did require several rehearsals. There were also some parts in the score of *Serpentine Line* that I had to explain for the musicians. For example, the flautist initially played the solo (Figure 8) within a major scale. It just did not fit, so I had to ask her to play “more atonal” and less confined to a scale. Then it worked out well.

Questions

I sent out a short questionnaire and the scores of *Serpentine Line* and *Fluttering* to four musicians to learn how they view some of the aspects of graphic notation. I made follow up interviews between May 21-31, 2018. The four musicians that I selected have worked both with free improvised music and with notated music. They have performed my music and/or we have improvised together.

The first question in the questionnaire was, “do you prefer to improvise or read traditional notation, or both?” The four musicians come from slightly different backgrounds, but they all prefer improvising when performing. Lisa Ullén is a pianist who has been active a long time in the improvised music scene in Sweden, and she is also actively working with experimental new music. Per Gärdin is a saxophonist and mainly an improvising musician. Magnus Alexanderson is a composer, and a guitarist who works with both electroacoustic music and experimental classical music, but lately plays mostly improvised music. Anders Sjölin is a composer of electroacoustic music but also performs improvised live electronic music.

The second question was whether the musicians thought it is helpful with symbols like in *Serpentine Line* or *Fluttering*. “Do the symbols help with the interpretation of the music?: what are there advantages or disadvantages?” They responded that they were generally positive to the use of graphic notation and its effectiveness in the scores they studied. It is “an opportunity to give a more individual or freer interpretation than what is possible with a traditional score” (Gärdin). Ullén believes it is “mostly helpful in interpreting the score”. Alexanderson explains that, “the benefits is that the alternative notation gives the piece an identity and shape that more or less can be reproduced. It is helpful in the sense that you get an overall view faster and hopefully doesn’t need any special explanation.” He continues, “maximum result out of minimum of means is in my opinion perhaps an ideal achievement” (Alexanderson). Sjölin reflected on

the electronic parts in *Fluttering* that the notation “forces you to think out a way to interpret the part and in a sense opens it up for improvisation, even though it isn’t improvisation in its purest sense. It is open but guides you to where the piece is to go, and I like that it is guiding me as a performer. It reduces the number of tools to work with” (Sjölin).

But there are also some possible caveats in using graphic notation in these pieces, such as, “there is a wider range of interpretations, and if you get specific instructions how to do the interpretation contradicting your own impulses, you may feel that you are not more ‘individual’ than with a traditional score, maybe even less” (Gärdin). Or even worse, there may be “problems due to prestige where the musician feels constricted or lack of understanding of the context” (Alexanderson).

As discussed earlier, indeterminacy and improvisation share many traits. They are similar in that they both are an invitation to the unknown and the music changes over time. I asked the musicians to explain if they believe that improvisation is retained in this context? Ullén explained what she feels is an important difference, “for me as an improviser you are listening and performing, responding to the room, and the others who you play with and creating at same time together” (Ullén). In improvisation, you create together. In indeterminacy there is still a composer hidden behind the curtain—it doesn’t matter how open the score is and, even though John Cage wanted to remove the person, it is still someone’s vision that the musician is trying to bring to life. However, the end result may sound very similar. Alexanderson posed an interesting idea that “the notation in *Fluttering* has to be “translated into my vocabulary to become improvisation.” He continues, “for me to truly improvise in this context would demand more time than one usually have... but it’s possible and all alternative notation in the score could probably be translated into improvisation” (Alexanderson). Gärdin pointed out areas in the score that you can retain the improvisatory feel, for example, the flute solo in *The Serpentine Line*: “This solo may be retained completely note for note by the player or only in its contour.” “In bar 3-5 for piano: you might make up an improvisation - or more of a composed phrase—that you play in the same way every time you play the piece” (Gärdin). However, he emphasise that “I don’t really see that as improvisation, an improvisation should be new every time at least in some way, although maybe similar stylistically” (Gärdin). Some of the graphic notation in *The Serpentine Line* is “up to the performer to retain or create new every time I would think” (Gärdin). Sjölin points out that the graphical notation helps “in the creative process as a performer, you are constrained with boundaries, but you have freedom to do a lot” (Sjölin).

To summarise, the four musicians point out a similar qualities in regards to graphic notation. They feel graphic notation is a good way to instruct the player, but they generally do not feel that improvisation can be retained in its true sense when it is within a composed framework. But they also point out that there are different approaches and more personal ways in how to interpret the symbols and whether it can be incorporated into one’s own musical vocabulary. In the interviews it was also agreed that many other factors also affect the outcome of using graphic notation, such as the makeup of the ensemble, background experience, the composer’s vision, personality and collective approach. The interviewees made it clear that there are some strengths and some weaknesses in using graphic notation. The conclusion is that there is a risk that the musicians may feel confined by the symbols or may have difficulty in interpreting the symbols and some improvisational elements may be lost. However, once the openness of the symbols has been worked out, the performance of the piece becomes more personal and confident.

Discussion

We translate abstract symbols into something personal depending on our background experiences. The musician may have, for example, a background in notated music or in improvised music. When listening to different performances of the pieces, there is considerable freer interpretation of the solos in *Fluttering* compared to *Serpentine Line*. In *Fluttering*, I do not think the musicians paid much attention to the graphic symbols in the solos at all but formed their own solos. On the other hand, the musicians that performed *Serpentine Line*, who are classically trained, often composed the symbols into *cadenzas* instead of actually improvising. If I had interviewed musicians who play mainly notated music, there might have been a very different discussion.

Why use graphic notation at all and why not let the musicians improvise freely? Firstly, I believe that improvisation and notation do not have to exclude each other. Both worlds may exist in parallel, but to me, it is a challenge to make the two worlds cross paths and make music together. My aesthetic idea behind composition is to create music that is organic and that it changes over time, but at the same time, I want the core idea of the composition to be retained. I believe graphic notation affords me this possibility. Secondly, there are other advantages such as putting the musicians at ease with the material, and, in other circumstances, a way to limit the musicians to play too much. As Stockhausen describes, “it’s alarming how quickly the musicians reveal their physical and spiritual state... Musicians are easily carried away by not listening, and this is often the reason for a performance turning into rubbish” (Stockhausen 122). Thirdly, the graphical score elements invites to a dialogue between the composer and the musician on how to perform the graphic symbols. I think it is good to have a dialogue between the musicians and the composer. Some may argue that it may be a problem if the composer is not around. However, from experience from performances of some of my pieces, for example, *Twittering Machine #3* for Orchestra (2018) and *Serpentine Line*, I have arrived late to the rehearsals, and the musicians have already interpreted the symbols into a musical context. There might have been some help from the conductor, but today’s musicians are quite open and have experience with alternative notation. And finally, graphic notation enables the musicians a possibility for more involvement in the performance and to contribute creatively to the end result. Perhaps John Zorn sums up the dichotomy between improvised music and open works best, “My particular thrust in writing the game pieces—as with all my music—is to engage, inspire, and enthrall a group of musicians into doing music that they are excited about, so that the excitement is passed on to the audience” (Zorn 197).

Conclusions

The experimental and *avant-garde* composers of the 20th century developed many tools, theories and concepts that the post-modern composers of the 21st century are still working with. This paper is an investigation of how the author uses graphic notation to help form a personal aesthetic compositional style. The scores discussed represent a combination of indeterminacy, improvisation and controlled structure, varying from open scores, such as 5x5, to very detailed graphic scores as seen in *Serpentine Line*. The pieces *Serpentine Line* and *Fluttering* are discussed more in detail for developments of ideas and compositional technique. The musicians that were interviewed come mainly from the improvisational practice and did not think the graphic part allows for improvisation in its purest sense. They, however, agreed that there are many benefits in using graphic notation. It is argued by the author in the discussion that graphic notation enables the musicians a possibility for more involvement in the performance and to have contributed creatively to the end result while still giving the composer control of the end result. It is also pointed out in the discussion that the aesthetic concern of the composer is to be able to compose music that is organic and that it changes over time, but at the same time can be retained around the core idea of the work. In future works, further experiments with graphic notation and compositional concepts will be executed, and the author hopes to refine the personal aesthetic further. It is also an aim to further test these techniques in practice, evaluate them and compare findings with other composers pursuing similar techniques in post-modern composition.

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