

CHAPTER 6

Electro-Acoustic Compositional Techniques

“So many composers think that you can take any sound and use it. That’s true insofar as you really can take it and integrate it and ultimately create some kind of harmony and balance. Otherwise it atomises... You can include many different forces in a piece, but when they start destroying each other and there’s no harmony established between the different forces, then you’ve failed. You must be capable of really integrating the elements and not just expose them and see what happens.” [Karlheinz Stockhausen, 1971]

Composers began using electronics in music in the 1920’s with the introduction of the Theremin as an electronic instrument. This process continued into the 1930’s with the introduction of the Ondes Martenot. However, as discussed in Chapter 2, the arrival of the first magnetic tape recorder in the 1930’s was to spark off a totally new school of composition called *Musique Concrète* which involved the recording and manipulation of natural sounds on tape for performance.

Composers began to introduce electronics into experimental music in the early 1960’s by inventing and adapting a portable electronic technology, which was easily accepted by the world of performers. It was also around 1960 that European composers began to break out of the closed cycle of music committed to tape. As mentioned earlier in Chapter 2, Varèse wrote *Déserts* for tape and orchestra in 1954, while Berio’s *Differences* combines a live quintet with a progressively distorted tape of the same instruments. This spate of innovative electronic compositional methods, was the embryonic development of the electro-acoustic compositional styles that are present today.

6.1 Previous techniques

In general, live electronics were used in two main ways in the 1960's. First, electronic versions were made of scores whose instrumentation was unspecified - *e.g.* John Cage's *Variations II* - which could now draw freely on the new range of sound sources opened up by electronics. Secondly, the way was prepared for pieces which specify a particular electronic system, which may or may not include a score for acting within its 'electronic instrumentation'. Varèse pointed out that a tape piece, in which the composer is in direct contact with the sounds he is using, becomes the terminal object of creation [Nyman, 1974]. By using live electronics, the composer-performer coupling get an even more direct contact with sound than Varèse could have had with tape manipulation and electronically generated sounds.

Generally, there are several categories of composition involving electronic techniques. Although there are styles such as *musique concrète* and pure *computer music* for example which don't involve a performer, there are many methods which do. Whether it is the interaction of the audience who can act as the 'performer' of the piece, or whether it simply involves a performer playing a live instrument involving some electronic element in the performance, electro-acoustic writing encompasses a large variety of styles. Music can be written so that a performer works with a rhythmic tape track - *e.g.* *The Persistence of Memory* (section 6.3) - or a tape track that requires a 'click-track' to help the performer hold their place with the non-leading tape part. Alternatively, as is shown in *Tremolo Mystique* (section 6.4), an extra performer could be used to start a tape or CD track at a particular moment of a piece using a score for tape/CD.

Another method of interaction with electronic effects exists in the medium of Multimedia. In this case - as in *The Theory of Everything* (section 6.2) - the audience can choose what strand of the piece they wish to see and hear, and through determinate choices, the composition can be heard through the hand of the listener. The identity of a composition is of paramount importance to most post-Renaissance

composers, yet this identity takes on a very different significance for the more experimental work where indeterminacy in performance guarantees that two versions of the same piece will have virtually no perceptible musical ‘facets’ in common. With this type of multimedia performance - *The Theory of Everything* - there is a certain level of indeterminacy in performance. However, there are perceivable links between performances, as all the elements building the compositions are the same, only varying in their playing order, as will be seen later.

6.2 *The Theory of Everything*

(for Multimedia - 1997)

Duration: approx. 2’ 20”

The Theory of Everything was conceived as a pure electronic music composition for a multimedia piece of the same name. The multimedia piece uses a variety of media and Internet technologies to introduce a number of stories. There are two main topic cycles - the *Egg* cycle and the *Chaos* cycle - which are used in the multimedia piece. A Chinese creation myth based around a mythical character *Phan Ku* is represented in the *Egg* cycle while a Greek creation myth is represented in the *Chaos* cycle. Music is used in the *Egg* cycle to introduce and conclude the narration of the story. Both sections of music, each in seven segments, are complete pieces of music. If the seven segments are concatenated, this results in a complete work. The music is purely electronic, and was generated using a Korg X5 synthesiser and the Logic Audio computer sequencing package.

6.2.1 The Computer-User-Interface

The main computer interface screen is shown in Figure 6.1. It displays a toggle bar in the top right-hand corner which allows for switching between the two main story paths - the *Egg* cycle and the *Chaos* cycle. Once a particular cycle has been chosen, the navigation bar at the top of the page will suggest a path to move through the different story clusters. In the *Egg* cycle, there are three story clusters:

1. “The Universe”
2. “The Egg Myth”
3. “Creation”

while in the *Chaos* cycle, there are two story clusters:

1. “The Chaos Myth”
2. “Origins”

Each story cluster has been broken down into its core fragments or ‘grains’. People from various disciplines such as astronomy, art, and cultural theory, were asked to respond to these grains based on their own specific field of experience. The grains are presented in the form of voice-overs incorporated with animations. While a user is viewing and listening to one of these grains, other potential paths are highlighted. All the grains of one story can be viewed sequentially, or else it is possible to cross-cut between stories and grains. Grains that have been visited are then traced by a blue circle, so that a user can view their trail through the site.



Figure 6.1 The Computer-User-Interface (Main Page only)

6.2.2 The use of Music in the Story Cycles

Only one of the main cycles in the multimedia piece makes use of music - namely the *Egg* cycle. Two of the story clusters in this cycle - *The Universe (The Big Bang)* and *The Egg Myth (Phan Ku)* - use music to introduce animations and voice-overs, and then to conclude them. Both clusters contain seven grains. Each of the grains are preceded by a 10 second musical sample, which is again played upon their completion. The music is chosen so as to represent in some way, the section it is preceding. If the seven grains of either story cluster are concatenated, then they represent a complete story. Similarly, by placing the musical samples end to end, and playing the resulting composition, a piece of music results which has the propensity to tell the complete story. As the two story clusters - *Big Bang* and *Phan Ku* - have similar subdivisions and the subdivisions tell equivalent parts to the story, then the first section of the composition *The Theory of Everything* should contain seven grains that are closely related to the seven grains in the second section.

6.2.3 Scientific Grain Structure for *The Universe - The Big Bang*

Fragment	Timeline	Keys	Animation
Birth	0 seconds	• Cataclysm • Density - 10^{14} gm cm^2 • Giant explosion • Big bang • Most distant galaxies • Supernatural influence? • Contraction	• Pictures of David Gradwell - Astronomer • Stars • Explosion
The Big Bang	10^{-4} seconds	• Sub-atom particles formed • Temperature $> 10^{12}$ Kelvin	• Explosion flame • Thermometer - Extreme heat
Quarks	10 seconds	• Temperature 10^{10} Kelvin • Breakdown in equilibrium • Radiation emitted	• Sub-atomic particles • Thermometer - Heat 2
Atoms, Gas and Gravity	1 million years	• Temperature 10,000 Kelvin • Density - $10^{-21} \text{ gms cm}^2$ • First atomic particles • Hydrogen ions - atoms • Hydrogen / Helium • Small tendrils of gas • Gravity - strong gravity • Beautiful galaxies	• Gas clouds film loop • Measure of Radiation in Space.
Galaxies	1 billion years	• Matter - Gas H + He • Enormous galaxy clusters • Virgo cluster • Milky Way • Andromeda galaxy • Spirals / Elliptical • First Stars • Supernovae • Glittering Jewel Box	• Galaxy formation film loop. • Local group film loop (Virgo, the Milky Way, and Andromeda) • Galaxies film loop of Spiral, Elliptical, etc. • Supernovae

		• Andromeda - 3m light years • Light for man on earth	
Life	10-20 billion years	• Ordinary star • 9 planets, 3 moons, rocks, ice • 3rd planet - unique - life • Edge of universe • Spectrum - info. - moving, distances, elements • Intelligent spacecraft • Earth destroyed • Sun - cool and expand • Red Giant	• Sun, Solar System, Earth • Gas cloud
The End?	8-15 billion years	• Universe expanding - 30km/sec/mlrs. • Doppler Effect • Star formations reduce - radiation left expand • expand and collapse • oscillating universe model • Cycle starts again	• Spectra • Doppler wavelengths • Reverse expansion

Table 6.1 Planning details for the story cluster on *The Big Bang*

Table 6.1 shows the overall plan laid out for the *Big Bang* story grain. Figure 6.1 below, clearly shows the temporally layered music fragment structure for the same story grain.

Frag. No.	music fragment name.	Time frag. 1	Time frag.2	Time frag.3	Time frag. 4	Time frag. 5	Time frag. 6	Time frag. 7
M1.	Dream-world	M1	M1	M1			M1	M1
M2.	Sunrise		M2	M2	M2	M2	M2	M2
M3.	Seashore							M3
M4.	Birds							M4
M5.	Space-Wing	M5	M5			M5	M5	M5
M6.	Festival							
M7.	Machine-Age - ascending...		M7	M7			M7	
M8.	Machine-Age - descending...			M8	M8			
M9.	In The Trees							
M10.	Percussion							M7
M11.	Piano+Birds			M3, M4				M3, M4
M12.	Piano					M7		M7, M8
M13.	Music Box		M7	M7			M7	

M14.	Orchestra-Hit		M14	M14	
M15.	Helicopter	M15	M15		
M16.	Helicopter	M16	M16	M16	
M17.	Tom-Toms *	M7			

Figure 6.1 *The Big Bang* - music fragment structure. *Tom-tom sound has an evolving music stream, defined by the arrow, but is also used by M7 in time fragment 1.

Fragment 1. Birth

images - Pictures of David Gradwell, stars, and a galaxy.

This first story grain is about the beginning of the Universe. Some questions about its birth and evolution have been answered by cosmologists while other mysteries still linger. At the beginning, the entire content of the universe were packed into a density greater than 10^{14} grams per cm^3 . Not even the intermolecular structures known today - protons, neutrons and electrons - existed in this pre-cosmic cauldron. It is widely accepted that the universe began with a giant explosion that astronomers called the 'big bang'. What occurred previous to this event is debatable. Cosmological models have been constructed to try to explain how the universe began, and what its ultimate fate might be. The most accepted theory at the moment is the evolutionary theory. This describes how the universe as we know it evolved from the big bang and the resulting radiation.

The music grain reflecting this theme contains two music fragments, one using the Dream-World sound and the other using Space-Wing. Along with these music fragments is another music stream using the sound of helicopters interpolated down to a low pitch, which is continuously evolving for the duration of the composition. The use of the Dream-World and Space-Wing sounds helps to suggest something alien and cosmic, something unknown and unusual. Incorporating the manipulated and grouped helicopter sounds proposes the Cataclysm and profound events that were the birth of the universe. The Dream-World sound is evolved chaotically from a pair of sustained

E natural pitches, the first note in the scale of notes to be used in the sound grains, while the Space-Wing sound uses B^b as well as A, B natural and G. The Helicopter sounds are large pitch clusters rather than identifiable pitches related to the chosen scale.

Fragment 2. The Big Bang

images - explosion flame, thermometer rising to maximum

During the first instances after the big bang, the subatomic particles that govern the universe were being formed. Cosmologists have broken down the universe's evolution into 4 eras. In this first era, the temperature of the universe was greater than 10¹² Kelvin (0°K being approx. -273°C). This era finished approximately 10⁻⁴ seconds after the big bang.

To portray the start and evolution of this era, both music fragments from the previous story grain are overshadowed by the arrival of two new grains, one using the Machine-Age sound - based on 5 tones of the scale namely E, F, G, A and B^b (relating to the notes B^b, A, B natural and G used in fragment 1)- and the other using the Sunrise sound. The Sunrise sound - using 3 tones from the scale, namely E, G and B^b - suggests the dawning of something, while the Machine-Age fragment represents the playfulness of newly forming sub-atomic particles, analogous in a way to the result of mixing two substances in a beaker in a chemistry laboratory and then watching a gaseous reaction occur. The Helicopter clustered sounds continue and are suggestive of the chaotic nature of this early stage of the universe's evolution, while another new music stream is introduced which is continuously evolving for the remainder of the composition incorporating a synthetic tom-tom over a five octave range, signifying the vastness of the evolving universe.

Fragment 3. Quarks

images - rising thermometer (no longer to maximum) and particles flying about

At the end of the first era, Quarks appeared (elementary particles eventually responsible for the physical equilibrium of the universe), hence beginning the second of the 4 eras describing the evolution of the universe, called the *Leptonic* era. This era takes the universe to an age of about 10 seconds. During this era, the primordial cosmos has cooled to an average temperature of about 10^{10} Kelvin. This era is categorised by the breakdown in equilibrium between electrons and positrons, and protons and neutrons. This breakdown results in radiation being emitted by the infant universe.

To convey the breakdown in equilibrium, and the introduction of Quarks, the Space-Wing music fragment is stopped as are the clustered Helicopter sounds, in tandem with the introduction of an inverted Machine-Age fragment. The 5 tones are now played descending an octave below the upper Machine-Age sound that is still being used. The chaotic sound of the synthetic tom-toms alongside the contrary-motion in the Machine-Age sounds is suggestive of these sub-atomic particles going crazy. The temperature of the universe is still extremely high, and the Quarks are on the verge of forming atoms, hence the mayhem.

Fragment 4. Atoms, Gas and Gravity

images - gas clouds, view of radiation in space

The third era of evolution takes the universe to an age of about 1million years when it is an enormous shock wave of radiation. The temperature is about 10,000Kelvin but its density has reduced to a mere 10^{-21} g cm³. Space was brilliantly illuminated as the radiation covered the whole spectrum, from gamma rays, right out to radio waves. Hydrogen now exists in ionised form, soon combining to form the first hydrogen atoms which will combine in turn to form helium. As the universe grew, the hydrogen

and helium atoms combine to form small tendrils of gas. As these gas clouds grew, gravity took a hold. The larger the cloud the stronger the force of gravity, the stronger the gravity the larger the cloud. So these clouds amassed and amassed, resulting in the universe that is seen today.

To capture the essence of this huge shock wave of radiation, a new music fragment using a full orchestral sound (Orchestra-Hit) is utilised. A succession of strong chords based on the 3 notes E, G and B^b (relating to the similar chord choice in fragments 2 and 3) are used to punctuate the music. To further accentuate this sudden change and evolution from the Leptonic era described by fragment 3, the musical fragments of Dream-World, Birds and Sea, and the ascending Machine-Age are terminated.

Fragment 5. Galaxies

images - The Milkyway, Pinwheel, Elliptical, Cartwheel, Whirlpool Grand Design
Spiral and Andromeda galaxies, Supernova

The universe is now about 1 billion years old. Appearing across it are clumps of matter. The gravity associated with this matter attracts gas clouds of hydrogen and helium. As the universe matured this association would become the enormous galaxy clusters. Our own galaxy cluster is called the local group, and contains just two large galaxies - Andromeda and our own galaxy, the Milkyway. Inside the galaxies, gas clouds were experiencing gravitational collapse and temperatures were increasing causing fusion reactions. The first stars had formed in the universe. These stellar giants consumed their fuels at great rates and ended their brief existence as massive explosions or supernova. The universe now appeared like a glittering jewelbox as stars exploded across its vastness. As you look at this faint fuzzy object in the heavens, consider that you are looking into the past. Some objects which can be viewed through telescopes are so far away that the light started from them before man appeared on the planet.

The theme of explosions is carried through into this story fragment by continuing the Orchestra-Hit fragment of music. The synthetic tom-toms are still in use below the music, and the Sunrise fragment is also being reused. However, the Machine-Age (ascending) is now moved to Piano instead of the Music-Box sound, while the Space-Wing sound is reintroduced, attempting to signify the vastness of space and the sheer number of youthful galaxies being created.

Fragment 6. Life

images - Sun, solar system, Earth, gas cloud

About 5,000 million years ago, a gas cloud experienced gravitational collapse and formed quite an ordinary star located on an outer spiral arm of a galaxy. As the star cooled and rotated, the leftover gas and dust formed a ring around it. In time this ring formed 9 planets over 30 moons and various other pieces of rocks and ice. On the third planet, something unique happened - Life. Man has only been a cosmic member for an inconsequential length of time. Yet, he has been able to partially unravel the tapestry of the cosmos. Observing celestial objects on the edge of the visible universe and measuring their light spectrum, one can tell if they are moving towards us or away from us, what elements they contain and their distance from Earth.

The use of music to impact the significance of the progression of the evolution of the Universe continues as the fragment of Orchestra-Hit is stopped abruptly suggesting a sudden paradox in the formation of galaxies and planets with the possibly unique creation of Earth. The Machine-Age fragment that is ascending is reintroduced, linking the significance of the creation of Quarks - the cornerstones of our universe - with the creation of life on Earth. In the same breath, the Dream-World fragment is reintroduced, suggesting motion and animation of both time and cosmic material, and life.

Fragment 7. The End?

Images - Doppler wavelengths, Spectra, Reverse expansion

So, what will happen to the cosmos in the future. Stars have been seen to end their life as supernovae. Other stars expand slowly and eventually contract into what is known as a 'black hole' from which nothing, not even light can escape. Speeds of recession of an object can be measured using the Doppler effect (best demonstrated if you listen to the rise and fall in pitch of a siren as it passes by). As an object approaches its spectrum shift is towards the blue, and as it recedes it is towards the red. In approximately 5,000 million years time our Sun will cool and expand to become a red giant. This expansion will swallow not only the Earth but man also, and mans home will be dead.

Regarding the life of the universe though, the two most excepted theories about its ultimate evolution are the open universe model, which says that the universe will continue to expand indefinitely, and the closed model which states that the universe will expand to a point where gravity will prevent further expansion and force a collapse until all that is left is radiation. If this is the case, then we at present are in the expanding phase. In time this phase will stop and our universe will again contract into an extremely hot dense state. The oscillating universe model elaborates on this to say that after the contraction another big bang takes place and the cycle starts all over again. If any of these models are correct, we must face the fact that, no matter what happens, the universe as we know it and all its creation has no future.

This final story fragment in *The Big Bang* story cluster is represented musically by the already present music fragments, but also with Birds and Seashore fragments. The Machine-Age fragment is moved for this section to piano from the Music-Box sound, with its rhythm being pronounced in the percussion. This adds an extra sense of urgency and confusion to the music, depicting the lack of understanding of what is going to happen to our universe eventually.

6.2.4 Scientific Grain Structure for *The Egg Myth - Phan Ku*

Fragment	Music Theme	Keys	Animation
Dawn	Introduction to nothingness. tingly, cosmic	- Heartbeat looped - Fade in from black	Egg in void sequence (hatching egg beside fire)
Cracking open the egg of sleep	Awakening, new life, consciousness, profound but funny, slightly absurd.	Collage of images of : - sleeping eyes and eggs - gradual growth - cracking eggs - waking eyes - new morning	Time lapse photography of : - fire - breaking eggs - sunny morning scene - radiation in Universe
The lover's Tiff	Separation, movement away, water lapping, fractal music.	- Circling <i>Ying-Yang</i> object which splits to form sky and ground. - Super-imposed face of <i>Phan Ku</i> - Feather floats upward - Lead falls downward	<i>Ying-Yang</i> drawing - Feather - Icon of a lady. - Sea and sky
They must be kept apart	Dramatic intervention	- Feet on a sandy shore - Thunder - Shot of angry red sky - Shot of bent shoulders against angry sky	- Feet on a sandy shore - Very angry sky - Photo of shoulders and back.
Exposure	Light then darkness. Sudden fear.	- Each shot is moved forward by the user clicking the camera button - Open eye and open camera iris (bright light is shone through the iris) - projection idea flickering duo-chrome daylight, eye closed. - Iris closed, duo-chrome night scene	- Iris of camera, open and closed - Human eye, open and closed - Night and day scene with old fashioned camera button . - Film frame guides - Duo-chrome look
The stopped Clock	Death is not the end. Brass band following a funeral - not literally. More like a Carnival.	- An old Grandfather clock is superimposed against a few frames of time lapse sky. - Clock stops, chimes, fades to black. - Pause in darkness - Many little clocks begin to be heard as well as bells, chimes, screams and a band. - Fade up to reveal teeming life scene	- Grandfather clock - Map - Dark sky - Airplane Controls - Collage image of life - view of a house from a plane, tick-tock words
The reading of the will	Simple, upbeat, happy	Insects and children's play-ground noise	Anatomy picture - different clickable parts.

Table 6.2 Planning details for the story cluster on *Phan Ku*

The *Egg Myth* is a Chinese myth of creation which describes how the world was formed by a primal deity called *Phan Ku* whose cult survives among the minority peoples of southern China, such as Miao, Yao and Li. Table 6.2 shows the overall

plan laid out for the *Phan Ku* story grain. Figure 6.2 shows the temporally layered music fragment structure for the story grain in a similar manner to Figure 6.1 with regards the *The Big Bang* story grain.

Frag. No.	music fragment name.	Time frag. 1	Time frag.2	Time frag.3	Time frag. 4	Time frag. 5	Time frag. 6	Time frag. 7
M1.	Dream-world	M1	M1	M1			M1	M1
M2.	Sunrise		M2	M2	M2	M2	M2	M2
M3.	Seashore							M3
M4.	Birds							M4
M5.	Space-Wing	M5	M5			M5	M5	M5
M6.	Festival						M6	
M7.	Machine-Age - ascending...		M7	M7			M7	
M8.	Machine-Age - descending...			M8	M8			
M9.	In The Trees				M8	M7		
M10.	Percussion				M8	M7		M7
M11.	Piano+Birds			M3, M4				M3, M4
M12.	Piano							
M13.	Music Box		M7	M7			M7	
M14.	Orchestra-Hit				M14	M14		
M15.	Helicopter							
M16.	Helicopter							
M17.	Tom-Toms							

Figure 6.1 *The Phan Ku* - music fragment structure.

Fragment 1. Dawn

images - Fire inside a mound, egg hatches.

In the beginning, the heavens and earth were still one and all was chaos. The universe was like a big black egg containing a mass of substance called nothing. Nothing was its name and nothing was there. Within nothing lay a thing that was not yet born or even thought of. Its name was *Phan Ku*.

The music chosen to represent this first fragment of the *Phan Ku* legend is quite similar to that used in fragment 1 of *The Big Bang*. However, the extra sounds of tom-toms and Helicopters are gone throughout this whole story cluster. The reason for this removal of music streams is due to the simplicity of the story of *Phan Ku*. It is not a complex story containing all the uncertainties of the beginning of the universe, but rather a simple fable or legend which has transcended generations of people. Now the music is attempting to portray the images of the hovering egg before hatching.

Fragment 2. Cracking open the egg of sleep

images - Fire, egg cracks, shot of radiation in the universe.

Phan Ku grew for 18,000 years, after which he awoke. Feeling suffocated by the giant egg he split it open and emerged sodden and damp into the darkness.

With the synthetic tom-toms gone, the ascending Machine-Age/Music-Box fragment gains a lot more prominence. It signifies the cracking open of the egg, and the birth of *Phan Ku* into the virgin world.

Fragment 3. The Lover's Tiff

images - Yin Yang, sea, icon of lady.

The light and the clear parts of the egg floated up to form the heavens and the heavy and opaque parts sank down to form the earth.

The addition of the inverted descending Machine-Age/Music-Box passage introduces strife as it competes against the ascending passage for dominance. This interaction, along with the addition of the piano playing Bird and Sea fragments suggests a mild fight between people - not serious, yet a disagreement of sorts. It also reflects the imagery on screen as the egg splits, and both rises and falls to form the heavens and earth, reflected in the ascending and descending passages.

Fragment 4. They must be kept apart

images - Feet on the beach at breaking waves.

Phan Ku placed his feet on the infirm surface of the earth. Almost at once the sky and the ground, resenting their separation, tried to reunite. Realising the danger, *Phan Ku* forced them apart by supporting the sky on his back. He grew ten feet every day and so the sky and the ground were gradually separated further and further from one another.

Through isolation of the descending passages of the Machine-Age fragment, also seen in the percussion and 'In the Trees' sound patches, the music attempts to capture the breaking of waves on the beach. The use of Orchestra-Hit helps to convey the suggestion of the breaking of the waves, which role down rather than up, as they wash back to sea after breaking high on the beach. Removing the Dream-World fragment draws further attention to the remaining sounds.

Fragment 5. Exposure

images - Eye, streets sky, inside lens of camera

Phan Ku shut his eyes against the sweat that rolled off his brow and all was darkness. He opened his eyes and light streamed in. Thus the darkness of night and the brightness of day came into the world.

The music once again switches to an ascending Machine-Age/Music-Box fragment, this time in the piano, but being copied once again in the percussion and ‘In the Trees’. The Orchestra-Hit is still played while Space-Wing is also reintroduced. The changes are subtle as *Phan Ku* is still standing but resting and creation is continuing to proceed. It will not wait for a pause even if *Phan Ku* attempts to rest.

Fragment 6. The Stopped Clock

images - Map, air-plane controls, and a view of a house as if from a plane, through tick-tock words.(surreal)

After 18,000 years of growth, blinking through days and nights, holding the obdurate sky and earth apart *Phan Ku* wearily lay down and died. By that time the sky and the ground had become reconciled to the fact that they would never be reunited and remained in their present day positions.

The important topic for the music to breach in this story fragment is that death is not the end. The typical band that may play at a funeral cortege is not supposed to be solemn and typically funeral-like. It should be more like a carnival. It is the beginning of something else. The use of the Festival fragment is specifically to ensure that an element of happiness may be seen at this moment of despair. Combined with the introduction of a descending Machine-Age/Music-Box fragment, this is suitably achieved, yet the choice of pitches in the Festival fragment - E, G, B^b and D - ensures that it blends with the pitches in the Machine-Age passage, and both are modal rather than the typically chosen ‘major’ key as a ‘happy’ sound. This preserves an unsettled feel in the music.

Fragment 7. The reading of the will

images - Anatomy picture. Click different parts to see what becomes what.

When *Phan Ku* died his giant body fell apart. His breath became the wind and clouds, his voice the rolling thunder. One eye became the sun and one the moon. His body and limbs turned to five big mountains and his blood formed the roaring water. His veins became far-stretching roads and his muscles fertile land. The innumerable stars in the sky came from his hair and beard, and flowers and trees from his skin and the fine hairs on his body. His marrow turned to jade and pearls. His sweat flowed like the good rain and sweet dew that nurtured all things on earth. According to some versions of the *Phan Ku* legend, his tears flowed to make rivers and the radiance of his eyes turned into thunder and lighting. When he was happy the sun shone, but when he was angry black clouds gathered in the sky.

Finally, the fleas in his hair jumped to the ground and began to procreate wildly. Their offspring became the ancestors of mankind. After *Phan Ku*'s huge body had decomposed there was an enormous void left in the world. The space occupied by his body was quickly filled with pain, pestilence and sorrow which to this day struggle with his creations.

The Festival fragment ends just as sharply as it began, as the festivities end, and the life continues. The Machine-Age fragment is reintroduced into the Piano, both ascending and descending. The rhythm of this passage is shadowed in the percussion. The music is back where it started, except in this case there has been life created and this is reflected in the piano and percussion parts.

6.3 *The Persistence of Memory*

(for Wind Quartet and Tape - 1997)

Duration: approx. 4' 30"

The Persistence Of Memory - written in 1997 - is based on the 1931 painting of the same name by Salvador Dali. This painting is one of Dali's most memorable Surrealist works. One hot August afternoon in 1931 upon taking a pencil and sliding it under a

bit of Camembert cheese which had become softer and runnier than usual in the summer heat, Dali was inspired with the idea for the melting watches, a symbol commonly associated with Dali's Surrealism, depicting the irrelevance of time. The piece is a one movement work based on a pitch centric E. There are 6 sections consisting of an *introduction*, a *finale*, and *four thematic sections*. Each thematic section describes a watch, while musical references through the choice of electro-acoustic sonorities are made concurrently to other features of the painting including the sea and beach.

6.3.1 Structural and Melodic Analysis of the Composition

Over the centuries, music has always been closely association with the visual arts, such as drawing, painting and architecture - so much so, that the periods of both mediums have become forever interwoven. In late 1996, I began searching though art books trying to find the picture that would move me in such a way as to attempt to represent it in a musical work. *The Persistence Of Memory* by Salvador Dali was such a painting. It is an oil canvas of 24x33cm presently housed in the Museum of Modern Art in New York. The painting depicts a typical Dalinian landscape, with the craggy rocks of his beloved Cape Creus jutting up in the background to the right. In the foreground, an amorphous self-portrait of Dali appears to melt. Three separate melting watch images even out the foreground of the work.

What is immediately striking about the painting is its detailed construction, where Dali draws on the suggested time relation between the melting clocks and the juxtaposition of the imagery in the foreground and the background as media to substantiate the proposition of the irrelevance of time. With all these relationships, and multiple views on what the picture actually represents and what emotions it evokes, there is a varied palette of possibilities with regards to how music can represent the painting. The result of these possibilities is a piece of the same name, written for Clarinet Quartet (B^b, E^b, A and Bass) or Saxophone Quartet (Soprano, Alto, Tenor and Bass) and

Tape. The following analysis will be completed in relation to the scoring for Clarinet Quartet and Tape.

The piece is based on the pitch centric E, and uses the *phrygian mode* [Lovelock, 1989] (beginning on E and consisting of ‘white notes’ only) as a basis for melodic expansion. The piece is in one movement form, consisting of six sections, including an introduction, a finale, and four thematic sections. Four important descriptors are chosen from the picture. These include three warped clocks and a closed pocket watch (*Grandfathers Watch*) covered in scampering ants. The piece is constructed so as to have each of the four thematic sections describe a particular clock. Also incorporated into the structure are all other elements in the picture including the tree, the sea, the beach, the mountains (*Cape Creus*), and the sky. They are important to the picture as a whole and are of similar importance to the piece in terms of texture and sonority, but not as critically defining as the warped clocks.

6.3.1.1 Introduction

The piece begins with a rich texture of synthetic sounds attempting to generate a dreamlike abyss of sound - analogous to a painter preparing the canvas for the brush. From this evocative opening emerges a hollow beat - a synthesised heart beat. It acts as a bass drum, yet generates a sound where the forte of the beat does not arrive until after the impact. At first, especially with regard to the heartbeat, pitch is not noticed in particular. However, pitch is important and pitch contrasts are stressed later as the piece evolves to emphasise this factor. If pitch is split into lower, upper and central registers, then the starting pitch is in the central register. The background of the picture is represented with wavelike sounds, representing waves breaking on the beach, crashing against cliffs, and thriving on turbulence. Birds flying in the wind, or sitting on the cliffs and in the trees are also represented in the opening synthesis. Whether it is dawn or dusk is not known or relevant to the listener.

The clarinets gradually enter the piece from bar 2. Simplicity and precision are used to convey the imagery. All four clarinets play the same opening E pitch which is used to contrast the sonorities that are available with the four different clarinets performing. The different tone quality of the A and B^b clarinets is explored by letting the A clarinet play higher pitches than the B^b in the opening section. The clarinets' vast dynamic range is used on long notes, with different instruments using *crescendi* and *diminuendi* at different times to create a timbale juxtaposition of sounds. Long Es are held, and 'grown' on each instrument, with instruments pairing up to do this at certain points. Eventually at bar 8, a break in the interplay occurs. A bridge passage to the first thematic section introduces shorter notation in parallel to the sustained notes. Dynamic contrast is still pursued, continuing the dreamlike, suggestive sound that has been presented.

6.3.1.2 First Thematic Section - *Portrait Clock*

In the foreground of the painting an amorphous self-portrait of Dali seems to melt. It lies on the ground, and a clock is melting over it. The first thematic section is based on this Portrait Clock. The tape sound has changed behind the stronger presence of the clarinets. The significance of this, the first of the chosen themes of the painting, requires an evolution of melodic and rhythmic ideas. The tape sound undergoes a collection of small but significant changes during this period. A new rhythmical device coupled with a faster tempo marking is used to phase out the heartbeat. It is more suggestive of turmoil, and crazy sounds, like traffic or distant hustle and bustle, all detracting from an elusive moment of peace often longed for at the sea. This *portrait clock* is located low on the ground, and the thematic section should reflect upon all the noises that can be heard from the clocks' location - all the things that contribute to its uniqueness in location and time. The whole concept of turmoil and crazed things is employed to generate this confusion easily imagined by looking at the self-portrait, if that indeed is what Dali intended it to be. Continual references are made to the imagery of the painting which envelop the portrait clock.

The instruments, for the first time, play a theme, which is an expansion of the centric pitch. The E^b Clarinet introduces the subject (theme), seen in Figure 6.1, in bars 16 and 17:



Figure 6.1 The 1st subject (theme) defining the *portrait clock*.

This subject is answered by a counter subject in the E^b and B^b clarinets at bars 18 and 19, which share the counter subject, which is first seen in the B^b and A clarinets at bars 21 and 22. The counter subject is an important point in the thematic development, as it is the first variation in pitch or rhythm. As can be seen in Figure 6.2, it is a melodic expansion in the *phrygian* mode of the pitch centric E, including the first three notes of the mode - E, F and G. This section is rhythmically warped, like the clock. Even though the section is played at a fixed tempo, rhythms are varied using triplets and groupings of four and five alternately, giving an erratic temperament to the rhythm. At the end of this thematic section, the tape-part gives more prominence to the sounds of the birds, which come in waves, just like the sea. This is a subtle link in the tape-part to the second thematic section, which represents the clock melting over a branch of the tree.

Figure 6.2 The counter subject defining the *portrait clock*.

6.3.1.3 Second Thematic Section - *Tree Clock*

The structure of the piece is cyclic within itself - *Arch Form* - ending up the way it started, and that is important in the context of which theme is constructed next. An anticlockwise approach is taken to represent the themes, adding to the impression of warped timing. With this structural format decided upon, the next clock to be 'painted' is the *Tree Clock*. The transition or bridge to the next clock theme of the painting begins at bar 28, with a sudden change of tempo - slowing from 110 to 70 - and a lengthened metre. This is followed quickly with a section consisting of frequent metre changes, and frequent *tempi* changes through use of *rallentandi* and *accelerandi*. A new rhythmic pattern emerges, creating an aura of happiness and gaiety, things that are associated with birds chirping in the trees or wind gusting through them.

The second subject or theme, appears in bar 33 in the E^b and B^b clarinets as a two note idiom. In bar 35 an extra note is added to an inverted version of the melodic idea to complete the subject. There is an answer to the subject in the form of a counter-subject in the A and Bass clarinets at bar 35, where they play a idiom based on an anticipatory pair of 16th notes followed by a sextuplet. These musical ideas and developments can be seen in Figure 6.3 below.

The figure displays a musical score for four clarinet parts: Eb Clarinet, Bb Clarinet, A Clarinet, and Bass Clarinet. The score is divided into two systems, each starting at bar 33. The first system (bars 33-34) shows the Eb and Bb Clarinets playing a two-note idiom (G4-A4 and F4-G4 respectively) marked *mf*, while the A and Bass Clarinets play a more complex rhythmic pattern marked *p*. The second system (bars 35-36) shows the Eb and Bb Clarinets playing a more complex rhythmic pattern marked *mf*, while the A and Bass Clarinets play a sextuplet marked *p*. The score includes dynamic markings (*mf*, *p*) and articulation marks.

Figure 6.3 The 2nd subject and its counter subject defining the *Tree Clock*.

The tape part makes the synthesised bird images more prominent in the sound, as the point of focus leaves the ground where the last clock was, and rises to the height of

the tree, where the present clock is. The use of lower, higher and mid register clusters of bird sound is employed. The melodic structure in this section is chosen to portray a sense of urgency. A heart beat heard at a high pitch adds to the new construction. In the painting, the clock on the tree is the smoothest of all the clocks, and the choice of groupings of six's and five's helps to push the music forward at a more even pace suggested by the more conforming of the clocks. At bars 38 and 39, the musical groupings slow step by step to eight-notes in the bass clarinet, just to re-emphasise the warped nature of the clock face that is begin portrayed through the music. This thematic section reaches a climactic conclusion at bar 41, when the E^b clarinet is used to create a long sustained fading high E. This note is the solitary link between this, the second thematic section, and the next theme. All other instruments - including the tape part - stop for a brief period underneath this held note, and when they re-enter, it is with the 3rd subject.

6.3.1.4 Third Thematic Section - *Ledge Clock*

The warped clock draped over the ledge in the painting is to be the thematic material for the 3rd section. This *Ledge Clock* is more distorted than the last clock, yet its clock face is more in view than any of the other clocks. The tape sounds get more complex to generate the texture that displays the location of the clock. It is near the tree, but nearer the ground than the last clock, so, sporadic bird calls can be heard, and the centrality of the tape based sonorities reflecting on the picture is heightened by the use of groupings of heart beats, at low, central and high pitches.

The 3rd subject is introduced on the B^b clarinet at bar 43. It is based around the same pitch cluster of E,F, and G that has been paramount in all themes so far. On this occasion, the melodic and rhythmic development loosely uses the form of a four part fugue. The A clarinet plays similar pitches to the B^b, and this contrasts sharply the difference in timbre between the two instruments at similar pitch.

At bar 44, the bass takes over the theme - its first thematic passage, while the E^b clarinet begins a new counter subject based on a regular beat of quartet-notes with some grace notes added to suggest ripples in the consistency of the beat. Figure 6.4 shows bars 43-45 where the 3rd subject and counter subject can be observed. The emergence of groups of five, six and eight notes in the B^b clarinet - seen in bar 45 of Figure 6.4 - seeks to heighten the feeling of inconsistency of the beat. These groups of eight represent the rhythm of the clock, through the ripples that are seen on the clock due to its melting. As if to try and force the clock of the painting to work, the bass, followed by the A clarinet takes up the counter subject still in fugue-like fashion with the E^b clarinet at bar 46.

The image shows a musical score for four instruments: Eb Clarinet, Eb Clarinet, A Clarinet, and Bass Clarinet. The score is for bars 43-45. The Eb Clarinet parts are in treble clef, and the Bass Clarinet is in bass clef. The A Clarinet is in treble clef. The score includes dynamic markings (mf, mp) and articulation (accents, slurs). The Eb Clarinet parts show a 3rd subject and its counter subject. The A Clarinet and Bass Clarinet parts show groups of five, six, and eight notes, which are used to heighten the feeling of inconsistency of the beat.

Figure 6.4 The 3rd subject and its counter subject defining the *Ledge Clock*.

The first beat of bar 48 sees a stagnation of motion that lasts for the whole bar. This slump is forgotten as early as bar 49. However, this process is reflective on the warped nature of the clock face. It is attempting to simulate the clock hand trying to pass over the edge of the clock that is draped over the ledge. As soon as the indecisiveness of the edge has passed, the clock hand continues around the clock again - reflected in the music getting structural support for the rhythm again.

The synthesised sounds are still more complex than before, slightly altered this time, signifying the irregularity of a warped clock. The monotonous echoing of the heart in the background however, keeps a surreal control over the direction of the music. The piece reaches its climax at bar 57, after a defining chromatic descent through all the

instruments in bars 55 and 56, ending up with the bass clarinet pounding out the 3rd subject for the ultimate time.

6.3.1.5 Fourth Thematic Section - *Ants*

The final thematic section of the piece begins with a brief one bar silence which follows the last statement of the 3rd subject. The tempo quickens to ♩=120 - the fastest of the piece so far, and contributes to a sense of frantic motion. Once again, a three tone idiom is used, containing E, G and B. It is two sixteenth notes followed by an eighth note. This time, it is used as an introduction to the 4th subject seen in the E^b clarinet at bar 61. This theme is symbolic of the Ants on the closed clock face. The other 3 instruments, play contrapuntal parts starting in bar 62, which achieve a frantic musical representation of the scurrying of ants over the clock face. The fact that the time on the clock face can not be seen influences the direction the music takes in this section. It is an educated guess that can hint at how the clock is working.

The unified, rich texture that is generated with all the instruments playing together is heavily based on material that was used earlier in the piece. All the rhythms and note-pitches are derived from earlier subject material. So, bars 61 to 65 contain the fruition of this theme, in the form of a contrapuntal passage, representing the ants that can be seen to scurry over the closed clock, the *Ants' Clock*. This short passage of bars 61 to 65 can be seen in Figure 6.5. Rhythmic devices are re-deployed, to stimulate our memories about earlier themes, and other images that are ever present in the painting. Bar 66 is the point where the preceding contrapuntal excesses come to a standstill, using two chords, the second dissonant, analogous to halting the scurry of the ants over the unknown time-keeper.

Figure 6.5 shows a musical score for four instruments: Eb Clarinet, Bb Clarinet, A Clarinet, and Bass Clarinet. The score is divided into four systems, each starting at measure 61. The Eb Clarinet part begins with a *p* dynamic, followed by *mp* and *ff*. The Bb Clarinet part starts with *mp* and ends with *ff*. The A Clarinet part starts with *p*, followed by *mp* and *ff*, and includes a 3-measure rest. The Bass Clarinet part starts with *mp* and ends with *f*, also including a 3-measure rest.

Figure 6.5 The 4th subject and its counter subject defining the *Ants' Clock*

6.3.1.6 Finale

The *Finale* of the piece, starts with bar 67, where the dreamlike sounds that were present at the beginning of the piece in the tape part, are re-introduced. This proceeds bar 68, in which the tempo is slowed once more to 85, the tempo marking of the start of the *Introduction*. The tape gives a reprise of the sounds from the *introduction*, which completes the *Arch-form* with this *finale*. A simple approach is accepted once again, over the contrapuntal nature of the *Ants clock* theme, or the fugal passage of the *ledge clock* for example. This section returns through material similar to that of the *Introduction* in reverse. Eventually, the long solitary E sonority appears again. It is like entering the abyss that was left behind at the start of the piece, so that the outside could be explored. In that abyss, time was meaningless, of little or no significance.

Figure 6.6 shows a musical score for five parts: Eb Clarinet, Bb Clarinet, A Clarinet, Bass Clarinet, and Tape/CD. The score is divided into four systems, each starting at measure 74. The Eb Clarinet part begins with a *pppp* dynamic. The Bb Clarinet part starts with *mf*, followed by *f*, *mf*, and *mp*, and ends with *pppp*. The A Clarinet part starts with *f*, followed by *mf*, *f*, and *p*, and ends with *pppp*. The Bass Clarinet part starts with *f*, followed by *p*, and ends with *pppp*. The Tape/CD part is a continuous sequence of notes.

Figure 6.6 The syncopation at the end of the *Finale* section of the piece.

Warped or melted time is what is employed outside this timeless background, in the form of the melted warping clocks to try and contrast both possibilities, and to show the insignificance of time as a concept as we know it. A solitary syncopated rhythm as seen in Figure 6.6, appears in bar 74 in the B^b clarinet, and repeats in the A clarinet, and finally in the B^b and bass clarinets. The instruments fade out together on the E sonority, just as they started, while the tape also finishes the way it started, when the rhythmic synthesised sounds disappear, and the dreamlike sounds play to silence.

6.4 *Tremolo Mystique*

(for Piano, Violin, Cello and Tape - 1997)

Duration: approx. 5'10"

Tremolo Mystique is based upon the temporal development of acoustic sounds generated by the three acoustic instruments in the piece. A tape or CD part is used to temporally alter the timbres that are typically generated. The instruments used in the composition, are the violin, cello and piano. All three were sampled to create a sound bank to allow them to be temporally altered, in particular the piano. The form of the piece was chosen in such a way as to allow for a complex analysis of the way sound is generated from all three instruments. I chose a common facet between all three instruments, the *Tremolo Effect*. The piano under normal circumstance does not generate a natural tremolo sound. If one of the strings is de-tuned slightly, then what are commonly referred to as 'Beats' are heard. Depending on the significance of the de-tuning, the beats will tremolo at a different speed. It is this phenomenon around which I chose to base the development of this piece. Taken to the extreme, if the beats are sped up to a certain speed they match the tremolo sound that a cello or violin would generate, albeit their relative sonorities are different.

6.4.1 The Use of Sampled Sounds

There are eight tape tracks in the piece, which are played at specific points throughout the piece. The piano sample comes from the chord that is present in bars 10-11 of the

piano part - a D⁷c major chord, as seen in Figure 6.7. It is based around the lower range of the piano, which generates a low rumbling wash of richness when struck.

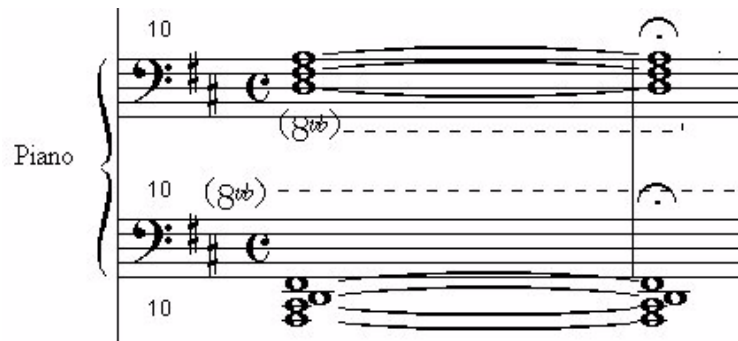


Figure 6.7 The piano sample material

The cello is sampled twice. The first sample, shown in Figure 6.8, is an interpolation of the idea presented at bars 12-13 - an octave glissando - over a ten second duration. This is the main subject material of the cello part for the piece. The second cello sample is a tremolo on a high D and E - seen in Figure 6.9 - which is developed from the idea in bar 17, again over a 10 second duration. This could be considered the second subject material for the cello.

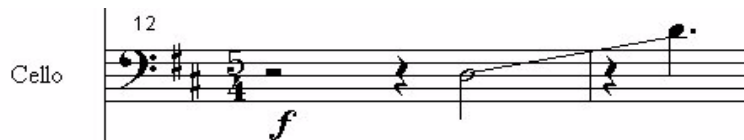


Figure 6.8 The cello's 1st sample material - *glissando*

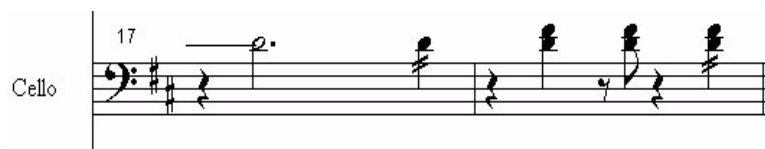


Figure 6.9 The cello's 2nd sample material - *tremolo*

The violin is also sampled twice. The first sample is an improvisation of the violin theme, which is seen in bar 12 - shown in Figure 6.10. It is a grouping of notes, with glissandi being the link between successive near pitches. The final sample, the second violin sample which is based on the tremolo seen in a high D in bar 36, is shown in Figure 6.11. This is the violins 2nd subject material.



Figure 6.10 The violin's 1st sample material - *glissandi*



Figure 6.11 The violin's 2nd sample material - *tremolo*

All the samples are from the main rhythmic and melodic subject ideas in each of the instruments, with the exception of the piano, where the sample is of the chord of the main idea, seen first in the bass clef of bar 2, rather than the rhythmic variations that are associated with it.

6.4.2 The DAT/CD Tracks

<i>Track No.</i>	<i>Sample Name (sample type)</i>	<i>[track duration]</i>
1.	Piano	[20 seconds]
2.	Piano + Cello(<i>tremolo</i>)	[10 seconds]
3.	Piano	[20 seconds]
4.	Violin (<i>tremolo</i>) + Cello (<i>glissando</i>)	[10 seconds]
5.	Cello (<i>glissando</i>).	[14 seconds]
	Piano + Cello (<i>glissando</i> + <i>tremolo</i>) + Violin (<i>glissandi</i> + <i>tremolo</i>)	[14 seconds]
	Piano + Violin (<i>tremolo</i>)	[14 seconds]
6.	Violin (<i>tremolo</i>) + Cello (<i>glissando</i>)	[10 seconds]
7.	Piano + Violin (<i>glissandi</i>) + Cello (<i>glissando</i>)	[10 seconds]
8.	Piano	[20 seconds]

Table 6.1 CD/DAT tracks for *Tremolo Mystique*, their contents and durations.

The eight tape tracks that are part of the piece are developed from different combinations of the aforementioned samples, using mixing, compression, hall effect, echo effect, and in the case of the piano mainly, dynamic tremolo effects. Each tracks content of samples are shown in order of track number in Table 6.1.

6.4.2.1 Analysis of Track Content

If the tracks shown in Table 6.1 are observed, it can be seen that their ordering displays a structural of the form $ABA_1B_1CB_1DA$, where each of the tracks is represented by a letter (*i.e.* track_1=A, track_2=B *etc.*) The first track takes the piano sound and stretches it over time using delay and echo effects. Using the *tremolo effect*, results in a piano sound similar to that given by a piano if a string is de-tuned slightly, resulting in a beat effect. The rate of vibrato in the tremolo is varied dynamically, analogous to the way a performer would crescendo and decrescendo over the duration of an *appassionato* passage of music. This track is the longest of any of the tracks, which is reflective of its significance as the core sonority in the piece's construction.

The second track involves the introduction of the cello *tremolo* sample. It is used in track two to contrast the tremolo of the effected piano and the natural cello sounds, while opening up the possibility of the piano tremolo mimicking this cellos tremolo under the right conditions. Both samples are effected using tremolo, and it increases in speed throughout the track.

The third track involves only the piano sample again. This time, the sample starts off quiet (unlike its use in track 1 where it has an explosive introduction and immediately shows that it is tremolo effected) and swells, yet the tremolo accelerates, substantially, before retreating to a certain extent in this sample. The objective of this sample is to remind a listener of the natural source that is the foundation of this track. Track three reflects on the accepted qualities of the piano timbre, and is suggestive of

what has begun to be altered, and what is going to be varied with the timbre during the piece.

Next, the fourth track. When one might expect a double sample of piano and another sound, the expectation is breached and a combination of the cello *glissando* and the violin *tremolo* samples are heard. The sounds are only affected using echo and delay effects, which accentuate the natural tremolo that is being played.

The fifth track is the longest track on the tape/CD. It is a combination of three sub-sections, resulting in a climactic electronic passage, where maximum development of the sonorities is provided, as a result of combinatorial use (*tutti*) of all the samples of the piece. The first section of the track, uses the cello *glissando* - effected with massive tremolo, for approximately 14 seconds, at which point the second section overlaps by beginning before the delayed-tremoloed cello *glissando* subsides. At this point the *tutti* second section begins and uses all the samples for a further 10 seconds with a substantial tremolo effect over all samples. When this sound is beginning to fade, the final section of this track begins using the violin *tremolo* (with tremolo effect provided on top of the naturally recorded tremolo) in conjunction with a quietened piano sample in the background.

The sixth track reintroduces the violin and cello together without a piano sample. There is tremolo effect present, but it is only secondary in loudness to the instruments, and is not overly apparent.

This precedes the seventh track, the penultimate track, where the piano sample and both cello *glissando* and violin *glissandi* samples play. The tremolo effect on the samples is sped up dynamically this time, so that at the end of the sample play, the electronically created tremolo of the piano matches the tremolo effected sample of violin *glissandi* and the tremolo effected cello *glissando*. All the samples are displaying beats of similar rate.

Finally, the eighth track contains the lone piano sample, where contrary to what has been happening all along - the tremolo effect slows down. It starts exceedingly fast, and dynamically slows, until finishing on the sustained true piano sample.

6.4.3 The Structure of the Composition

After the realisation of the tracks discussed in section 6.3, they were incorporated into a piece that had been conceived and created in parallel, which included the three sampled instruments. The composition begins with a lone piano, as does the first tape track. The piano introduces the first thematic material, underneath a fast repetitive D natural on the bass of the piano. This theme is based on a D⁷c major triad. The chord gradually gets separated - as seen in Figure 6.12 - as rhythmic variations of the same chord appear between bars 1 and 9. This culminates in *Track 1* being introduced with over the piano *fermata* at bars 10 and 11. The sound sample used in *Track 1* is of the chord present in bars 10 and 11, as was shown in Figure 6.7. The use of tape allows the natural declination of the sustained chord to be overturned and prolonged, while exploring the texture of a tremolo on the chord.



Figure 6.12 The 1st piano subject

From within this rich texture come the next two subjects, the violin's 1st subject in bar 12 (Figure 6.10), and the cellos first subject in bars 12-13 (Figure 6.8). The theme that was in the piano at the start now begins to subside, and the string instruments briefly dominate the timbre of the sonority being created. The violin develops its three note thematic motif, through varying the rhythm of the motif, and fluctuating between a D

natural and an E natural as the last pitch of the motif. While the cello is only playing a long *glissando*, it also varies its theme, by manipulating the start and end points in consecutive bars for the *glissando*.

Bar 21 sees the introduction of *track 2*, which reflects on the subject material of the violin and cello. Now the cello *glissando* is generated on the tape track along with the piano. Quickly, the violin adds to the texture, playing a chromatic variation of the violin 1st subject *sul ponticello* (on the bridge). The piano disappears for a short period, while the violin and cello exchange chromatic passages. Marked *subito*, the cello begins a rhythmic passage, using groupings of triplets to create an energetic ambience. The piano no longer confined to the bass of the instrument, begins to play the violins 1st subject. The violin takes over the triplet rhythmic motif from the cello at bar 30 briefly, while the piano continues to use the violins 1st subject now in tandem with its own 1st subject which it is restating.

Eventually, the violins 2nd subject - based around a tremolo on a high D natural - appears, which at bar 33 is played over the cellos long *glissando* and the pianos rendition of both the violin 1st subject and piano 1st subject. This can be seen in Figure 6.13.

Figure 6.13 Bars 33- 37, containing the violin 2nd subject and *Track 3*

Track 3 containing just piano is heard at bar 36 below the 2nd violin subject and by the cello 2nd subject. The main theme is sporadically reintroduced in the piano while the violin and cello gradually develop their 2nd subjects through variations of rhythm and dynamics. This development is stagnated briefly at bar 46, when *track 4* is played - containing violin and cello samples only. This electronic material, is a temporal development of the violin and cello music that has been played since *track 3* was played. *Track 4* accompanies a chord on the bass of the piano along with a descending glissando that occurs in the treble of the piano. This glissando, is the 2nd theme or subject for the piano.

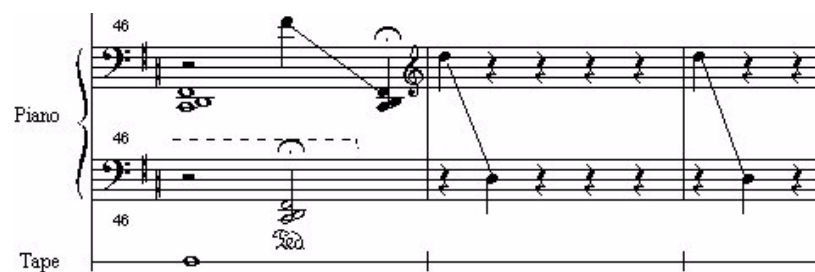


Figure 6.14 The 2nd piano subject

Seen in Figure 6.14, this 2nd piano subject becomes more prominent as the music moves forward. The glissandi are played on the strings inside the piano from bar 51, which produces a resonant texture in the music. At this point, the cello is rhythmically varying its 1st subject material, while the violin is concatenating both its subjects. Ultimately in bar 56, the violin and cello begin a short contrapuntal passage of glissandi, before executing a *decrescendo* over a quiet chromatic piano passage. This is anticipatory of *track 4* being played, which it duly is at bar 60.

When *track 4* begins, the three instruments enter a *Sensa Mesura* (S.M.) section. All three have suggested melodic and rhythmic patterns to play for specified durations underneath the 3 sections of *track 5*. The first section of *track 5* is quiet, and is constructed around the same D major chord upon which the piano 1st subject was based. All three instruments have changing rest values in their allocation. The cello and violin work in tandem, while the piano has a different duration rhythmic allocation.

The tape is playing a long cello glissando beneath this, which interacts with the glissandi that the two live string instruments are playing.

The second section of *track 4* encounters the climatic point of the piece. All the samples are used in this section of the track, in the equivalent of a tape *tutti*. The samples are all effected with *tremolo* and *delay* and *hall effects*, which creates a blend of sonorities which interact temporally due to the temporal effects being used. The texture of the section reaches a *fortissimo* at its completion, which includes the introduction of harmonics on both string instruments, which is the maximum development they are going to attempt with tremolos. Below this, the piano has three pitches - C[#], D and F[#] - which are to be repeated in any order or speed for the 14 second duration of the section. The piano is also playing a variation of the violins 1st subject, removing the glissandi and changing the pitches.

The third and final section of *track 5* continues with the use of only 2 samples - the piano, and the violin *tremolo*. The live instruments have a *decrescendo* marked on their parts, and again they play suggested notations with varied rest-lengths for the duration. At bar 63, a meter is reintroduced after the brief *sensa misura* section. The violin and cello begin the section with wide-ranging rhythmic glissandi in contrary motion. These develop into a reworking of the violins 1st subject material at bar 66.

Bar 72 is the point of re-entry for the tape, which is now using *track 6*, involving the violin and cello only. The effects differ slightly from the track used preceding the *sensa misura* development of bars 60-62. All track samples are effected with electronic tremolo which remains masked by the violin *tremolo* sample until the sonorities begin to fade, and it is no longer hidden.

Use of the chords from the piano is accomplished on the strings in combination from bar 76, as the piano juxtaposes its 2nd theme of *glissandi* against the string representation of the pianos 1st subject. At bar 80 *track 7* is played, which introduces

the piano again as an electronically altered tape instrument. The tremolo effect is increased as the tape plays, and it effects the cellos glissando as well as the piano chord. *Track 7* ends with all instruments with tremolos of equal rate - due to the electronic manipulation. At this point, the piano has begun to restate its opening theme, this time accompanied by the cello mimicking its chords and the violin playing the 1st violin subject.

By bar 83, the cello and violin (at bar 84) begin to imitate the treble piano lines 16th note notation, until a sudden chord in the piano at bar 87 interrupts. Bar 88 sees both strings playing tremolo notes above a final statement of the piano subject. A chordal ending occurs in bars 89 and 90. The final tape track, *track 8* is played at bar 90. This comprises of a lone piano sample which has massive tremolo effect electronically placed on it. Gradually the effect slows down, until the beats of the tremolo disappear, as does the music of all the live instruments.