



London
Sinfonietta

Teachers' Resource Pack

MUSICAL CYCLES
Sounds and Gyorgy Ligeti

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INTRODUCTION

LONDON SINFONIETTA

Ligeti Remembered I **Tuesday 13 March 2007** **Queen Elizabeth Hall**

György Ligeti	<i>Ramifications</i>
Alexander Goehr	<i>Behold the Sun</i>
Oliver Knussen	<i>Requiem - Songs for Sue</i>
György Ligeti	<i>Piano Concerto</i>
György Ligeti	<i>Melodien</i>

George Benjamin	<i>conductor</i>
Claire Booth	<i>soprano</i>
Pierre-Laurent Aimard	<i>piano</i>

Ligeti Remembered II **Saturday 19 May 2007** **Queen Elizabeth Hall**

György Ligeti	<i>Self-portrait</i>
György Ligeti	<i>Chamber Concerto</i>
Steve Reich	<i>Sextet</i>
György Ligeti	<i>Aventures & Nouvelles</i> <i>Aventures</i>

Martyn Brabbins	<i>conductor</i>
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The London Sinfonietta performed works by Gyorgy Ligeti in two concerts during 2007 entitled Ligeti Remembered I & II. Ligeti Remembered II also featured *Sextet* by Steve Reich whose own work was inspired by the great Hungarian composer, who died in June 2006.

Ligeti is considered as one of the most influential composers of the 20th Century.

About this pack

This pack has been produced to help teachers prepare students coming to either of the above London Sinfonietta concerts. They can of course also be used separately as an introduction to the composers and their composing styles and techniques. They have been framed to allow for maximum flexibility in their use. These materials begin with an introduction to the music of Gyorgy Ligeti and Steve Reich. They are followed by a range of possible activities for use in the classroom to help gain access to the ideas behind their compositions together with an appendix providing background reading, including simple biographies and musical output of both the composers to be heard in concert and some additional web references for further study.

The teachers' activities have concentrated on a few key aspects of the work of the composers – textures and styles, playing and composing techniques. Instead of providing step by step lesson plans, they provide practical 'jumping off' points with a range of ways for exploring the musical aspects and ideas and of thinking about them. The teacher can control their use with perhaps two or three of those ideas with younger students at KS3, with the other ideas to be retained as extension activities. At the same time they allow senior students to explore for themselves and think widely about all or most of the activities. There should be enough ideas and prompts in each activity to keep the most able student still thinking and developing, while each idea is simple enough in itself to engage younger and less experienced pupils.

Teachers will know themselves the nature of the learning in terms of the national curriculum for KS3 pupils and do not need detailed help to justify these activities, and older students can use any of these activities as projects in their examination work. However, a simple statement about the musical learning to be found at the end of each activity is provided as guidance and relevant national curriculum statements are noted to support busy teachers.

We hope the materials will help teachers to think broadly and innovatively about how to approach challenging music in the classroom and help to make it accessible to their pupils.

THE MUSIC OF GYÖRGY LIGETI

György Ligeti died in June 2006 and we are now able to look at his entire output and make some judgements about his place in the world of composing.

He is probably best known by the general public for his music which features in the Stanley Kubrick films *2001: A Space Odyssey*, *The Shining*, and *Eyes Wide Shut*, and also possibly for his opera *Le Grand Macabre*. The key parts of his music that were used in the films were the extremely atmospheric - for the primeval landscapes, the mysterious Moonscape and for strange visual effects and dreamlike scenes.

Ligeti felt strongly about the importance of continuing and building on our musical traditions:
"All new art follows a chain of tradition. You can't escape it."

"I don't believe in the kind of experiment that means putting away the old criteria - that you can put shit on the table, spray it with gold and call it art. When I was part of the avant-garde, it was because modern art was forbidden in the Nazi and Communist eras. My music was a reaction against that. It was a protest, but eventually it became boring to me."

"I have come to a more modest idea on the lines of Candide - 'mais il faut cultiver notre jardin'. Do what you do best, cultivate your own little patch, but don't expect to change the world."

In his earliest work he was clearly following in the footsteps of the musical language of his countryman Béla Bartók. There are still some signs of the shapes, scales and harmonies of folk music pervading his music as a result of Bartók's early influence, such as in the Viola Sonata. Bartók wrote a huge set of piano works, *Mikrokosmos* and Ligeti's set of piano pieces, *Musica Ricercata* (1951-53), are often compared with it partly because of the devices and didactic process he uses. The first uses only note A in several octaves plus a D at the end, the second adds another note, the third a fourth note and so on, so the final piece has all twelve notes of the chromatic scale. Using the minor second so freely led him, rather bizarrely, to be condemned as 'decadent' by the regime in Hungary where all music had to be approved for publication by the composer's union. *'I am an enemy of ideologies in the arts. Totalitarian regimes do not like dissonances.'* Things could only get worse and he didn't stay much longer in Hungary.

He moved into electronic music with Stockhausen in the middle of the fervour of the new studios in Cologne in Germany, but was never the devotee that others in the group became. However, the sounds he discovered clearly influenced him to look sometimes for sounds which resembled electronic textures.

Ligeti was good at absorbing the styles and ideas of others and making them his own. He developed almost a 'signature' Ligeti sound – an ethereal quality with mysterious strands and webs of harmony interweaving through the texture of a piece. He was determined that his music would not be *'polite and normal with its tie neatly tied'* and was always open to new ideas and strands of thought, bringing wit and humour to modernist thought.

Atmosphères (1961) is written for large orchestra and is the first major work which made his name and in which he developed what he called his 'micropolyphony' technique. As a key work from Ligeti's output, it contains most of the ideas that he explored in the 1960s. He concentrates almost exclusively on the texture of sound, the 'sound mass', using the chord clusters which pervade almost all his music. Every note of the chromatic scale over five octaves is played at once in his first chord. No one plays the same note. The music then grows out of it, gradually but continually changing the texture. The 'micropolyphony' is found in the individual players, where and how they move and merge gradually into another cluster. In *Ramifications* (1969), Ligeti was experimenting with tuning, writing for two string groups that had to be tuned a quarter-tone apart. Georg Haas, in homage to Ligeti's inventiveness, has written a *'Homage to Ligeti'* for two pianos which are specially tuned a quarter tone apart.

In the 1970s, Ligeti became more interested in rhythm and, more specifically, polyrhythms. He eventually heard the music of Steve Reich and Terry Riley but even before that he was trying them out for himself, for example in *Continuum* and *Clocks and Clouds*. His *Three Pieces for Two Pianos*, and particularly the second movement *"Self-portrait with Reich and Riley (and Chopin in the background)"*, show his affinity with their work very clearly. African rhythms start to enter his music around the same time. Significant works here are *Études pour piano*

using influences from the gamelan, African polyrhythms, and Bartok and the *Poème Symphonique* for 100 metronomes. The 18 piano Etudes that Ligeti composed over the two decades before his death in June this year are perhaps the most significant addition to the solo-piano repertory since Messaien. They explore more of what is possible in piano technique, and suggest new rhythmic and harmonic directions to him for other work.

In the mid-'70s he wrote his first opera, *Le Grand Macabre*, a work of absurd theatre recreating the spirit of Alfred Jarry. The opera is sexually explicit, and opens with an overture for 12 motor-horns. The young lovers, engaged in love-making throughout most of the opera, were originally to be called Spermando and Clitoria, altered to Amando and Amanda. One character is under the influence the entire opera. Many thought it the funniest opera ever while others were less amused. His surreal interests make one less than surprised that *Alice in Wonderland* was his next project. He was always wanting to communicate better with his audience: '*Stage action and music should be dangerous and bizarre, absolutely exaggerated, absolutely crazy.*'

The Piano Concerto demonstrates many of these new influences: the crazy machine music of Conlon Nancarrow, the irregular stresses of African drumming and various European folk songs and nursery rhymes appearing out the harmonic morass, harmonic surges, chaotic but at the same time light and ethereal.

He loved the surreal abstractions possible with language in such key works as *Aventures* and the a cappella *Nonsense Madrigals* where he uses only the alphabet as his text.

Ligeti was a master contrapuntist too: examine any of his scores, staves racing from top to bottom of the page, bar-lines bulging here and there to accommodate extra notes, and see in the detail of the invention how the voices go one against the other. No one of his generation was a finer craftsman.

Stephen Plaistow, The Guardian, June 14, 2006

LIGETI'S MUSIC IN CONCERT

AVENTURES AND NOUVELLES AVENTURES

Orchestration: flute/picc, clo, cb, piano/celeste/harpsichord: 1 percussion, soprano, mezzo soprano, baritone

These somewhat surreal pieces, first performed in 1963 and 1965 respectively, make one ask the most pertinent question of all - 'What is music?' Puccini is said to have defined music as 'sounds organised by wisdom'. We sometimes need to know the intention of the composer to decide on the wisdom. We always need to hear the music in the context for which it was written. In these linked works we need to see as well as hear the performers to feel the way in which the vocal sounds used become a new form of language.

Aventures opens with a single vocal note and a kind of 'white noise' which grows and decreases. A huge range of vocal noises and vocalisations include long crescendi and diminuendi on one note, hums, growls, laughs, spitting, screeches, screams, heavy breathing, every vowel sustained, high and low hard consonants, explosive shouts, ah, shti, rrrr, shots, and so on. Declaiming bass tones herald another section which dissolves in a very warm harmonic passage with a hum-held semitone. Additional added 7ths and 9ths merge with low sounds and dotted patterns which sound manipulated electronically and the piece ends with an 'Oh.....' suggesting emotional crisis. 'Ha and eh?' in very rapid succession dominate the first movement of *Nouvelle Aventures*. At one point the horn player is also asked to produce very similar kinds of 'vocalisations' and builds the excitement, suggesting moods and actions through different levels of agitation. Harmony is developed using incidental overlapping of phrases, a chorale and some double declamations. Long silences are used to punctuate sections or actions where the performers are instructed to appear '*as if turned to stone*'.

All the text used is in the international phonetic alphabet and is notated in only approximate pitch and some with approximate rhythms too. Ligeti gives the performers very precise instructions, however, on how to produce toneless breathing, declaiming, whether to perform to the audience or the other performers, how to sing into the horn, where and how to brush the piano strings, and the kinds of materials to be used by the percussionist such as a balloon, plastic cups, a tray piled with dishes.

These pieces seem to explore the distortion and abstraction of

- a) Sounds
- b) Meaning and use of language in music
- c) Rhythms and meticulous timings
- d) Harmony of accident

They are in the form of mini-operas without words (Ligeti calls it 'mimodrama') and were the result of developing a whole new vocal repertoire – and needed to develop a whole new set of singer's with the relevant skills to perform them. The singers have to find a huge range of different kinds of sounds from squeaking to declaiming to growling to heavy breathing (see description above).

One of Ligeti's purposes in the piece is to explore the relationship between music and language, the sound inflections that speech uses to be understood, a study of wordless communication which is possible in music. Ligeti says the work is '*semantically meaningless and has only emotional content*'. People often watch and listen to opera in a foreign language and don't necessarily understand what is going on dramatically though the context usually gives a good idea. Here we can interpret Ligeti's vocal sounds in the same way – throughout the pieces the singers are asking questions, exclaiming, complaining, laughing, shouting and heavy breathing. They move from high drama to pathos. Sections are often divided by silence – like a conversation that has a lull in it – and is then filled with hubbub while the next conversation gets underway.

Ligeti himself describes *Aventures* as having five parallel streams of 'events' which combine and interact. The singers use the sounds, their context and their timing to present these feelings and events. It sounds too abstract but in the 'flesh' it can be most entertaining like a comic opera. Every vocal effect imaginable, every facial and other gesture, including roaring into the grand piano, is used to communicate in some way with the audience and create a sense of drama and often humour – one of the highlights in the 'drama' is a percussionist throwing a wine bottle into a dustbin.

CHAMBER CONCERTO

Orchestration for 13 players: flute/picc, oboe/cor anglais/oboe d'amore, clarinet, bass clarinet, horn, trombone : vln1, vln2, vla, clo, cb : piano/celeste/harpsichord/electric organ.

Ligeti's *Chamber Concerto* was written in 1969/70 and is in four movements: *Corrente; Calmo sostenuto; Movimento preciso e meccanico; Presto*. These represent for Ligeti different kinds of movement – gentle motion, static interrupted by excited rhythms, mechanical, scattered, flitting and erratic.

It is called a concerto because each individual player must be a virtuoso to be able to play the music, but there are actually no solo parts at all in it. Instead, groups of soloists overlap and alternate with one another, often in timbre blocks such as woodwind, brass or strings..

The music is full of extraordinary sounds – slowly evolving threads and patterns, interruptions and spiky hammering chords, simple chords moving chorale-like in solemn procession, single notes or clusters of notes hanging for an eternity. The harmony is often of two kinds pulling against each other - precisely defined harmonic structures, and blurred, much darker harmonies. Rhythmically, the work contains fast and furious passages, out of phase sections, and strongly distinct rhythmic drive.

The first movement, *Corrente*, is written polyphonically and opens with strange interweaving textures, sustained, creeping tremolo strings sul ponticello, holding the interval of a second for a long period. The pitch cluster starts to expand higher and lower with some added pentatonic suggestions and produces low muddy chords emerging from extremely quiet misty trills high above, low rushings punctuated by bites from the brass – finally fading to nothing. Ligeti loves asking his players to play, for example, '*at the edge of audibility*' or '*attack imperceptibly*'.

Movement 2, *Calmo sostenuto*, is written largely homophonically, with still, simple hung chords growing with 7ths and 9ths and gradually changing textures and clusters of notes and a sustained melodic line beneath it. The central moment is a sustained but unstable tritone. This gradually and calmly disintegrates into fluctuating lines, again playing with high and very low sounds interacting. Tremolos of all sorts resolve eventually onto a single note.

Movement 3, *Movimento preciso e meccanico*, is rhythmically mechanical and rushes about, snakelike, spiky, scalic, scrubbing, chugging, with a very liquid feel to it. As the strings rise helter skelter, higher and higher to the end they finish on a very long held tritone as the music winds down before being spiked at the end rather incoherently. The movement reminds one of his symphonic poem for 100 metronomes with its fascination for machinery, both regular and irregular.

The fourth movement, *Presto*, is fast, furious and virtuosic. It closes the work with trills, fast pizzicato notes and brass interjections. After slowing down to a complete stop the repeated high and low notes begin to close in, pizzicato becomes col legno along with a very percussive use of the piano. Bass instruments out of synch with each other and a high screeching spiky ending with a rising tremolo close the whole work.

SELF PORTRAIT
(from three pieces for two pianos)

Self portrait with Reich and Riley (and Chopin in the background)'': is one of Ligeti's 'Three pieces for two pianos': Monument – Self Portrait – Movement. It was written in 1976.

This second piece, 'Self-portrait', to be heard in the concert is a sort of broken Moto Perpetuo with four different sections all exploring the sort of interference patterns and rhythmic resolutions which one might consider as a homage to American minimalism (and which also intrigued Steve Reich and made his name). The movement is sandwiched between the very stark *Monument* and the more liquid final *Movement*, both movements beginning in the middle register and extending outwards.

Some of the patterns are produced by blocking the sound which comes from some of the keys in a way which disrupts the rhythms, particularly confusing since it is so fast. Ligeti is again fascinated by the effects of a rhythmic illusion, rather like using a stroboscope or in op-art. The rhythms sometimes occur simply because some pitches recur as a result of there being two pianos rather than one.

The first section of the piece starts on top D and gets further and further out of phase between the two pianos and then almost back again – then by adding additional notes close to the D the patterns which need resolving become more complex. In the second section Ligeti uses the tiny trill motif which ends the first section and adds falling percussive contrasts down the octave, but still with the slightly out of phase feeling and rhythmic resolutions he loves. The third section adds a chorale-like falling bassline melody (used at the end of all three movements) which he immediately uses in a mirror canon to explore the interference patterns produced. The ending in the fourth section is very low having started with percussive arpeggiatic figures still in moto perpetuo.

REICH'S MUSIC IN CONCERT

SEXTET

Orchestration: 2 synthesisers and pianos + 4 percussion players

Sextet was commissioned by the Laura Dean Dance company and written for the Nexus Percussion ensemble and first performed in 1985. A great deal of Reich's other music has been used by dance companies too because of its particular rhythmic and subtly changing qualities. The work is in five movements but played without a break. The structure is as arched one of A B C B A with the outer movements paired, having many similarities in fast speeds, parallel chord cycles and other musical material. The second and fourth movements are also paired and share similar moderate speeds and the middle movement is much slower. Reich was interested in overcoming the limitations of the short duration notes of most percussion instruments and has deliberately chosen mostly resonant percussion instruments which produce sustained sounds such as the bowed vibraphone and the marimba.

The first movement opens with fast, oscillating and regularly hanging chords on the piano developing a greater melodic identity as the movement progresses. The heavy, low unfolding pattern of the second movement develops like a walking bass with the bowed vibraphone hanging above it. The slow drip and chords of the third movement are interspersed with ambiguous, overlapping African rhythms. More drips in the fourth movement where the piano accompaniment of the second movement becomes the melodic material of the fourth with oscillating ostinati moving in and out of phase. The rhythmically very dynamic final movement has a Latin flavour, repeating patterns on resonant percussion with shifting stresses in both the bassline and the harmony.

IDEAS AND ACTIVITES FOR THE CLASSROOM

1. Interference patterns

Interference patterns can be found in lots of different places – look for some and relate them to what happens in the rhythmic music of Reich and Ligeti.

Think of what happens when you throw a stone in water and the way the lines spread out and interlink – these are known as interference patterns. If possible, find pictures of water with rings in it where something has been dropped in.

Hold your hands, up palms facing the light coming through the window. Open the fingers and wave your fingers of each hand in front of one another in front of the window. Look beyond your hands to the light beyond and watch the patterns.

Find a Bridget Riley image, (websites in appendix) preferably a black and white one, on the web – many of them are examples of experiments in interference patterns and optical illusion.

Steve Reich and György Ligeti enjoyed working with these in musical terms. Listen to a CD of Steve Reich 'Drumming'. Try the next exercise – 'In and out of synch'.

LEARNING

Key musical learning at all stages	Investigating repeated patterns and interference patterns in other manifestations to develop understanding of the work of Reich and Ligeti.
KS3 programmes of study - key elements addressed in this exercise	1) Creating and developing – 2b 2) Responding and reviewing – 3a, 3b 3) Listening and applying knowledge – 4a, 4b, 4d
Other	Breadth of study – 5a, 5b, 5e

2. In and out of synch

In pairs:

a) one person plays a three time rhythm emphasising the first beat of the bar, maybe **tap**, clap, clap etc. The second person plays the same but in four time – **tap**, clap, clap, clap

Keep repeating it till the regular pattern of twelve become clear.

\boxed{X} - - X - - X - - X - - \boxed{X} - - X - - X - - X - - \boxed{X} - - X etc
 \boxed{X} - - - X - - - X - - - \boxed{X} - - - X - - - X - - - \boxed{X} - - - X etc

- b) Do the same with 4s and 5s and write down the pattern
- c) Do the same with 6s and 7s and write down the pattern
- d) Do the same with 7s and 9s, or 11s and 13s and so on.

The larger the unit the longer it will take for them to resolve rhythmically and the more interesting sub-patterns will emerge.

And then:

Try the same thing adding a third person and see where the overlaps and patterns develop

Use instruments rather than clapping, but not too different – the patterns that emerge should primarily be rhythmic ones, rather from different colours.

Record a pattern over a long period of time and then play another one over the top of it. Always be listening carefully to the result and see how you might use it or develop the idea.

Try using a maximum of 3 pitches in a short phrase and develop a phase shift over time of the phrases.

Listen to a CD of Steve Reich 'Clapping'.

LEARNING

Key musical learning at all stages	Working with periodic rhythms and phase shifting, comparing them with a composer's use of them
KS3 programmes of study - key elements addressed in this exercise	4) Controlling sounds – performing skills – 1b 5) Creating and developing – 2a 6) Responding and reviewing – 3a 7) Listening and applying knowledge – 4a, 4b
Other	Breadth of study – 5b, 5c, 5e

3. Vowels and vocalisations

a) Play the game '**Why are you cross?**'

Two people sit opposite each other sitting on their hands with everyone watching. They have an argument while counting up to 30, using your voices in many different ways.

For example

- 1) 'One' – very quiet and clipped
- 2) 'TWO, THREE, FOUR' - loud and argumentative
- 3) 'FIVE, SIX' – very slow, drawn out and defiant
- 4)and so on

Discuss all the different tone used by the voice alone. Try it again with two other people without sitting on their hands and discuss what gestures they used as well.

Try it again with an entirely different 'story line' – maybe trying to get off with each other, or shopping, and see what other tone qualities people use.

b) **New Adventures**

Invent a new piece by using one of the 'story lines' or conversations again with vocalisations instead of words, in the manner of Ligeti's *Aventures*.

Use sounds such as

- squeaks,
- growls,
- vowels,
- mmmm,
- laughs,
- rrrr, kkkk, ha!, eh?,
- heavy breathing,
- long singing tones with crescendi and explosions.

Use a long sustained sound beneath the conversation to bind it together as a piece.

Make a break with a longish silence to feel like a break in the conversation and then start 'conversing' again.

Can you give reasons why this should be called music – or not?

LEARNING

Key musical learning at all stages	Developing new relationship between words, gestures and music in the manner of Ligeti
KS3 programmes of study - key elements addressed in this exercise	8) Controlling sounds – performing skills – 1a 9) Creating and developing – 2a, 2b 10) Responding and reviewing – 3b 11) Listening and applying knowledge – 4b, 4c, 4d
Other	Breadth of study – 5b, 5e

4. Using cluster chords

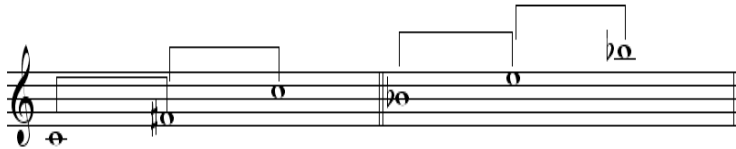
Have a group size of at least three people, preferably more and with a variety of tone qualities. Use whatever instruments are available and can be played in a sustained way.

Pick any simple chord or 'cluster' of notes at random and hold it, using alternate breathing if necessary between the players to make it last continuously.

Then

- Add a 7th and/or 9th above or below it
- Hold it some more
- **Develop a creeping melodic line above or below it
- Add very gentle ornaments or runs around the lines in the chord or try to make a more liquid sound within it
- Gradually move the chord upwards (or downwards if you started high) either with a crescendo or diminuendo at the same time and settle somewhere and sustain it still again.
- Go through the same process again from **
- Add occasional short sharp spiky very high or very low instrumental shouts to punctuate your developing piece
- Break - and restart with a very high chord and dissolve from it downwards onto a very low one
- Add a tritone* and hold to the end on a diminuendo.

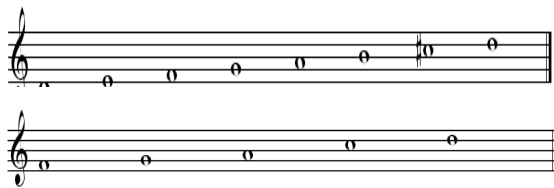
*A tritone is an interval four tones apart, for example:



Listen all the time to the way that the texture and tone quality is changing as you play. Take turns to stop and listen to the others.

Try writing down what you have done as accurately as you can. Come back to it later and see if you can reproduce it.

Try the whole of the above again – but this time deliberately choose notes in your cluster which come from a diatonic, whole-tone, or pentatonic scale (below).



LEARNING

Key musical learning at all stages	Investigating chords and the gradually changing tones and textures of micropolyphony.
KS3 programmes of study - key elements addressed in this exercise	<ul style="list-style-type: none"> • Controlling sounds – performing skills – 1b, 1b, 1c • Creating and developing – 2a, 2b • Responding and reviewing – 3b, 3c • Listening and applying knowledge – 4b, 4d
Other	Breadth of study – 5b, 5c

Appendix I

GYÖRGY LIGETI 1923-2006 – A SHORT BIOGRAPHY

Ligeti was born in 1923 in Transylvania in a region of Romania which was largely Hungarian with a large Jewish population. He felt like an outsider from his very earliest days. Many of his family were persecuted and lost their lives during the war and he was forced into a labour camp by the Nazis. After the war he trained at the Academy in Budapest in Hungary. He remained in Hungary during the repressive times until the Soviet invasion in 1956, going into what he called 'internal exile', keeping his head above water by writing in officially approved styles 'by day' and working privately on his own new musical language. This meant that when his work was eventually played in public it caused a sensation – no one had any idea he was formulating these ideas over so long.

In 1956 he fled, hidden in a mail train, to the west and he eventually became a full Austrian citizen. This enabled him to think freely about music, to travel more widely and meet and share experience with some major musical names of the day. He visited Cologne where he worked with Stockhausen in his new electronic studios, developing as a brilliant theorist for the new music movement and as a musical adventurer, always open to new ideas. Teaching composition at the Music Theatre Academy in Hamburg for 16 years gave him a secure base to work from and his output and reputation grew from then. He was from time to time visiting professor in Stockholm and in the US and taught on the famous Darmstadt new music courses.

He has been much lauded and received many of the significant international music prizes over the years. He was admired and hugely influential in his field, widely acknowledged as a musical pioneer but he continued to feel an outsider, never happy being associated with any strident ideologies or 'schools' of thought.

His interests were always wide – he nearly studied physics rather than music - and his understanding of ideas such as fractal geometry, chaos research, biochemistry and the writing of Lewis Carroll show in the preoccupations of his work. Wit and humour permeate his later music. He was the grand-nephew of the great violinist Leopold Auer and his son, Lukas Ligeti, is now a composer and percussionist based in New York City.

Appendix II

LIGETI'S WORKLIST

Opera

Le Grand Macabre (1975-77, second version 1996)

Orchestral

Concert românesc (1951)

Apparitions (1958-59)

Atmosphères (1961)

Lontano (1967)

Ramifications, for string orchestra or 12 solo strings (1968-69)

Chamber Concerto, for 13 instrumentalists (1969-70)

Melodien (1971)

San Francisco Polyphony (1973-74)

Concertante

Cello Concerto (1966)

Double Concerto for Flute, Oboe and Orchestra (1972)

Piano Concerto (1985-88)

Violin Concerto (1992)

Hamburg Concerto, for Horn and Chamber Orchestra with 4 Obligato Natural Horns (1998-99, revised 2003)

Vocal/Choral

Requiem, for Soprano and Mezzo Soprano solo, mixed Chorus and Orchestra (1963-65)

Lux Aeterna, for 16 solo voices (1966)

Clocks and Clouds, for 12 female voices (1973)

Nonsense madrigals, for 6 male voices (1988-1993)

Sippal, dobbal, nádihegedüvel (With Pipes, Drums, Fiddles) (2000)

Chamber/Instrumental

Sonate, for solo cello (1948/1953)

Andante and Allegro, for string quartet (1950)

Balade (Ballad and Dance), for two violins (1950)

Six Bagatelles for Wind Quintet (1953)

String Quartet No. 1 Métamorphoses nocturnes (1953-54)

String Quartet No. 2 (1968)

Ten Pieces for Wind Quintet (1968)

Trio for Violin, Horn and Piano (1982)

Hommage à Hilding Rosenberg, for violin and cello (1982)

Sonata for Solo Viola (1991-94)

Piano

Induló (March), four-hands (1942)

Polifón etüd (Polyphonic Étude), four-hands (1943)

Capriccio 1 & 2 (1947)

Invention (1948)

Három lakodalmi tánc (Three Wedding Dances), four-hands (1950)

Sonatina, four-hands (1950)

Musica ricercata (1951-1953)

Trois Bagatelles (1961)

Three Pieces for Two Pianos (1976)

Études pour piano, Book 1, six études (1985)

Études pour piano, Book 2, eight études (1988-94)

Études pour piano, Book 3, four études (1995-2001)

Organ

Ricercare - Ommagio a Girolamo Frescobaldi (1951)
Volumina (1961-62, revised 1966)
Two Studies for Organ (1967, 1969)

Harpichord

Continuum (1968)
Passacaglia ungherese (1978)
Hungarian Rock (Chaconne) (1978)

Electronic

Glissandi, electronic music (1957)
Artikulation, electronic music (1958)

Appendix III

STEVE REICH – A SHORT BIOGRAPHY

Stephen Michael Reich was born in 1936 in New York. He was educated at Cornell University and then the prestigious Juilliard School. He has worked with many of the key names of the twentieth century including Berio, Milhaud and Ligeti. *The Guardian* has described Reich as one of the few composers to have "*altered the direction of musical history.*" He first experimented with 12 note composition but was more attracted to the rhythmic rather than the melodic or harmonic results of it.

He is a pioneer of minimalism, although his music has increasingly deviated from a purely minimalist style. He first got into shift phasing and ever moving patterns which are his trademark though making tape loops and experimenting with canon. Some of this early experimentation was used in film scores.

He became a close colleague of Terry Riley, another minimalist who combines simple patterns at different times to create shifting patterns and a sort of chance (aleatoric) additional rhythm. One of his early experiments was It's Gonna Rain where he used recordings of a sermon to cut and make tape loops to play in and out of phase with each other.

Reich spent time in Ghana studying drumming and the gamelan in Bali, both of which influenced his very important piece 'Drumming' first performed by his new ensemble Steve Reich and Musicians, a group which has been performing his music ever since.

More recently he has moved on from phase shifting, working with larger and larger ensembles and looking at other music processes such as augmentation of phrases and melodic strands. His most recent work has a stronger political theme to it, and harks back to his Jewish background. His *Different Trains* contrasts his childhood train journeys with those journeys used to transport children to their deaths under the Nazi regime. Operas on the Hindenburg disaster, nuclear weapons, Dolly the Sheep and cloning are testament to his wide concerns.

His work has been a great influence on many other composers, particularly those in the pop world such as Brian Eno. John Adams commented, "*He didn't reinvent the wheel so much as he showed us a new way to ride.*"

He has been working now for many years with major orchestras, festivals and choreographers, and has been much lauded with major music prizes. Concert halls around the world marked his 70th birthday in 2006.

Appendix IV

STEVE REICH WORKLIST

It's Gonna Rain, - tape (1965)
Come Out, - tape (1966)
Piano Phase - 2 pf, or 2 marimba (1967)
Slow Motion Sound concept piece (1967)
Violin Phase - vln and tape or 4vlns (1967)
My Name - 3 tape recorders and performers (1967)
Pendulum Music – 3/4 microphones, amplifiers and loudspeakers (1968)
Four Organs - 4 electric organs and maracas (1970)
Phase Patterns - 4 electric organs (1970)
Drumming - 4 pairs tuned bongos, 3 marimbas, 3 glocks, 2 female voices, whistling and piccolo (1970/1971)
Clapping Music - 2 musicians clapping (1972)
Music for Pieces of Wood - 5 pairs of tuned claves (1973)
Six Pianos (1973) - transcribed as *Six Marimbas* (1986)
Music for Mallet Instruments, Voices and Organ (1973)
Music for 18 Musicians (1974–76)
Music for a Large Ensemble (1978)
Octet (1979) - revision for slightly larger ensemble, *Eight Lines* (1983)
Variations for Winds, Strings and Keyboards for orchestra (1979)
Tehillim - voices and ensemble (1981)
Vermont Counterpoint - amplified flute and tape (1982)
The Desert Music - chorus and orchestra or voices and ensemble (1984, text by William Carlos Williams)
Sextet - percussion and keyboards (1984)
New York Counterpoint - amplified clarinet and tape, or 11 clarinets (1985)
Three Movements - orchestra (1986)
Electric Counterpoint - electric gtr or amplified acoustic gtr and tape (1987)
The Four Sections - orchestra (1987)
Different Trains -string quartet and tape (1988)
The Cave – 4 voices, ensemble and video (1993, with Beryl Korot)
Duet – 2 vlns and string ensemble (1993)
Nagoya Marimbas - two marimbas (1994)
City Life - amplified ensemble (1995)
Proverb - voices and ensemble (1995, text by Ludwig Wittgenstein)
Triple Quartet - amplified strg quartet (with prerecorded tape), or 3 strig quartets, or strg orch (1998)
Know What Is Above You - 4 women's voices and 2 tambourines (1999)
Three Tales - video projection, 5 voices and ensemble (1998–2002, with Beryl Korot)
Dance Patterns - 2 xylophones, 2 vibraphones and 2 pianos (2002)
Cello Counterpoint - amplified clo and multichannel tape (2003)
You Are (Variations) - voices and chamber orchestra (2004)
Variations for Vibes, Pianos, and Strings - dance piece for 3 strg quartets, 4 vibraphones, 2 pf (2005)
Daniel Variations - 4 voices and instruments (2006)

Appendix V

USEFUL WEBSITES FOR FURTHER STUDY

LIGETI

Ligeti biography and worklists

http://en.wikipedia.org/wiki/Gy%C3%B6rgy_Ligeti
www.essentialsofmusic.com/composer/ligeti.html

Site with lots of Ligeti 'creative activities' for use in school

www.braunarts.com/ligeti/

Ligeti home page

www.gyoergy-ligeti.de/

Snatches of Ligeti's music and score snippets to play from

www.gyoergy-ligeti.de/special/ton/index.html
www.gyoergy-ligeti.de/special/ton/index.html

Obituaries

www.schott-music.com/news/komponistennews/show,3336.html
www.telegraph.co.uk/news/main.jhtml?view=DETAILS&grid=&xml=/news/2006/06/13/db1302.xml
<http://arts.guardian.co.uk/news/obituary/0,,1796976,00.html>

Review of Aventures

www.helsom.demon.co.uk/opera/Aventures.txt

Discussion on Chamber concerto

<http://links.jstor.org/sici?sici=0040-2982%28198903%292%3A168%3C30%3ALCC-SO%3E2.0.CO%3B2-R&size=LARGE>

STEVE REICH

Official Steve Reich website

<http://www.stevereich.com/>

Publisher's homepage on Reich

http://www.boosey.com/pages/cr/composer/composer_main.asp?composerid=2781&langid=1&ttype=SNAPS HOT&title=Snapshot

Biography and work lists

http://en.wikipedia.org/wiki/Steve_Reich
<http://w3.rz-berlin.mpg.de/cmp/reich.html>

Analysis

<http://media.hyperreal.org/zines/est/articles/reich.html>

RHYTHMS, PHASE SHIFTING AND INTERFERENCE PATTERNS

Interference patterns images and explanations

<http://id.mind.net/~zona/mstm/physics/waves/interference/twoSource/TwoSourceInterference1.html>
<http://en.wikipedia.org/wiki/Interference>

Bridget Riley pictures

www.google.co.uk/search?hl=en&ie=ISO-8859-1&q=Bridget+Riley+images&btnG=Google+Search&meta=www.usc.edu/schools/annenberg/asc/projects/comm544/library/artists/RileyBridget.html
www.askart.com/AskART/artists/search/Search_Repeat.aspx?searchtype=IMAGES&artist=109768

ABOUT THE WRITER

These materials were written by Anice Paterson, commissioned by the London Sinfonietta. After 20 years teaching music and performing arts in schools, she was Music Adviser for Leicestershire Education Authority, Chair of the National Association of Music Educators (NAME) and for five years before her recent retirement was responsible for the production of all publications for NAME. She continues to be a practising musician and guide to young teachers.