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# **The Prepared Piano Music of John Cage: Towards an Understanding of Sounds and Preparations**

Simon Peter Anderson

A thesis submitted to the University of Huddersfield in partial fulfilment of  
the requirements for the degree of Master of Philosophy

October 2012

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*Quantum in me fruit*

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# Abstract

The subject for this thesis is the prepared piano music of John Cage with particular attention focussed on the preparations that create the varying sonic pallets in this music. The thesis is divided into six chapters, each chapter fulfilling one of two tasks. Firstly they will provide for pianists an examination of ways in which Cage's instructions in the scores for preparing the piano can be interpreted, and it will highlight the difficulties that become apparent (and should be considered) when performing Cage's prepared piano music. The second function to be fulfilled will be to musicologists who wish to trace the development of Cage's prepared piano music with relation to his later chance determined music.

Chapter one traces the historical and aesthetic influences that were relevant to Cage in the creation of the prepared piano, and places it in an historical context.

Chapter two looks at John Cage's compositions for prepared piano and provide a thorough inventory of John Cage's prepared piano pieces. Chapter two also examines the possibilities for making suggestions for the recreation of Cage's preparations.

Chapter three examines the physical relationships between piano, strings and preparations.

Chapter four analyses the solo prepared piano pieces and highlights the compositional techniques that Cage used in the composition of the prepared piano pieces.

Chapter five looks at the reasoning for performer choice in relation to ambiguity discussed in chapter three

Chapter six explores the six movement work *The Perilous Night*, and uses it as a case study to identify and explain all of the issues discussed within this thesis.

# Introduction

In 1917 Edgard Varèse wrote 'I dream of instruments obedient to my thought and which, with their contribution of a whole new world of unsuspected sounds, will lend themselves to the exigencies of my inner rhythm.'<sup>1</sup> By inventing the prepared piano John Cage had created an instrument that would make possible a whole new world of unsuspected sounds.

The research contained in this thesis locates the prepared piano music of John Cage, spanning the period 1938-1948, within an historical framework of experimental music of the twentieth century and it will articulate and illustrate the choices that need to be made by a solo pianist. It combines an historical approach with both a performance bias and research into the physical and acoustical component of the act of preparing a piano and it demonstrates how the two can inform each other.

Research and analysis of Cage's work have been scarce in comparison to its importance. In recent years much of the scholarship surrounding Cage focuses on the music composed after 1951, beginning with the *Music of Changes* (1951), in which Cage's use of chance methods brought him notoriety, but the beauty, technical skill and significance of his earlier compositions, particularly his prepared piano music, have been overshadowed. The research contained in this thesis will contribute a further understanding of Cage's methods, the events that led to the prepared piano music and the influence upon him, both on the use of the prepared piano and compositional techniques and it will demonstrate that Cage was able to widen the boundaries of composition by utilising the transformation of sound. It will also confirm how essential the prepared piano and subsequent mastery of sound was to John Cage's aesthetics and future compositions. Cage was influential in introducing noise into the constraints of Western music, leading people to compose, perform and listen to music very differently; this was largely due in the first instance to his work with the prepared piano.

The prepared piano music served as my introduction to the music of John Cage. I was struck with the minutiae of sounds that were created by one person at a piano. What also struck me was the 'beauty' of the music (although I am sure Cage would not be pleased with such a description). Paul Griffiths sums up my feelings;

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<sup>1</sup> T. Holmes, *Electronic and Experimental Music: Technology, Music and Culture*, Routledge, 2008, p. 16.

The novelty of the prepared piano was not only that it placed a variety of percussion sounds beneath the pianist's fingers, but also that it allowed the composer and, to a lesser extent the performer, to choose sound empirically. Instead of writing for more or less defined timbres of standard instruments, the composer could try out various points of the piano, working more in the manner of an electronic composer than an orchestrator. The corresponding disadvantage is that the sounds cannot be stipulated with any exactitude.<sup>2</sup>

In my opinion, in the prepared piano music, Cage has helped change the face of modern music. It brought together art forms and created a music that was inventive, surprising, mysterious and almost tactile all at the same time. Added to which, the prepared piano music was an integral part of the development of modern music, without which Cage may not have composed his silent piece or utilised indeterminacy and chance as much as he did in his later compositions.

When I looked further into the creation of the prepared piano, it became apparent that there were no definitive rules – performers were left to their own devices to make judgements towards the sounds that they utilised in the performance of the prepared piano music and, although this would suit Cage's later aesthetic, a badly prepared piano would not do justice to Cage's music. As Cage would say in his introduction to *The Well-Prepared piano* by Richard Bunker on listening to a badly prepared piano – 'he wished he had never invented the instrument'.<sup>3</sup> This thesis arose through the desire to make sure that the prepared piano be approached holistically and with an understanding of the factors that must be considered when preparing a piano.

The material contained in this thesis can be utilised in two major ways. Firstly it will be of importance to performers of John Cage's prepared piano music. It will provide a thorough examination of how a performer can interpret the instruction given by Cage in the score, and highlight the difficulties that become apparent (and should be considered) when performing the solo prepared piano music of John Cage.

Secondly it will be important to people who wish to trace the development of Cage's prepared piano music with relation to his later chance determined compositions. It will establish Cage's solo prepared piano music within a broader artistic spectrum, both historically and philosophically, highlighting the historical grounding for this period in Cage's life. It will examine major incidents occurring in the world at the time that may have effected Cage's creation of the prepared piano and also in other artistic

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<sup>2</sup> P. Griffiths, *John Cage*, Oxford University Press, 1981, p. 14.

<sup>3</sup> J. Cage, *How the Piano came to be Prepared* in *Empty Words*, English Ed., London, Marion Boyars, 1980, p. 8.

circles, including interdisciplinary pedagogy which may have influenced Cage's ideas and concepts of this period and illuminated how they led to the germination of Cage's later compositional techniques.

Mystery, intrigue and antipathy have always surrounded the prepared piano. The uncertainty may have arisen because of the thought that the piano is being mutilated as a result of the insertion of foreign bodies into its physique. It may be due to the enigmatic nature that surrounds its inventor, or the sonic result that occurs due to the transformation of the piano.

Whatever a person's viewpoint, it must be recognised that the prepared piano is an independent instrument and an additional member of the keyboard family.

If a piano is prepared by a professional pianist then no harm will come to the instrument being prepared, and the resulting sonic effects that are produced create a melee of sound that cannot be achieved without the aid of technological manipulation. However, many pianists will not have the opportunity to practice on a prepared piano (many are not willing to prepare their own instruments). This means that a large amount of time is needed to either 'test' for the desired sounds on the piano that will be prepared or to perform, not knowing for sure, the resulting sonic pallet that will be created. Neither example is ideal in a real life situation.

Mystery also surrounds the method of composition. What was chosen first? Were the preparations and therefore the sounds chosen before the notes or were the notes chosen before the sounds? If the preparation was paramount to the notes then the sonic result becomes the prime part of the composition and the notes and rhythmic patterns become coincidental to the piece.

This leads to further questions; if the sounds are superior to the notes, then the important part of the performance must be the positioning and resultant sounds of the preparations. But Cage does not tell his performers what the sonic result should be or give a clue as to the pitch or characteristic of the sound he requires. However, this argument can be flipped, because the notes are therefore always going to be coincidental as the music on Cage's score does not represent the sounds that are produced.

Unless actually stipulated by the composer, the piano is usually prepared well in advance of the concert. The range of time it takes to prepare a piano can vary greatly; pieces with few preparations will take a shorter time than pieces with a large variety of preparations. Some pianists will take



minutes and others will spend hours deciding on the correct type of preparation and the experimenting to achieve the desired sonic effect. Most performers will simply take 'as long as they have'.<sup>4</sup> Cage once stated that to prepare a piano for a piece such as the *Sonatas and Interludes* he would need about three hours.<sup>5</sup> It is even rumoured that Cage poured Cognac into the piano to loosen the strings.<sup>6</sup> In the majority of Cage's prepared piano music most preparations remain in situ for the whole performance (some pieces require the performer to add and remove preparations during the performance such as the number pieces 31'57.9864" *for a Pianist* and 34'46.776" *for a Pianist*). It should also be noted that after a performance, preparations need to be removed with the same amount of care as when they were inserted. This causes logistical problems for pianists who wish to play both prepared piano pieces and un-prepared piano pieces in the same concert (generally this situation requires two pianos).

Most pianists will have their own methods for preparing and de-preparing a piano, but everyone should abide by a few simple rules. There are numerous types of preparations and pianos at the disposal of a performer and most performers will experiment with these to discover a preferred sound.

A Comprehensive instruction for preparing the piano can be found in Richard Bunger's manual on the prepared piano.<sup>7</sup>

The prepared piano is a standard grand piano which has had its sound transformed by inserting foreign objects such as bolts, screws or rubber, between the strings to alter the timbre and sound produced when the pianist strikes the keys and is generally played in exactly the same manner as a normal piano. The legend surrounding the creation of the prepared piano is widely documented by scholars and Cage himself (although not always entirely accurately as shall be discovered in chapter one). The most recited recollection comes in the form of an introduction Cage wrote to Richard Bunger's prepared piano manual '*The Well Prepared Piano*',<sup>8</sup> called *How the Piano Came to Be Prepared*. In the introduction to Bunger's manual Cage describes how his involvement in the West Coast dance scene in the late 1930s brought him to the attention of Bonnie Bird who had been hired

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<sup>4</sup> John Tilbury Conversation with author 2004

<sup>5</sup> J. Cage, *Sonatas and Interludes*, in R. Kostelanetz, *John Cage*, London, Allen Lane The Penguin Press, 1971, p. 75.

<sup>6</sup> J. Peyser, *To Boulez and Beyond: Music in Europe since The Rite of Spring*, New York, Billboard Books, 1999, p. 175.

<sup>7</sup> R. Bunger, *The Well Prepared Piano* 2<sup>nd</sup> Ed., San Pedro: California, Litoral Arts Press, 1982.

<sup>8</sup> Ibid.

as the new director of the dance department at the Cornish School in Seattle. Bird hired Cage in 1938 as accompanist to the contemporary dance class; he would also take on the role of teacher of percussion.

The prepared piano was invented in 1940 after a request by one of the final year dance students, Syvilla Fort (1917-1975), to compose an accompaniment for a dance for her graduate recital. As was the norm at that time, Cage watched the choreography and composed the music to fit the duration and style of the piece. What influenced Cage was the African character of the piece. Syvilla Fort was an African American, and Cage believed that the movements Fort was producing with her body evoked Africa. Cage also felt that the title *Bacchanale* (which is a dance to the God of Wine, Bacchus) suggested a type of primitivism. Cage wanted to find a sonic match for Fort's total body African representative dance. Bonnie Bird who was Fort's dance teacher at the time recalls the moment when Cage approached her about Fort's choreography:

When Syvilla and I were discussing her graduation concert, I said she could have two or three pieces written for her by different composers available from the music department – and John was one of them. She had to prepare the rough outline of the dance so they had something to see, and then she worked with the composers. John came to me after seeing the dance and said “I have to have a gamelan orchestra [...]. She's done an absolutely beautiful work called *Bacchanale*, which has many textures that would be so right with the gamelan.” So I said, it's not possible. We can't even buy a gong.<sup>9</sup>

In the late 1930s Cage had two mediums for composition: percussion music and a 25 note serial approach based on Schoenberg's 12 tone techniques. As Cage's anecdote reveals, Fort left many parts of her graduate recital to the last minute, giving him three days in which to compose the piece<sup>10</sup>. Cage initially desired a percussion ensemble to accompany Fort; this would suit his primitive, tribal idea. However, he discovered that the space at the theatre where the final recital was to take place had no room for a percussion ensemble. The theatre owned a grand piano, though, which was located in the wings of the theatre. Cage had few options, and reverted back to his serial technique but he found no luck in trying to form an African sounding tone row. He decided that what was wrong was 'not him, but the piano'<sup>11</sup> and decided to change it. Cage states that he:

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<sup>9</sup> R. Boyle, Bonnie Bird, in P. Dickinson *Cage Talk: Dialogues with and about John Cage*, Rochester University Press, 2006, p. 70

<sup>10</sup> R. Kostelanetz, *Conversing With Cage*, 2<sup>nd</sup> ed., New York: London, Routledge, 2003, p. 62.

<sup>11</sup> J. Cage, How the Piano came to be Prepared in *Empty Words*, p. 7.

went to the kitchen, got a pie plate, brought it into the living room and placed it on the piano strings. I played a few keys. The piano sounds had been changed, but the pie plate bounced around due to the vibrations, and after a while, some of the sounds that had been changed no longer were. I tried something smaller, nails between the strings. They slipped down between and lengthwise along the strings. It dawned on me that screws or bolts would stay in position. They did. And I was delighted with the sounds they produced. [...] I wrote *Bacchanal* [sic] quickly and with the excitement continual discovery provided.<sup>12</sup>

Cage would later realise that there were going to be problems with his invention, however, he had

a solution to the problem of the gamelan. He went on working with it, but then he realized that he wasn't going to have a grand piano but an upright in the theatre. So when he got home, where he had an upright, he began inserting old pieces of pie plates and things like that. And he went on working with it and that's how the prepared piano came [about] – with *Bacchanale*<sup>13</sup>

There are several interesting points that need discussing from these accounts by Bonnie Bird. Firstly, that the dance initially provoked oriental images (gamelan) for Cage and not African. But more importantly, that the theatre had an upright piano and not a grand piano, as has always been stated. To prepare an upright piano is completely different to preparing a grand piano and that the prepared piano was invented on an upright piano and not a grand is an interesting point to note. Bird also states that Cage had an upright piano at home, but it has always been thought that Cage had a Steinway model O at this point.

Cage created the prepared piano out of necessity for a one man percussion ensemble. Cage wrote; 'With just one musician, you can really do an unlimited number of things on the inside of the piano if you have at your disposal an 'exploded' keyboard.'<sup>14</sup>

As Cage wrote in the liner notes to the first recording of the *Sonatas and Interludes*, his magnum opus for the instrument, performed by Mario Ajemian, 'composing for the prepared piano is not a criticism of the instrument. I'm only being practical.'<sup>15</sup>

In the space of sixteen years (1938-1954) Cage composed thirty-eight pieces that featured some form of piano mutation. Of these thirty-eight pieces he wrote one concerto, seventeen pieces to

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<sup>12</sup> R. Bunger, p. 5.

<sup>13</sup> R. Boyle, pp. 71-72.

<sup>14</sup> J. Cage, *For the Birds* English Ed., London, Marion Boyars, 1981, p. 38.

<sup>15</sup> Booklet text for Maro Ajemian's recording of the *Sonatas & Interludes*: *John Cage: Sonatas and Interludes*, Composers Recordings Inc. CRI 700 (reissue).

accompany the dance, eight for pieces for concert performance, two duets, eight works for percussion ensemble including a prepared piano and two to accompany films.

Why did Cage spend over a decade composing for this instrument? Many factors point to his continued enthusiasm. Initially the prepared piano created a platform for recognition by peers; when Lou Harrison heard it, he said 'Oh dammit! I wish I'd thought of that'<sup>16</sup>. Cage would also receive acclaim from the wider artistic community – receiving awards from the 'Guggenheim Foundation (\$2400) and also the National Academy of Arts and Letters (\$1000 awarded for the Sonatas & Interludes'<sup>17</sup> [...] which cited him for extending the boundaries of musical art'.<sup>18</sup>

Not only did the prepared piano bring Cage to the attention of the artistic community, but also the wider public. His work was becoming more valued and he was receiving commissions from talented virtuosi and dancers. This meant that Cage was at last receiving income for his work and receiving print space from critics and reviewers.

Cage received offers for compositions from the up-and-coming piano duo Arthur Gold and Robert Fizdale. Gold and Fizdale premiered Cage's Book of Music for two prepared pianos in 1945 and in review in the Tribune by critic Virgil Thomson Cage's music was described as 'original expression of the very highest poetic quality.'<sup>19</sup>

Cage and Cunningham also received rave reviews for their first collaborative concerts together, in which there were short piano solo dances by Cunningham, divided by Cage's prepared piano music alone.<sup>20</sup> Cage's scores were described as very beautiful in their delicate strength.<sup>21</sup>

However, it could be suggested that the prepared piano acted as a form of musical psychology for Cage; a way in which Cage could express his emotions and feelings in much the same way as one might use a psychologist to speak through deep rooted uncertainties and apprehensions. Many of his prepared piano pieces were composed at a time when he was suffering mental health issues due to the break-up and subsequent divorce from his wife Xenia and, although Cage did not want his

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<sup>16</sup> L. Miller, Henry Cowell and John Cage: Intersections and Influences, 1933-1941, *Journal of the American Musicological Society*, 59(1), Spring 2006: p. 49, notes.

<sup>17</sup> C. Tomkins, *The Bride and the Bachelors*, Penguin Books, 1976, p. 103.

<sup>18</sup> Ibid., p. 71.

<sup>19</sup> K. Silverman, *Begin Again: A Biography of John Cage*, New York, Alfred A Knopf, 2010, p. 58.

<sup>20</sup> Ibid., p. 63.

<sup>21</sup> Ibid., p. 64.

marriage to end, he also found himself drawn to the company of Merce Cunningham. Many of Cage's prepared piano works from this time are given titles that reveal a sense of loneliness and loss. As Kenneth Silverman points out in *Root of an Unfocus*, Cage is 'obsessively repetitive, with hammering outbursts', and in *The Perilous Night* 'the pianists hands are significantly separated widely on the keyboard'.<sup>22</sup> The most blatant title to confirm his foreboding is *A Valentine out of Season (Music for Xenia to play)*.

## Overview

This thesis is divided into five chapters. Chapter one explores the historical and aesthetic influences that were relevant to Cage in the creation of the prepared piano and places it in an historical context. The chapter will consider five significant areas that influenced Cage in the invention of the prepared piano: the influence and music of Henry Cowell (1897-1965); percussion music and percussion instruments; Cage's early works and technical language; invented instruments and noise and dancers and music of the dance.

At the heart of chapter two is the subject proper of the thesis, or the nuts and bolts! The chapter will look at John Cage's compositions for prepared piano and provide a thorough inventory of John Cage's prepared piano pieces, which aims to be of use to performers and scholars. Completing such an inventory has provided a comprehensive resource incorporating for each piece such minutiae as date of composition, publisher and a meticulous record and explanation used in the compositions. This resource will essentially take the form of a physical elucidation of the preparations, and a practical treatise of functionality with input from professional performers. It has also combined a detailed record and explanation of all the preparations used in the prepared piano compositions tracing the use and preference of certain materials in the creation of different sound mutations. This has proved enlightening to both the aesthetic preoccupations of the composer during the time of composition and the socio-historical context of the work. While the study does not take the form of an archival investigation - it does not aim to discover new, previously un-quantified prepared piano music of John Cage - it was an essential pre-requisite of the thesis to create an inventory of the extent of Cage's prepared piano output, as it has provided a contextual base for any analysis. No existing published source provided such a detailed inventory and commentary.

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<sup>22</sup> Ibid., p. 62.

Central to this thesis is an examination of the materials Cage used for preparing pianos and the effects that each material has. Chapter two will also examine the possibilities for making suggestions for the recreation of Cage's preparations. This sort of hypothesis has been largely possible because of a single source: the preparations of the *Sonatas and Interludes* collected by Cage and housed at the John Cage Trust, which have been scrutinised with respect to height, weight, width, length, circumference and gauge. The solutions suggested in this chapter have been decided through informed decisions via this resource. By the end of this chapter a performer will be able to reduce the ambiguity in choosing materials for preparation by utilising the descriptions of preparations of the materials provided.

Uniquely, this thesis has examined the physical relationships between piano, strings and preparations. Chapter three, therefore, deals with the problems associated with preparing a piano for performance, including the choice of preparation and the ambiguity of Cage's preparation chart.

Despite the experimental nature of Cage's prepared piano music chapter four will analyse *five* pieces of prepared piano music. By conducting analyses, it will be possible to balance the demands of the compositional techniques (such as the number patterns used in the structuring of pieces) mathematics and aesthetics of the solo prepared piano music. It will provide a treatise for the complex rhythmic structuring of the pieces which underpins the compositional output during this stage of Cage's career, and demonstrates how the music overflows the rigid structuring of the pieces. In this stage of his career Cage was concerned with devising a formula to enable numerical relationships between the larger durational ratios and smaller durational ratios. It can be discovered from a brief glance at the scores from this period that Cage did not stick to the formula rigidly. The chapter will also analyse the relationships between the written harmony in the score and the tones produced from preparations, with reference to results from chapter three, highlighting the discrepancies between the notated score and the abstract sound produced by the preparations.

Chapter five brings together many of the issues discussed thus far in the thesis and applies them to issues relating to performance. The chapter will look at the reasoning for performer choice in relation to ambiguity discussed in chapter three. It will expound whether the way a piano is prepared affects the way a performer plays, or alternatively whether the way a performer plays affects the way a piano

is prepared. The chapter will also consider the authenticity and importance of performances that do not create the transformation of sound suggested by Cage in his pieces.

It will become evident that I have focussed the bulk of research on the solo prepared piano pieces and not duos or concerti; this is simply due to a practical nature and that the majority of the solo prepared piano music fitted into a ten year period, and involved a fairly similar style of composition – whereas the later pieces such as the duos and concerto involved Cage's first ventures into different styles of composition.

Most writings on Cage from this period result from anecdotes and memories, either from Cage himself to people who surrounded him at the time, or from Cage's own writings written years after the event occurred; these often prove to be not particularly reliable, particularly regarding people and dates. However, Cage's early collections like *Silence: Lectures and Writings*, *For the Birds: John Cage in Conversation with Daniel Charles*, *A Year from Monday: Lectures and Writings*, *Empty Words: Writings, 1973-78* have proven invaluable as a source, describing his theories and feelings leading up to the creation of the prepared piano and of course during its infancy. Within Cage's writings the later collections, such as *M: Writings '67-'72* and *X: Writings '79-'82*, whilst providing invaluable insights into Cage's progression, have provided little supporting evidence for this thesis.

Primary sources consulted, in addition to Cage's scores, manuscripts and writings have included interviews with professional pianists who are renown interpreters of Cage's prepared piano music including Philip Thomas, Margaret Leng Tan, and Richard Bunger-Evans.

Three largely biographical sources have been consulted during the research of the thesis - *The Roaring Silence* by David Revill, *Begin Again* by Kenneth Silverman and *Chance and Circumstance* authored by Caroline Brown.

Revill's book was completed just before Cage's death in 1992 and gives a good introduction to the life of Cage. '*The Roaring Silence*' begins with Cage's ancestors and traces his life through lots of personal anecdotes; however, the sources are not extensively listed, and certain occasions within Cage's life have been omitted (more than likely at the request of Cage) whom Revill states was involved in proof reading the biography. Revill makes it clear that he was a fan and at times can come across biased.

Kenneth Silverman's biography of Cage '*Begin Again*' was published in 2010 and is a thoroughly comprehensive account of all aspects of John Cage's life, including details of relationships that until recently have remained 'unspoken of'. Silverman's work draws on interviews from many of Cage's contemporaries to reinforce his findings. The biography describes compositions with reference to their importance at the varying points in Cage's career; however, the musical aspects aren't looked at in detail.

Carolyn Brown's memoir '*Chance and Circumstance: Twenty Years with Cage and Cunningham*' documents Brown's time as a lead dancer in the Cunningham Dance Company, from its inception in the 1950s until her departure in the 1970s. At the centre of her accounts is her relationship with Cage and Cunningham, describing the sometimes polar opposites between Cunningham and Cage's personalities. Most importantly, however, Brown is able to highlight details about the artistic world at an integral point in its development.

Other sources include *The Cambridge Companion to John Cage* edited by David Nicholls, a collection of 14 articles which are separated into three parts; Aesthetic Contexts, Sounds, Words, Images and Interaction and Influence and focus on key points in Cage's life. The most notable chapters for this research have been the chapters that discuss Cage's goal of giving up control so that sounds can be sounds, in particular the chapter '*Music I: to the late 1940s*' by David W. Bernstein. This chapter is particularly useful as it gives a historical grounding to Cage's artistic development, and describes the development from the limited musical exposure of Cage's youth, through the twelve-tone instruction Cage received from Adolph Weiss and eventually Schoenberg, to Cage's first experiments with percussion music and his attempts at establishing an all sound music, finishing with the experimentation with the early prepared piano pieces. The biographical study *The Bride and the Bachelors* written by Calvin Tomkins is a perfect complement to this chapter, filling in brief gaps in Cage's life that may have been omitted. '*Cage's Collaborations*' written by Leta E. Miller is an attempt to analyse the impact that other artists (musicians, painters and dancers) had on Cage's compositional output. This chapter does investigate the many influences other artists had on Cage, and does focus at times on individual works, including the prepared piano music. However, another article written by the same author, entitled *Henry Cowell and John Cage: Intersections and Influences*,



1933-1941<sup>23</sup> offers in much more detail a good hypotheses to justify the reasons for the direction Cage took in this particular period in his artistic life. Also by Miller is '*The Art of Noise: John Cage, Lou Harrison and the West Coast Percussion Ensemble*', published in *Perspectives on American Music, 1900-1950* edited by Michael Saffle, which traces the effect that Cage's early years in the West Coast of America, had on his later compositional output, including the prepared piano.

*American Experimental Music, 1890-1940* also by David Nicholls incorporates a chapter entitled The Future of Music Credo: The development of a philosophy of experimentation in the early works of John Cage. As the title suggests it places Cage's development and philosophy of experimentation into the framework of experimental music, and analyses his early works with this premise in mind. Of particular interest to this research was Nicholls' analysis of early works, particularly the percussion music and the new techniques Cage was applying with regard to structure, including his development of the now famous micro-macrocosmic structure, which would dominate much of his prepared piano music for a decade. In this publication, Nicholls importantly highlights Cage's fascination with noise, and his insistence for its unrestrained introduction into music.

*John Cage's Theatre Pieces: Notation and Performances*, written by William Fetterman is of importance to this study as it initially focuses on the early dance accompaniments. It briefly outlines, as most of the other text mentioned do, the factors that led Cage to the West Coast and becoming associated with dance and dancers. However, this publication focuses large amounts of time on the importance of the early prepared piano dance works and the confidence that they instilled in Cage as a composer.

Several theses have proven invaluable during this research John Cage and Music Since World War II: A Study in Applied Aesthetics by Ellsworth J Snyder, A PhD dissertation from the University of Wisconsin, 1970, 'Form and Structure in the Music of John Cage' by Deborah Ann Campana, 1985 dissertation from Northwestern University and Robert Coleridge's 2005 thesis 'Music and Dance in the Twentieth Century: Issues and Analyses' from the University of Southampton.

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<sup>23</sup> L. Miller, Henry Cowell and John Cage: Intersections and Influences, 1933-1941.

Snyder's dissertation serves as an introduction and analysis of, as worded by the author, the third distinctive period in twentieth century art music – that of the age of Cage and Stockhausen.<sup>24</sup> Synder investigates the influences on Cage's music and the aesthetic means he created when composing his music, including durational devices, means of composing, relationship of scores to performances and the notational systems that Cage utilised.

Campana's thesis is an early analytical study of Cage's music focussing on the relationship between form and structure. The thesis is split into three parts, divided into pre-chance, transition to chance and chance and indeterminacy. The thesis provides a biography of Cage's life leading up to and during the composition of the works from each period and then analyses key works.

Coleridge's thesis highlights the partnership between music and dance in the twentieth century. Coleridge explores historical and aesthetic issues that concerned many of the musicians and dancers at the beginning of the twentieth century. He also focuses predominantly on the artistic relationship between Cage and Cunningham, and debates the importance of the collaboration between the two.

Useful resources in German have included , *Musik-Konzepte Sonderband John Cage* by Heinz-Klaus Metzger and *Cage und Cunningham Von Rhythmic structures Zufallsoperationen* by Silke Hilger.

The first book that investigates John Cage's music from an analytical *and* a historical agenda is James Pritchett's *The Music of John Cage*. Although this book focuses on the entirety of Cage's vast compositional output (right up to his death in 1992, when the book was first published), it is an important text in establishing Cage's preparation for inventing the prepared piano. The publication draws on all of the ideological perspectives Cage utilised in his compositional life and endeavours to examine the relationship that the influences had not only on his composition, but also his writings and philosophical viewpoint.

Up to this point the core text for the prepared piano was 'The Well-Prepared Piano' written in 1973 by Richard Bunger, with a forward by John Cage. This publication does not focus on Cage's music for prepared piano per se, instead it is 'a detailed response to those students, professors and just-plain curious who have subsequently bombarded me with questions about this exciting and remarkable

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<sup>24</sup> E. J. Synder, *John Cage and Music Since World War II: A Study in Applied Aesthetics*, Doctoral Thesis, The University of Wisconsin, 1970, p. 1.

instrument.<sup>25</sup> In essence the 'Well-Prepared Piano' is a manual for (predominantly) performers, but also composers, documenting the techniques of choosing and ultimately preparing a piano. It details how a performer should engage in the task of preparing a piano without damaging the piano in the process, but also approaching the task without trepidation, giving general techniques for preparing the piano, including a description of the anatomy of the piano. Bunker's own introduction to the first edition of the book states:

I believe that John Cage's invention of the prepared piano is one of the significant musical events of our century. I believe that his frequently maligned, yet seldom-heard music for the instrument will yet become part of the pianist's standard repertoire, and that the prepared piano, as an instrumental resource, will rightfully become the domain of still more composers. If this little book can thus serve composers and performers, it will have served well.<sup>26</sup>

Although a good resource for the novice prepared piano performer, highlighting techniques and repertoire, the manual does not address any of the wider issues related to the prepared piano, relating to reasoned choice of preparation selection, nor any of the aesthetic problems that performers encounter when performing prepared piano music. However, as previously mentioned this manual for the prepared piano does not have John Cage's prepared piano music at its core, and thus issues relating to Cage's music are not discussed.

Originally a PhD thesis and later published in 1979 only in German, *Das Präparierte Klavier des John Cage* by Monika Furst-Heidtman was the first analytical study based solely on the prepared piano music of Cage. Furst-Heidtman catalogues all of Cage's prepared piano music, and briefly highlights issues that occur when preparing the piano.

The most recent publication which does focus solely on the prepared piano music of John Cage is 'John Cage's Prepared Piano: The Nuts & Bolts' written as a publication of a doctoral thesis by Tzenka Dianova. The publication is split into three distinctive parts 'Getting prepared to prepare a piano' in which Dianova again provides a resource for performers in approaching the task of preparing the piano including, again, the dangers inherent in preparing a piano and a 'safety manual for preparation' with a description of the preparation that Dianova herself uses for preparing a piano, much the same as Bunker does in his manual. In part two Dianova focuses on playing the prepared piano and in part three Dianova briefly discusses the prepared piano works, giving a brief history of

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<sup>25</sup> R. Bunker, p. 8.

<sup>26</sup> Ibid., p. 10.

the piece and listing the duration of the piece, level of difficulty for preparing, objects needed for preparation and the time required to prepare the piano for performance. This publication is, like Bunker's, largely an illustrated guide to preparing pianos for pianists, utilising experience that the author has gained from years of experience in performing the repertoire. It is useful for pianists who wish to learn the difficulties (and ways of overcoming them) in preparing a piano. However, neither publication present the prepared piano with a historical grounding as is presented in this thesis, nor do they offer any great insight into acoustic results and performer interaction. The uniqueness of the research that follows lies in the scientific nature of the research. This thesis details what happens to a piano when it is prepared and, distinctively, it analyses the effect on the resultant sounds. It consequently attempts to offer an understanding of the reaction between sounds, preparations and performers. Unlike previous research, this thesis takes at its core not the showmanship or curiosity of the prepared piano but the sonic capabilities. In 1949 Pierre Boulez describes the essential features that this study aims to emphasize:

One's first reaction on hearing about John Cage's prepared piano might well be curiosity verging on amused scepticism. Some demented inventor can easily be pictured, a "piano de-tuner" doing his best to clothe the strings with metallicizing vegetation. More seriously, one thinks of a subtle and ingenious soundsmith, drawing new possibilities from the percussive aspects of the piano. The reality has more to do with questioning acoustic ideas received in the course of the evolution of Western music; ideas on which the most radical and challenging works are still based. Instead of giving what might be called pure sounds – fundamentals and natural harmonics – John Cage's prepared piano supplies us with the complexes of frequencies.<sup>27</sup>

John Cage commented in his *'Lecture on Nothing'* that 'I found that I liked noises even more than I liked intervals.'<sup>28</sup> With the prepared piano, Cage was able to compose for an instrument that could produce noises so 'eloquently'.

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<sup>27</sup> J-J. Nattiez, *The Boulez-Cage Correspondence*, Cambridge University Press, 1995, p. 27.

<sup>28</sup> J. Cage, *Lecture on Nothing* in *Silence* English Ed., London, Marion Boyars, 1968, p. 117.



*Figure 1: John Cage preparing a piano.*

*(Used with permission of the John Cage Trust, © John Cage Trust).*

# Chapter One: Historical Perspectives

## 1.1: Context

I once asked Arragon, the historian, how history was written. He said, "You have to invent it." When I wish as now to tell of critical incidents, persons, and events that have influenced my life and work, the true answer is all of the incidents were critical, all of the people influenced me, everything that happened and that is still happening influences me.<sup>29</sup>

Examination of the influences that indirectly or directly impacted upon the creation of the prepared piano is essential as it makes clear the context within which the prepared piano was created and demonstrates that the invention was not a whimsical notion, but one that came through consideration and experimentation. This chapter will consider five significant areas that influenced Cage in the invention of the prepared piano: the influence and music of Henry Cowell (1897-1965); percussion music and percussion instruments; Cage's early works and technical language; invented instruments and noise; and dancers and music for the dance.

Henry Cowell was one of the most influential figures in experimental music in the twentieth century. As a promoter of new music in America he gave people the 'open sesame'<sup>30</sup> to compose music which reflected a more individual outlook than had hitherto been the case, instead of conforming to the ideas of nineteenth century traditionalists. As a composer he invented and used new techniques for creating sound and noise, influencing the creation of the prepared piano through his advocacy of percussion music and non-Western ideas in composition. Particular reference to Cowell's utilisation of inside-the-piano techniques will be examined and discussed. It will be demonstrated how pieces such as *The Banshee* (1925) and *Aeolian Harp* (1923) can be seen as a direct pre-cursor to the prepared piano, in the light of the exploitation of new instrumental techniques.

Cage's use of percussion ran parallel with his creation of the prepared piano, and was his major obsession for the years preceding the prepared piano's conception. What is particularly important to note is how percussion music and percussion instruments were central to Cage's quest for the discovery and control of new sounds, which consequently led to the invention of the prepared piano. A prepared piano allows a new sonic palette to be controlled by a single player instead of a whole

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<sup>29</sup> J. Cage, Autobiographical Statement in R. Kostelanetz, *John Cage Writer*, New York, Limelight Editions, 1993, p. 237.

<sup>30</sup> J. Cage, History of Experimental Music in the US, *Silence*, English Ed., London, Calder and Boyars, 1968, p. 71.

percussion ensemble. This chapter demonstrates how Cage's fascination with percussion began, paying particular reference to Oskar Fischinger (1900-1967), and his theory that everything has a spirit that is set into vibration when it is struck<sup>31</sup>. The section will also survey the reception of percussion music at the time and demonstrate the influence that this had on the creation of the prepared piano. This influence of Edgard Varèse (1883-1965) on Cage's use of percussion will be examined, particularly his employment of percussion sounds as material in its own right, where the sound is not used to punctuate or consolidate harmonic structure. The sounds of other cultures will also briefly be considered and, in particular, the comparisons made between the music of the Orient (where much music uses the non-pitched percussion instrument) and the sound of the prepared piano.

A discussion of the structure Cage uses in his early percussion works, particularly in the *Constructions* (1939 and 1942), will be made to highlight the similarities between this and the structure of the prepared piano music.

A section on invented instruments has been included to demonstrate other types of instruments being created within Western art music suggesting links and possible influences upon Cage. Particular importance will be shown through examination of Cage's *Future of Music: Credo* (1937) on the influence of Luigi Russolo (1885-1947) and the Futurists, his manifesto '*The Art of Noise*', and the invention of the noise machines as a pre-cursor to Cage's invention of the prepared piano.

The majority of Cage's prepared piano music was written for the dance and so the chapter will finish with a brief look at the influence of dancers and the composition of dance music upon the creation of the prepared piano. Contemporary dancers encouraged the use of percussion music as accompaniment to their choreography and Cage was employed as an accompanist and composer for the dance at the Cornish School. He composed percussion music for the dances, and was also helped by many dancers in the performance of this music. *Bacchanale* (1940), an accompaniment for a dance by Syvilla Fort (1917-1975), was the first piece written exclusively for prepared piano. It was also his work with dancers that led him to utilise the micro-macrocosmic structure to which the majority of his prepared piano music conforms.

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<sup>31</sup> C. Tomkins, p. 86.

## 1.2: Henry Cowell

Henry Cowell was the code to the enigma of experimental music in the twentieth century. He was, as John Cage would describe, the 'open sesame'<sup>32</sup> to a generation of experimental composers, particularly from the United States, and the pre-emptive person for many techniques touched on in the Avant-garde.<sup>33</sup>

Cowell's importance as a new music advocate was realised as a result of the New Music Society that he founded in 1925. Cowell wanted to 'present musical works embodying the most progressive tendencies of this age, and disseminate the new musical ideas.'<sup>34</sup> As part of his ever expanding new music empire Cowell created the New Music Quarterly in 1927, his role being that of editor and publisher. *New Music Quarterly* would publish scores by predominantly American composers, but also like-minded European composers and this publication was how in 1933, John Cage and Henry Cowell would first become acquainted. Richard Buhlig (1880-1952), Cage's teacher at that time and a friend to Henry Cowell, suggested Cage send his *Clarinet Sonata* (1933) for publication in New Music. Although the piece was rejected by Cowell as he felt Cage had not 'found himself completely'<sup>35</sup> (Cage's first publication in New Music was *Amores*<sup>36</sup> (1943)), Cowell did, however, suggest that the piece be played at a New Music Society Workshop. This workshop would be the first official meeting.

Cowell had previously been highly regarded as a pianist/composer, touring the world, particularly Europe, in the 1920s and 1930s and had even performed at New York's renowned Carnegie Hall twice in the February of 1924. He was in demand to such an extent that he felt the necessity to hire a manager. In his recitals he performed solely his own compositions, demonstrating his new extended technique for piano playing, and wowed crowds with his thumping of keys with fists and forearms, or

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<sup>32</sup> J. Cage, *History of Experimental Music in the US*, p. 71.

<sup>33</sup> *Ibid.*

<sup>34</sup> R. H. Mead, Henry Cowell's New Music Society, *The Journal of Musicology*, 1(4): Oct. 1982: p.450.

<sup>35</sup> *Ibid.*, p. 455.

<sup>36</sup> C. Shultis, Cage and Europe, in D. Nicholls, *Cambridge Companion to John Cage*, Cambridge University Press, 2002, p. 20.



with his playing inside the piano's body. As Mead elucidates by the time Cowell had 'reached California that summer, he had become a national celebrity.'<sup>37</sup>

It is possible to draw similarities in the initial stages of Cage and Cowell's education. Cowell was largely self-taught, learning from the multicultural surroundings of San Francisco, something which would greatly influence his later compositions with regard to non-western techniques and the influence of noise as a subject for music, which would in turn influence Cage. Cage would drop out of college and travel around Europe to immerse himself in different cultures and different art forms. By the time of Cowell's seventeenth birthday in 1914, (also the point at which he would receive his first formal type of musical training from Charles Seeger), Cowell had composed his Opus 108.

The lack of formal training and therefore any type of constraint in Cowell's education could be considered advantageous, as it meant he wasn't tied to any formal school of thought. His early music, especially his early piano pieces, began their life as sketches whose conception arose from an auditory device, which in turn have taken their inspiration from Cowell's interests or surroundings. The focus of Cowell's imagery can be discovered from the titles of some of his early works, such as *Rippling Waters*, *The Night Sound*, *Mist Music*. The earliest of Cowell's published scores, *The Tides of Mananaun*, dates from when the composer was fourteen years old, in 1911. Cage's early music, has been described as 'doodles' or meanderings, a result, likely, of there being no formal constraint on his musical education – his only formal musical training had come from his Aunt Pheobe on the piano.

By the early 1920s Cowell was extending his use of the inside of the piano. He had christened the piano he utilised the 'string piano'. By this, Cowell meant that all parts of the piano should be used in the composition and performance of piano music, particularly the strings. Cowell discovered that he could produce new timbres by using harmonics of the strings, muting the strings with different parts of the hand, or playing the strings with varying kinds of pizzicato. Cage would also use the term 'string piano' as a direct homage to Cowell. Many of Cage's early works, such as the *First Construction (in Metal)* (1939) and *Second Construction* (1940), call for the use of a string piano and his early prepared piano works were never composed for prepared piano in name but merely for string piano.

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<sup>37</sup> R. Mead, Henry Cowell's New Music Society, p449.

It wouldn't be until the composition of *Totem Ancestor* October 1943<sup>38</sup> that Cage would begin calling the instrument by its new name, the prepared piano. Amazingly enough Cage had not felt the need to record the preparations of his prepared piano pieces up to this point. It wasn't until the premiere recording of Cage's early piano music by Jeanne Kirstein that Cage and Kirstein had to re-invent the preparations by ear for *Bacchanale*.<sup>39</sup>

It is clear that Cowell's teaching included demonstrations of the techniques he was employing in his compositions. In the introduction to Richard Bunker's manual on the prepared piano, 'The Well Prepared Piano', Cage describes Cowell's demonstrations of *The Banshee*, a piano piece composed in 1925, that makes use of the inside of the piano producing glissandi effects on the strings. Cage, who was to act as what Lou Harrison would describe as one of 'Cowell's pedal boys',<sup>40</sup> would depress the sustain pedal while Cowell would 'operate' inside the piano's body, using what Cage describes as a 'darning egg'.<sup>41</sup> Cowell was using his theories in composition and experiences with performance to create a holistic approach to teaching his students.

In 1934 Cage received one of ten scholarships donated by Charles Ives to study at the New School for Social Research in New York, an establishment that was progressive, socially aware, anti-nationalistic and open to anybody. It was also an institution at which Henry Cowell taught. Cage enrolled on Henry Cowell's course 'Primitive and Folk origins of Music'. This course consisted of twelve one and a half hour lectures in which Cowell promised to 'show the beginning of music and its slow development through folk music, oriental cultivated music and early European cultivated music into our present system'.<sup>42</sup> Cage's name appears on only one attendance register for that year, being the Origins of Music course,<sup>43</sup> yet Cage also states that he took Cowell's courses in Modern Harmony, Survey of Contemporary Music and New Possibilities in Piano Playing. It is possible that Cage attended these lectures, in particular, the demonstrative lecture in innovative piano playing, which Cage mentions frequently when he describes Cowell performing his experimental works such as *The Banshee* in which the pianist performs cross string glissandi with the finger tips whilst silently

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<sup>38</sup> R. Bunker, Prepared Piano: The First 40 Years' in *The Well Prepared Piano*, 2<sup>nd</sup> Ed., San Pedro California, Litoral Arts Press, 1981, p. 83.

<sup>39</sup> *Ibid.*

<sup>40</sup> L. E. Miller, West Coast Prelude (1917-1943), in L. E. Miller and F. Liberman, *Composing a World: Lou Harrison, Musical Wayfarer*, University of Illinois Press, 2004, p. 11.

<sup>41</sup> J. Cage, *How the Piano Came to be Prepared*, p. 7.

<sup>42</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences* p. 53.

<sup>43</sup> *Ibid.*

depressing the keys and *Aeolian Harp* (1923) where the pianist plays inside the piano, again whilst producing glissando effects from strumming the strings with parts of the hand (finger tips and nails).<sup>44</sup>

Cowell's lectures appear very experiential, often incorporating live performances from visiting professionals, and he utilises the recordings of indigenous music from around the world to illustrate examples from units of the course including Oriental, African, Indian, Balinese etc., (more of this will be discussed in the following section on percussion). Cowell purchased the recordings for the New School after his trip to the Berlin Phonogramm Archiv in 1931 and 1932. It was at this time, while on a Guggenheim fellowship, that Cowell was also granted the opportunity to study with distinguished specialists in Indian and Indonesian music at the University of Berlin.<sup>45</sup>

Cage's prepared piano music bears similarities to Cowell's early piano compositions, and Cowell even stated that Cage had the idea for writing for the prepared piano 'by knowing my own things for the strings of the piano very well.'<sup>46</sup> In pieces such as *Anger Dance* (1914) Cowell utilises motives incorporating repetition. This idea is close to much of Cage's pieces like *Bacchanale* (1940), where the right hand line deals with linear motivic gestures and the bass is grounded by a repetitive pattern in the left hand line. In Cage's music the repetitive patterns contained in the compositions usually appear in the works that were written to accompany the choreography of a dance. This is likely due to the process utilised when composing music for dancers. Using repetition is a simple and effective way of increasing the amount of music needed to suit the proportions of a dance before a new theme is needed, representing a new gesture introduced by the dancer. The same consideration can be made for pieces that were written to accompany films like *Music for Marcel Duchamp*. In music theatre it is known as a 'vamp'. As Henry Cowell points out 'anyone who has worked in a dance studio knows that dances are always being subjected to alteration through repeated trials, in semi-improvised fashion. In a very few cases, the dancer will give the composer a definite plan [...]'<sup>47</sup> In fact, in the manuscripts to the *Bacchanale* Cage was quite obviously working along these lines. Whilst composing the music and watching the choreography, he did not write out the notes but simply puts ditto marks in the score. This style of vamping works extremely well for music composed on a

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<sup>44</sup> J. Cage, *How the Piano Came to be Prepared*, p. 7.

<sup>45</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences* p. 55.

<sup>46</sup> *Ibid*, p. 81.

<sup>47</sup> H. Cowell, Relating Music and Concert Dance, *Dance Observer*, 4(1): 1937: p. 7.

prepared piano as the transformation in sound is so great that there is no chance that a sort of monotony will occur.

It should be noted that Cage and Cowell use repeated patterns in their music for different reasons. Cowell's music was very representative, and he utilised it to conjure up images. Nicholls points out that the repetition in *Anger Dance* was used to demonstrate 'the composer's frustration with an unsympathetic doctor.'<sup>48</sup> In Cage's music the repetitive tendencies were usually a result for the medium in which the music was composed. In most cases the compositions were for dance accompaniment, and in some cases Cage would have to extend bars to fit in with the dancer's choreography.

Charles Seeger had realised the importance of Cowell's unconstrained experimentalism. He also realised that it was important for Cowell to carry on developing his new techniques. He instilled in Cowell the importance of examining 'systematically his own use of compositional techniques; and, conversely, that he should compose a repertory of works which would further explore these innovations.'<sup>49</sup> To comply with this, Cowell wrote *New Musical Resources* between 1916-1919, considerably revising it before its publication in 1930. While a fellow at Wesleyan University in 1960, Cage composed a list of ten books that influenced him the most; the list included *New Musical Resources* amongst it.<sup>50</sup> The manual is divided in three sections: Part one: Tone combinations, where Cowell explains his theories on overtones, polyharmony, tone quality and dissonant counterpoint. Part Two: Rhythm, in which Cowell discusses time, meter, dynamics, form, combinations of meter and time, tempo and scales of rhythm. Part three: Chord formation elucidates Cowell's thinking behind tone clusters and chord building from different intervals.

Most important to the prepared piano is Cowell's investigation into the use of overtones and micro-tones in music discussed in Part One of *New Musical Resources*. Cage would say

the prepared piano also makes possible the use of micro-tones, that is, pitch differences less than our conventional half-tones. This provides an auditory pleasure which has long been known in jazz and folk and Oriental music, but which has largely been excluded from our standardized serious music, with the

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<sup>48</sup> D. Nicholls, *American Experimental Music 1890-1940*, Cambridge University Press, 1990, p. 134.

<sup>49</sup> *Ibid.*

<sup>50</sup> *Ibid.*, p. 190.

exception of the modern uses of  $\frac{1}{4}$  tones,  $\frac{1}{8}$  tones,  $\frac{1}{16}$  tones and even 43 tones to the octave, in the works of Alois Haba, Julian Carillo, and Harry Partch.<sup>51</sup>

A thorough investigation into frequency, the overtone series and the effects of preparations on the frequency of tones will be examined in chapter three, but it is important to consider the derivation of Cowell's experiments with overtones and the impact that this had on the prepared piano. Practically every tone produced by a vibration consists of several similar properties. The most basic level of a tone is the fundamental. The fundamental is the strongest sounding part of a tone. A tone also consists of weaker sounding tones which are generally higher. These weak sounding tones are known as partials or overtones. Overtones are a natural vibration system of frequencies, which, when excited, produce numerous frequencies (partials) simultaneously. Each partial tone varies in sonic quality due to the variance in amplitude between partials; therefore the number of partials created and the volume of each one are important. By inserting preparations between the strings the partials produced create some interesting results. The key to the prepared piano is the production of and utilisation of the harmonics created when inserting the various kinds of preparations. It is fair to assume that the sonic possibilities created by Cowell in his experiments gave Cage an insight into the possibilities of harmonics that can come from a piano. In *Sinister Resonance* (1930) Cowell begins to realise the possibilities of muting the strings of the piano. By muting strings Cowell is able to produce even more varying timbres of sound. Again comparisons can be drawn to Cage's prepared piano music. The preparations that Cage uses are effectively mutes used to dampen the vibrations at varying parts of the string. By altering the position of the mute along the string (as Cowell did with hand positions along the string i.e. closer to bridge, near dampers) new sounds can be produced. The significance of altering the position of preparations by even a fraction will be investigated in later chapters.

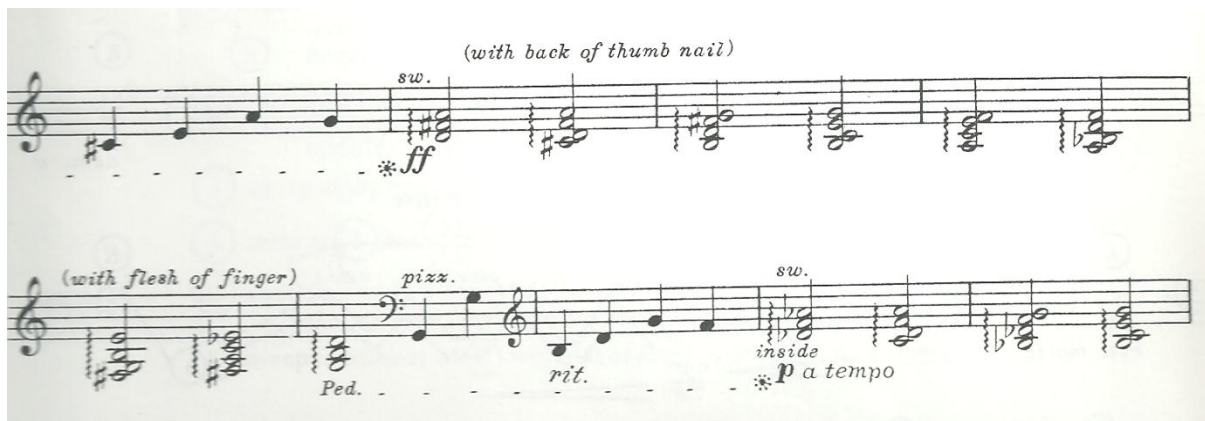
A similarity between Cowell and Cage is that both composers make comments about performing on different types of pianos. Cowell says 'while on most standard makes and models (of grand pianos) it is practical to perform *Sinister Resonance* just as written, there are to be found makes and models on which it is impractical, in which case it is always permissible to make such adjustments in the work as

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<sup>51</sup> J. Cage, A Composer's Confessions in R. Kostelanetz, *John Cage Writer*, New York, Limelight Editions, 1993, p. 36.

may be necessary.<sup>52</sup> Cage remarks on performing the *Sonatas and Interludes* (1946-1948) 'I think anyone will have to remark eventually on the fact that all of the performances are different, because my table of preparations is not precise, and only suited the piano that I was actually working on. So that the result is that everyone's performance of the *Sonatas and Interludes* is a fresh experience. And a feather in the hat of indeterminacy, I think. Or it could be a black eye on indeterminacy, according to how you look at it. I think David Tudor feels that the *Sonatas and Interludes* only existed when I played them on the piano for which they were composed. I think he thinks that the work has disappeared in the various transformations that have taken place. [...] I didn't like it when I first wrote it [not being able to control the performances]. But I was persuaded to like it through what I call practicality and circumstances.'<sup>53</sup>

The influence of Cowell's piano experiments is obvious in Cage's future inside the piano explorations. *The Aeolian Harp* is the first composition for piano that Cowell disregards conventional sound production and conventional performance techniques. Cowell asks the performer to use fingernails to pluck individual strings and to sweep the strings with the pads of the fingertips and the fingernails again. Before Cowell's experimentations, the production of sound was limited to the outside of the piano.



**Figure 2: An Extract from *Aeolian Harp* by Henry Cowell demonstrating the inside piano technique (bars 13-21).**

*The Banshee* is probably Cowell's most infamous work, and is one that Cage regularly commented on himself. In *The Banshee* the performer, with the help of an assistant, must manipulate the strings in

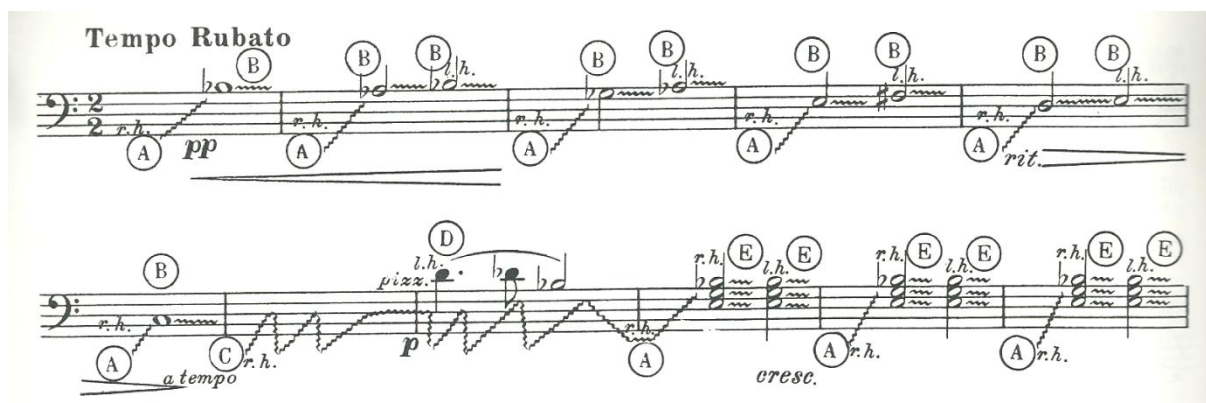
<sup>52</sup> D. Nicholls, *American Experimental Music 1890-1940*, p. 174.

<sup>53</sup> W. Duckworth, An interview with John Cage in R. Fleming and W. Duckworth, *John Cage at Seventy-Five*, Lewisberg, Bucknell University Press, 1989, p. 19.

the piano with different parts of the hand and fingers; this then produces a variety of different sounds not encountered by simply playing the keys.

- (E) sweep along three notes together, in the same manner as (B).
- (F) sweep in the manner of (B) but with the back of finger-nail instead of flesh.
- (G) when the finger is half way along the string in the manner of (F), start a sweep along the same string with the flesh of the other finger, thus partly damping the sound.
- (H) sweep back and forth in the manner of (C), but start at the same time from both above and below, crossing the sweep in the middle.
- (I) sweep along five notes, in the manner of (B).
- (J) same as (I) but with back of finger-nails instead of flesh of finger.
- (K) sweep along in manner of (J) with nails of both hands together, taking in all notes between the two outer limits given.
- (L) sweep in manner of (C) with flat of hand instead of single finger.

**Figure 3: An Extract from the Explanation of Symbols in *The Banshee* (Opening Page).**



**Figure 4: An Extract from *The Banshee* (bars 1-11).**

In *A Composition* (1923) Cowell introduces a foreign object into the piano to produce different sounds, an early incarnation of the prepared piano and in *Synchrony* (1929-1930) Cowell asks the pianist to use a percussionist's beater on the low piano strings. In Cowell's *Sinister Resonance* (1930), the performance directions display a similarity to the specifications in the performance notes of Cage's *The Perilous Night* (in which Cage specifies the type of piano to play on), Cowell states:

While on most standard makes and models (of grand pianos) it is practical to perform *Sinister Resonance* just as written, there are to be found makes and models on which it is impractical, in which case it is permissible to make such adjustments in the work as may be necessary.<sup>54</sup>

What was different about Henry Cowell compared with other pioneers is that he was not possessive of the procedures or methods that he used in his music, and he allowed colleagues to develop the

<sup>54</sup> D. Nicholls, *American Experimental Music 1890-1940*, p. 166.

ideas he had formed. Cage was no exception. In *Sound Form No. 1* (1937) and *The United Quartet* (1936) Cowell begins to develop his principles of what he would title his 'unification principle' in which he explores the organisation and mirroring of small and large sections – similar to Cage's micro-macrocosmic structuring principles. In the percussion quintet *Pulse* (1939), a piece that Cage was extremely familiar with as he had conducted its premiere in 1939, Cowell develops a structuring system that again not dissimilar to Cage's own square root method (or macro-microcosmic structure), in which the small sections of the piece mirror the larger sections of the piece. In *Pulse* the number five is important. The piece is for five players, and it contains five large sections; four out of the five sections are subdivided into five sections each containing five bars. The total number of bars in *Pulse* is  $5 \times 5 \times 5 = 125$  bars. Cage's *First Construction (in Metal)* depends on the number 16. The piece is written for 16 different sounds, has 16 sections and each section is divided into 16 bars. Like Cage in *First Construction (in metal)*, Cowell articulates the different sections by changing instrumentation and timbre as does Cage in *First Construction (in Metal)*. This similarity of rhythmic structuring is quite clear.<sup>55</sup> It can be seen from figure 4 that like Cage, Cowell delineates the different sections of the rhythmic structuring by inserting a rehearsal number or changing the instrument to create a contrast between the new and previous sections. The first bar of *Pulse* is a blank bar for player one, but players two, three and four have an introductory bar that sets the pulse of the piece.

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<sup>55</sup> For a full analysis of this method see particularly D. Nicholls, *American Experimental Music 1890-1940*, p. 173-174 and L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p. 71-73.



**Pulse**  
for  
John Cage and his Percussion Group  
Henry Cowell 1939

PLAYER 1  
3 Korean Dragon's Mouths  
3 Rectangular Woodblocks

Rather rapid pulse

high  
medium  
low

3 Korean Dragon's Mouths

high  
medium  
low

3 Rectangular Woodblocks

Blank setting pulse

Section 1

Wd. blks

Section 2

Dragon's Mouths

Section 3

Section 4 - etc.

**Figure 5: An Extract from *Pulse*, demonstrating the early attempt at rhythmic structuring (player 1, bars 1-20).**

David Nicholls believes that the essential notion that Cage took from Cowell was that 'all sounds were potentially musical and that they can be freely brought together in a musical composition.'<sup>56</sup> John Cage stated that Cowell was the 'open sesame' to many young composers in the early part of the twentieth century. This section has shown that as a musical pioneer and an advocate for young experimental composers through his work with the New Music Society, Cowell laid the seed of experimentation in Cage that instigated the ideas that germinated the creation of the prepared piano. Cowell's role as a teacher of experimental and world music at the New School for Social Research nurtured Cage's own inventive nature and demonstrated the interaction between different cultures proving vital to the creation of the prepared piano.

Cowell's manifesto *New Musical Resources*, a book that Cage rated as one of the ten most influential books on his career, had a direct implication on the creation of Cage's prepared piano. Particularly it has been shown that Cowell's experiments with overtones and harmonics were particularly essential to Cage. It has also been shown that Cowell was the genesis for many of the pre-compositional ideas

<sup>56</sup>D. Nicholls, *American Experimental Music 1890-1940*, p. 217.

that would dominate much of Cage's music and particularly the prepared piano music. Through analysis of Cowell's percussion works *Pulse* and earlier works such as *String Quartet No.1* (1916) and *United Quartet* (1936)<sup>57</sup> it can be seen that Cage borrowed and developed Cowell's use of rhythmic structuring, which he would utilise for over a decade in his prepared piano music.

### 1.3: Percussion

I honestly believe and formally predict that the immediate future of music lies in bringing of percussion on one hand, and sliding tones on the other, to as great a state of perfection in construction of composition and flexibility of handling on instruments as older elements are now<sup>58</sup> **(Henry Cowell)**

As the above quote demonstrates and through his printing of percussion scores in the New Music Publication series Cowell was a great advocate of percussion music. His advice to Cage in a letter dating from 1937 (pre-empting the prepared piano) was to arrange all percussion instruments so that they could be performed by a single player<sup>59</sup>. Cage concluded that the prepared piano was 'a percussion orchestra [...] directly under the control of a pianist's fingertips.'<sup>60</sup>

Cage's use of percussion ran parallel with his creation of the prepared piano, and was his major obsession for the years preceding the prepared piano's conception; for Cage, 'percussion music is revolution.'<sup>61</sup> The intention of this section of chapter one is to contextualise the prepared piano through an examination of percussion music and percussion instruments and identify the role it played in influencing John Cage's creation of the prepared piano. What is particularly important to note is how percussion music and percussion instruments were central to Cage's quest for the discovery and control of new sounds, which consequently led to the invention of the prepared piano. A prepared piano allows a new sonic palette to be controlled by a single player instead of a whole percussion ensemble.

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<sup>57</sup> For an analysis see D. W. Bernstein, Music I: to the late 1940s in D. Nicholls, *Cambridge Companion to John Cage*, Cambridge University Press, 2002, p. 69.

<sup>58</sup> Henry Cowell: Taken from the programme for a percussion concert at Mills College, 18 July 1940, cited in L. E. Miller, *The Art of Noise: John Cage, Lou Harrison, and the West Coast Percussion Ensemble*, in Michael Saffle, *Perspectives on American Music, 1900-1950* New York/London, Garland Publishing Inc., 2000), p. 237.

<sup>59</sup> L. E. Miller, Henry Cowell and John Cage: Intersections and Influences, p. 81.

<sup>60</sup> *Ibid.*

<sup>61</sup> J. Cage, *Goal: New Music, New Dance* in *Silence*, London, Calder and Boyars, 1968, p. 87.

For John Cage, percussion music allowed an exploration into sound and noise, creating a music that incorporated *all* sound and *all* noise. He wrote 'new music is part of the attempt to liberate all audible sound from the limitation of musical prejudice'<sup>62</sup>

Percussion music began the revolution. It was merely the first in a series of steps Cage took to 'liberate all audible sound from the limitations of musical prejudice'<sup>63</sup>

Cage believed that:

percussion is completely open. It is not even open-ended. It has no end. It is not like the strings, the winds, the brass (I am thinking of the other sections of the orchestra) [...] If you are not hearing music, percussion is exemplified by the very next sound you actually hear, wherever you are, in or out of doors or city. Planet? [...] The strings the winds, the brass know more about music than they do about sound. To study noise they must go to the school of percussion. [...] The spirit of percussion opens everything, even what was, so to speak, completely closed.<sup>64</sup>

Cage's initial interest resulted from another influence of Henry Cowell, 'I saw the New Music Publication of percussion music, heard Schoenberg call it nonsense, doubted whether it was nonsense [...] began the writing of the first Quartet for percussion. I organised the composition on a rhythmic basis, indicating no instruments. Friends helped me perform it on kitchen utensils, pieces of wood, tire rims, brake drums etc. I was unaware at the time that I was doing what many Negro street musicians in New Orleans had done.'<sup>65</sup> Henry Cowell's contribution to Cage's influence in percussion will be discussed later in this section.

Cage readily stated that his enthusiasm for percussion came from his experiences as an assistant to the abstract film maker Oskar Fischinger. Cage became an assistant to Fischinger helping to write the music for one of his films. Cage and Fischinger met through a mutual friend Galka Scheyer<sup>66</sup>, who was a fan of Cage's twelve tone, static motivic music. Cage recalls that one day Fischinger said 'Everything in the world has its own spirit which can be released by setting it into vibration,'<sup>67</sup> and 'a sound made from wood had a different spirit than one made from glass.'<sup>68</sup>

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<sup>62</sup> J. Cage, *A Composer's Confessions*, p. 41.

<sup>63</sup> L. E. Miller, *The Art of Noise*, p.251.

<sup>64</sup> J. Cage, *Autobiographical Statement*, p. 247.

<sup>65</sup> M. Hicks, John Cage's letter to Peter Yates, December 24, 1940, *American Music*, 25(4): Winter 2007, p. 512.

<sup>66</sup> J. Cage, *A Composer's Confessions*, p.31.

<sup>67</sup> J. Cage, *Autobiographical Statement*, p. 239.

<sup>68</sup> J. Cage, *A Composer's Confessions*, p.31.

So he told me all we need to do to liberate that spirit is to brush past the object, and to draw forth its sound. That's the idea that led me to percussion. In all the many years that followed up to the war, I never stopped touching things, making them sound and resound, to discover what sounds they could produce. Wherever I went, I always listened to objects. So I gathered together a group of friends, and we began to play some pieces without instrumental indications, simply to explore instrumental possibilities not yet catalogues, the infinite number of sound sources from a trash heap or junk yard, a living room or a kitchen.<sup>69</sup>

As a result, Cage began experimenting with sounds by 'hitting, rubbing everything,'<sup>70</sup> Cage would later go on to say 'There's a lot of deeper meaning in just plain experimentation.'<sup>71</sup> This notion handed Cage a philosophy; one where harmony was not paramount to structure, and which led directly to the composition of music for percussion instruments and in turn, the prepared piano. While influencing Cage to begin composing percussion music, it is hard to believe that this explanation is the primary reason for his enthusiastic departure into composing for percussion instruments. Percussion was becoming a useful tool to the composers of the early twentieth century, particularly in the symphony orchestras, where music by Milhaud and Stravinsky were using larger forces in their compositions. In his article 'Towards Neo-Primitivism' Cowell felt the need to divide the history and current utilisation of percussion into four sources. Firstly the Italian Futurists, second, the percussion section of the traditional orchestra, thirdly from the direct experience with primitive percussion rhythms such as the Cuban composers Armadeo Roldan and Josè Ardèvol, whose music incorporated Cuban and African primitive percussion rhythms into their music. Finally Cowell included members of the 'Pacific Coast group', whose interest for percussion music came from their work with modern dance.<sup>72</sup> The eventual outcome of works for percussion and orchestra would come from Varèse and his work *Ionisation* in 1931. 'With this work Varèse announced the new disagreement: between sound and noise [...] instead of consonance and dissonance.'<sup>73</sup> However a more detailed account of Varèse's influence will be discussed later in this section.

Cage would realise that he was not alone in his quest for exploration in sound, '[...] percussion music grew from 3 or 4 compositions in 1934 to about 50 at the present time. It became clear to me that

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<sup>69</sup> J. Cage, *For the Birds*, p. 73.

<sup>70</sup> J. Cage, *Autobiographical Statement*, p. 239.

<sup>71</sup> M. Hicks, *John Cage's Letter to Peter Yates*, p. 512

<sup>72</sup> L. E. Miller, *The Art of Noise*, p. 215.

<sup>73</sup> M. Hicks, *John Cage's Letter to Peter Yates*, p. 510

although all of the compositions I received were different that they had one thing in common: the desire to explore sound and rhythm, and to organize the results of the exploration.<sup>74</sup>

Cage also delighted in the way percussion music appeared to remove the barriers between what might be considered 'high art' and 'low art', or professional and amateur, 'I solved this problem for myself by writing music which could be played by a group of literate amateur musicians, people who had not developed instrumental skills on a professional level and therefore still had time to enjoy playing music together with friends.'<sup>75</sup> This social aspect appeared early in Cage's percussion writing, when he and Xenia, who was a student of Hazel Dreis a master bookbinder, lived in a big house with Xenia's fellow bookbinders. His percussion compositions for unspecified instruments were performed in the evenings by the bookbinders:

I finished a Quartet for four percussion players. I had no idea what it would sound like, nor even what instruments would be used to play it. However, I persuaded three other people to practice the music with me, and we used whatever was at hand: we tapped tables, books, chairs, and so forth. When we tired of these sounds, we invaded the kitchen and used pots and pans. Several visits to junkyards and lumberyards yielded more instruments: brake drums from auto-mobiles, different lengths of pipes, steel rings, hardwood blocks. After experimenting for several weeks, the final scoring of the Quartet was finished. It included the instruments that had been found, supplemented by a pedal timpani and a Chinese gong which lent to the whole a certain traditional aspect and sound.<sup>76</sup>

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<sup>74</sup> *Ibid*, p. 513.

<sup>75</sup> J. Cage, *A Composer's Confessions*, p. 33.

<sup>76</sup> *Ibid.*, p. 31.



**Figure 6: John Cage's Percussion ensemble, 18 July 1940 – Front L-R Doris Dennison, Margaret Jansen. Rear L-R Lou Harisson, John Cage, Xenia Cage. (Used with permission of Oakland Tribune © Oakland Tribune).**

Cage also commented: 'All noises interested me. I must admit that at that time I really didn't have a cent. Perhaps, if I had been a bit better off, I would have used slightly more conventional instruments'<sup>77</sup>

The financial situation in New York, and the expenses occurred for composing for percussion also became an issue for the development of composition for percussion and the eventual employment of the prepared piano. The cost of transporting '17 players, using: 1 snare, 2 bass, 5 black Chinese tom toms, 5 small painted Chinese tom toms, 1 pair bongos; Wood: 8 Chinese wood blocks, 6 dragon mouths (temple blocks) 4 pairs of claves; Metal: 1 mariembula, 2 pairs of finger cymbals, 4 Chinese cymbals, 1 pair of crash cymbals, 1 Turkish cymbal, 1 pair of jazz cymbals, 5 gongs, 1 tam tam, 1 Chinese painted gong, 3 Japanese temple gongs, 5 Japanese cup gongs, 13 oxon bells and 1 set of orchestral bells'<sup>78</sup> would have been great.

In an interview with Daniel Charles, Cage was asked when he realised the potential of the prepared piano as an alternative for percussion; he replied 'It was through the social problems here In New York City. You can't get a group of people together in New York for any length of time, because

<sup>77</sup> J. Cage, *For the Birds*, p.73.

<sup>78</sup> H. Cowell, *Drums Along the Pacific*, *Modern Music*, 18: 1940: p. 47.

they're all too busy making money. So that when I had to give a concert of percussion music at the Museum of Modern Art, I found that I couldn't get a full rehearsal – ever.<sup>79</sup>

Through his work with the New Music Society Henry Cowell had become involved with the publication of music which upheld the progressive ethos of the Society.<sup>80</sup> One development that particularly influenced him was the composition of percussion music. In 1933 Cowell began a series of publications through the New Music Society entitled New Music Orchestra Series.<sup>81</sup> Most notably this series published William Russell's *Fugue for Eight Percussionists*. The fugue introduces new techniques for performing percussion music. Russell experimented with varying types of mallet or stick materials, he would also develop an idea that Cowell stressed the importance to Cage that of varying set up of instruments so a single player could play multiple instruments at the same time. Russell was also an advocate of using the piano as a percussion instrument, and he also found ways of amalgamating instruments from non-Western cultures, such as Africa and Asia with Western instruments.

Not surprisingly this stimulus had led Cowell to begin work on his own compositions for percussion, such as *Ostinato Pianissimo*, in 1934. As Cage was studying with Cowell at the time, he must have been fully aware of these compositions and the possibilities formed with percussion ensembles. The premiere of *Ostinato Pianissimo* would eventually be given nine years later in a concert conducted by Cage in the famous Museum of Modern Art concert in 1943.

Although Cowell was an advocate of percussion music and supporter of Cage as a percussion composer Cage's opinion of Cowell's views in return were indifferent.

In the 1940 article 'Drums Along the Pacific', Henry Cowell made clear his positive feelings about Cage's (and Lou Harrison's) compositions for percussion. He made clear that their compositions were largely a result of interactions with contemporary dancers. This article, although completely in favour of him, left Cage with major objections to Cowell's interpretation of his music and the use of percussion. 'I think of percussion as a beginning of exploration of the whole field of sound, with the goal being the use of electricity and film, which will make the whole field of available for use [...] Most

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<sup>79</sup> W. Duckworth, *An Interview with John Cage*, pp. 19-20.

<sup>80</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p.70

<sup>81</sup> *Ibid.*

of the work Lou and I have done has been in spite of dancers [...] I would like to see an article which shows the connection between percussion and other experiments with new materials and the organized sound mentioned in Varèse's article<sup>82</sup> [...] I didn't ever want to write about what I felt about your article, because I was disappointed in it.'<sup>83</sup>

In 1936 Cowell was arrested and subsequently imprisoned at San Quentin prison for a ten and a half year sentence, although he only served four. During this time Cage showed great support for his friend, and the two men were to frequently correspond. In 1937 Cage sent a letter to Cowell, once again asking for focus and career advice.<sup>84</sup> Prior to Cowell's incarceration he was in the process of forming a symphonic percussion ensemble. Cowell allowed Cage to take up the mantle and borrow his instruments. The other monumental piece of advice that Cowell gave Cage was 'to find a shop that could make percussion instruments; he advised Cage to develop and arrange them so that a single player could control several at once.'<sup>85</sup> Cowell had essentially prophesized the creation of the prepared piano. It is interesting to note that Cage would never acknowledge any influence of Cowell on his interest in percussion music. He believed Cowell's interest lay in 'exoticist tradition and not an ancestor in the sonic genealogy'<sup>86</sup>, he also believed that Cowell's interest in folk, primitive and oriental music was more to do with musicology (what we would now call ethnomusicology), and preservation, rather than exploration, 'not relevant to my point are the frank transcriptions of Eastern music [...] these signify a love for the Orient as it is, rather than a desire to bring elements of it together [...] to create a new music.'<sup>87</sup>

David Patterson points out that '[...] there is little if anything in Cage's music that suggests any kind of compelling interest in the music of Asia and even less that might constitute direct stylistic borrowings'<sup>88</sup>, even though much of his prepared piano and percussion music is regarded as having Oriental or Asian leanings, that during the war the Office of War information would broadcast Cage's

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<sup>82</sup> Organized Sound for Sound Film. (Published in *The Commonweal*, Vol. XXXIII, No. 8, December 13 1940).

<sup>83</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p. 96.

<sup>84</sup> *Ibid*, p. 63.

<sup>85</sup> *Ibid*.

<sup>86</sup> M. Hicks, p. 507.

<sup>87</sup> J. Cage, The East in the West in R. Kostelanetz, *John Cage Writer*, New York, Limelight editions, 1993, p. 21.

<sup>88</sup> D. W. Patterson, Cage and Asia: History and Sources in D. Nicholls, *Cambridge Companion to John Cage*, Cambridge University Press, 2002, p. 41.



prepared piano music to the South Pacific, with the hope 'of convincing the natives that American loves the Orient.'<sup>89</sup>

In an interview with Daniel Charles, Cage was asked if there really was any influence from Asia or Africa, if only through an oral tradition. Cage replied that 'As I mentioned, I attended some of Henry Cowell's classes in New York where I heard some music of that type. If there were any influences, I was not conscious of them; anyway, at that time I had not seriously studied the theories of Indian or Indonesian.'<sup>90</sup> In a different article Cage would allude to some techniques that were similar to Oriental music in his percussion music, 'In general, then, there may be pointed out certain large musical conditions which are characteristically Oriental. They are: that the music be non-thematic, non-harmonic, non-motival; that it have (a) an integral step-wise use of scale, (b) structural rhythm, (c) an integral use of percussive sound and (d) pitch distances less than a semi-tone.'<sup>91</sup> This idea was expounded in a review article of one of Cage's percussion concerts by Virgil Thompson:

The effect in general is slightly reminiscent, on first hearing, of Indonesian Gamelan orchestra, though the interior structure of Mr Cage's music is not Oriental at all. His work attaches itself, in fact to two different traditions of Western modernism. One is the percussive experiments by Marinetti's Futurist noise makers and continued in the music of Edgard Varèse, Henry Cowell and George Antheil, all of which made in full awareness of Oriental methods, is thoroughly Western in its expression. The other is curiously enough the atonal music of Arnold Schoenberg.<sup>92</sup>

Margaret Leng Tan sees the importance of Cage's return to the West Coast after studying with Henry Cowell in New York as 'a move not only coincidental but propitious in that the West Coast, facing Asia, lies open to whatever influences may be borne on cross-cultural currents'<sup>93</sup> and that 'Cage welcomed the Ying Yang opposing forces between noise and music.'<sup>94</sup> Continuing on the lines of Chinese philosophy Tan draws a link between Cage's use of individual tones in the prepared piano, created by differing materials used in the preparations to the Chinese concept of the living essence of every tone. 'Moreover, the Chinese classification of instruments was to put them into eight sound systems according to the material of which they are made (earth, wood, stone, metal, bamboo, gourd,

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<sup>89</sup> C. Tomkins, p. 98.

<sup>90</sup> J. Cage, *For the Birds*, p. 75.

<sup>91</sup> J. Cage, *The East in the West*, p. 62.

<sup>92</sup> V. Thomson, New York Herald Tribune, January 22 1945, cited in P. Dickinson *Cage Talk*, University of Rochester Press, 2006, p. 76

<sup>93</sup> M. Leng Tan, "Taking a Nap, I Pound the Rice": Eastern Influences on John Cage in R. Fleming and W. Duckworth, *John Cage at Seventy-Five*, Lewisberg, Bucknell University Press, 1989, p. 38.

<sup>94</sup> *Ibid.*, p. 39

skin and silk).<sup>95</sup> This philosophy links closely with Cage's initial interaction with Oskar Fischinger. Tan goes on to say '[...] we can observe that with the exception of the macrobiotic diet and his adoption of Indian metrical concepts (raga) into the early percussion and prepared piano works Cage's indebtedness to the East lies exclusively within the realm of its ideas and not its practices.'<sup>96</sup>

The exoticism and Eastern links are aurally very obvious in the prepared piano music, and often links are made to Indonesian gamelan. What is very clear, is that, with the prepared piano, Cage was introducing sounds that were far outside the reach of Western art music at this point in time. The idea of a far reaching music is confirmed with the fact that Cage's 'A Book of Music' for two prepared pianos was used by the Office of War Information, and re-named as Indonesian Supplement No. 1.

The second piece of advice that was to prove most influential was that Cowell urged Cage to work with dancers, as 'all dance studios want drums'<sup>97</sup> Cowell had begun publishing articles regarding the relationship between music and dance, and particularly drawing attention to the quest for equality between dance and music. Cowell would invent his elastic form music to try and combat this hierarchical conundrum. It was in the 1950's that Cage would acknowledge Cowell's elastic form music as a pre-cursor and influence to his indeterminate music.<sup>98</sup>

As mentioned earlier *Pulse* was written for Cage's percussion group. It's instrumentation reflects Cowell's vast knowledge of the resources available for percussionists, but also shows Cowell's ability to fuse non-western instruments with Western instruments; included are pipe lengths and brake drums, alongside Korean dragons mouths, Chinese tom-toms, Japanese temple gongs, and rice bowls. This work also demonstrates Cowell's imperfect example of square root form.<sup>99</sup>

To consolidate his interest in percussion music, Cowell became central to the advocacy of Edgard Varèse's seminal work *Ionisation* for thirteen percussionists composed 1929-1931, organising and performing in the premiere in 1933.

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<sup>95</sup> *Ibid.*, p. 40.

<sup>96</sup> *Ibid.*, p. 54.

<sup>97</sup> M. Leng Tan, p. 63.

<sup>98</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p. 69.

<sup>99</sup> D. Nicholls, *American Experimental Music 1890-1940*, p. 169.

Edgard Varèse moved to America in 1916 after being released from the French Army serving in the First World War in 1915. His first work in the United States, *Amérique*, was supposed to serve as a vision into a new world, both a new world recovering from war and an extension into a new world of sound. This work, finished in 1921, was a display of his future intentions with sound. *Amérique*, lasting circa twenty-three minutes is a single movement piece composed for a symphony orchestra. What is striking about the composition is the extension of the percussion section within the largely standard orchestra, not just in the size (it has parts for eleven players), but also the extension of the kinds of instruments utilised, such as sirens, which until this point in time had not been utilised in a percussion section of a symphony orchestra. The use of the percussion section was not just to punctuate harmonic passages, but to provide the section with rhythmically complex polyphonies.

Mellers points to a form of Debussian aesthetic form that attracted Varèse, involving the 'rejection of conventional musical stylisations, and of clearly defined distinctions between musical sound and noise.'<sup>100</sup> Music for Debussy and Varèse was not intended to enhance the romantic, or satisfy the urges of the emotional self; this was extraneous to the purpose of music. To enable this process, Varèse and Debussy, to some extent before him, discarded the 'conventionalised materials of diatonic and chromatic melody, of harmony, and of rhythmic pattern related to harmonic tension.'<sup>101</sup>

Varèse began his pursuit of discarding conventionalised systems by re-thinking the western appreciation of the characteristics of a sound and of the production sounds. In the 1920s Varèse began composing works which demonstrated the varying elements of a sound, including the use of noise as music. In *Offrandes*, Varèse uses sounds not associated music, such as car horns, sirens, clattering of cans. Each instrument is treated as a sound.

By using the sounds of mechanical or non-musical objects Varèse is connecting the human with the scientific, or the primitive with the machine, the relationship of which is inherent in our consciousness on a day to day basis. Varèse would comment 'the modern composer [...] is an artist that must discover, through activity of the mind, nerves, body and senses, the aural order which is inherent in

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<sup>100</sup> W. Mellers, *Music in a New Found Land: Themes and developments in the History of American Music*, London, Faber, 1987, p. 157.

<sup>101</sup> *Ibid.*

Nature; but he will be a scientist in that his discovery can emerge only from the way sounds behave.<sup>102</sup>

The direct lineage between Cage and Varèse can be seen through Cage's use of the single sound or noise as an solitary entity in its own right. It does not require any justification on a psychological level, nor any definition on a romantic level for its explication. It merely desires the performance of its features, which are ubiquitous with all other sounds, audible or not. Sounds are sounds and silences are silences.

In a letter to Peter Yates, Cage traces his use of percussion and therefore his championing of the sound to Varèse, and before Varèse to Russolo and the Futurist movement. Cage makes clear his affinity to Varèse in this letter, 'please emphasize organized sounds wherever possible'.<sup>103</sup> What was essential to Cage as an experimental composer, was not the re-creation of previous 'primitive' instruments nor in fact with the creation of new instruments played primitively. For Cage, the goal was to create 'an instrument which would make the entire field of sound available for musical purposes: any desirable frequency, amplitude, overtone structure and duration'.<sup>104</sup> As Cage implies in this statement the future lay with the creation of electronic instruments. Percussion and electronic instruments have one thing in common and that is the exploration of sound and rhythm. The similarity between Cage's statement and Varèse's from 1917 are obvious; 'I dream of instruments obedient to my thought and which with their contribution of a whole new world of unsuspected sounds, will lend themselves to the exigencies of my inner rhythm'.<sup>105</sup>

Varèse's most influential piece came in 1931, *Ionisation*. This composition is purely percussive and scored for thirteen players. The instrumentation consisted of three bass drums, two side drums, two snare drums, tarole, two bongos, tambourine, tambour militaire crash cymbal, suspended cymbals, three tam-tams, gong, two anvils, two triangles, sleigh bells, chimes, celesta, piano, Chinese blocks, claves, maracas, castenets, whip, guiro, sirens (high and low pitches) and a lion's roar. The variety of noise produced by the players was unheard of at this point, including a variety of hissing, scraping,

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<sup>102</sup> *Ibid.*, p. 160.

<sup>103</sup> M. Hicks, *John Cage's Letter to Peter Yates*, p. 508.

<sup>104</sup> *Ibid.*, p.511 .

<sup>105</sup> E. Synder, p. 8.

banging and wailing. Noises produced from the metallic elements used in the composition bring life to the idea of the machine, and of controlled power of city life.

Although Cage makes much of his initial admiration of Varèse's use of the term 'organized sound', he would eventually become disillusioned even with Varese's need to keep control of the sounds,

He tries to bend sounds to his will, to his imagination. And that is very quickly what bothered us. We knew that he wouldn't let sounds be entirely free. What we were looking for was in a way more humble: sounds, quite simply. Sounds pure and simple.<sup>106</sup>

Cage would go on to say 'to us any sound seemed capable of becoming musical by the very fact that it was incorporated into a musical piece.'<sup>107</sup>

It appears also that Varèse wasn't too pleased to be associated with the *enfant terrible*. Cage and Harrison had co-operated in the recording of Harrison's Third Symphony, advertising it with the Varèse term, as a recording of organized sound. 'When they sent an advance copy of the disc to Varèse, he responded with a telegram asking them not to use his phrase.'<sup>108</sup> After arriving in New York, Xenia and John made a visit to Edgard and Louise Varèse's house. Xenia and Louise Varèse were at one end of the room having a conversation and Cage and Edgard at the other. Xenia suddenly stood and beckoned for them to leave. It transpired that Louise Varese had said to Xenia that the reason the telegram about the use of Edgard's quote had been sent was because 'we didn't want your husband's work confused with my husband's work, any more than you'd want [...] any artists work confused with that of a cartoonist.'<sup>109</sup>

Percussion music allowed an exploration into sound and noise that incorporated all sound and all noise. As Cage said, 'I think of percussion as a beginning of exploration of the whole field of sound, with the goal being the use of electricity and film, which will make the whole field of use available for.'<sup>110</sup>

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<sup>106</sup> J. Cage, *For the Birds*, p. 73.

<sup>107</sup> *Ibid.*

<sup>108</sup> D. Revill, *The Roaring Silence*, London, Bloomsbury, 1992, p. 74.

<sup>109</sup> *Ibid.*, p. 80.

<sup>110</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p. 96.

Cage had been composing for some time before he had his success with writing for percussion. This success eventually led to his performance at the Museum of Modern Art, and a full article in 'Time' magazine.

Percussion music is a contemporary transition from keyboard-influenced music to the all-sound music of the future. Any sound is acceptable to the composer of percussion music; he explores the academically forbidden 'non-musical' field of sound insofar as in manually possible.

Methods of writing percussion music have as their goal the rhythmic structure of composition. As soon as these methods are crystallized into one or several widely accepted methods, the means will exist for group improvisations of unwritten but culturally important music. This has already taken place in Oriental cultures and hot jazz.<sup>111</sup>

It has been demonstrated in this section how Cage was pushed by Cowell into composing for contemporary dance as he said 'all dance studios want drums.' The next section of this chapter will examine the role that dance played in the creation of the prepared piano.

## 1.4: Dance

Music and dance have been associated for centuries. Music gained a fair superior recognition as an art form due to its association with religion. As dance did not have such support it became largely associated with early rituals and pagan celebrations. It became a symbol of folk culture and thus associated as a means of secular amusement rather than an intellectual art form.<sup>112</sup> A hierarchy arose between music and dance; and up to this moment in time music was the dominant factor. Contemporary dancers created an art form that was non-reliant on music. However, Cowell believed that there was still a need for some form of accompaniment.<sup>113</sup>

Cowell remarks that percussion instruments become an essential tool for any composer of dance music: 'Percussion instruments can achieve definite beginning point, because before each entrance of a tone, there can, if one wishes, be silence. There has been no other tone immediately beforehand; therefore the new tone is not a continuation of a sound that has gone before, but marks the point of a new entrance. It is in this aspect that percussion aids dance, by defining shape.'<sup>114</sup>

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<sup>111</sup> J. Cage, *The Future of Music: Credo* in *Silence* English Ed., London, Calder and Boyars, 1968, p. 5.

<sup>112</sup> H. Cowell, *Relating Music and Concert Dance*, *Dance Observer*, 4(1): 1937: p.6.

<sup>113</sup> H. Cowell, *Relating Music and Concert Dance*, p.6 .

<sup>114</sup> H. Cowell, *A Discussion of Percussion*, p.4.

Cage soon discovered that there was a link between contemporary dance and percussion. Cage was offered a job at the Cornish School in Seattle in 1938 (named after its founder and chief advocate Nellie Cornish). The class had a strong heritage as it was led by the newly appointed Bonnie Bird who had been a member of the Martha Graham Dance Company, and had brought with her to the school the forward thinking that was associated with Graham. Although the class was not huge, it had some very talented dancers, including Merce Cunningham (1919-2009), Syvilla Fort (1917-1975) and Dorothy Hermann. As Leta E. Miller points out, although Cage was actually only in Seattle for two years (1938-1940) 'he often cited this period as seminal to his later works.'<sup>115</sup>



**Figure 7: L-R: Merce Cunningham, Bonnie Bird, Syvilla Fort and Dorothy Herrmann at Cornish School, 1938. (Used with permission of the John Cage Trust).**

The wealth of written material that Cage produced during his time at Seattle also appeared in dance journals, emphasising the importance he placed on dance in the creation of his work. In his article 'Goal: New Music, New Dance', which was originally published in the Dance Observer in 1939, Cage's opening statement is 'Percussion music is revolution. Sound and rhythm have too long been submissive to the restrictions of nineteenth-century music. Today we are fighting for their emancipation. [...] At the present stage of revolution, a healthy lawlessness is warranted. Experiment

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<sup>115</sup> L. E. Miller, *Henry Cowell and John Cage: Intersections and Influences*, p. 47.

must necessarily be carried on by hitting anything - tin pans, rice bowls, iron pipes - anything we can lay our hands on'.<sup>116</sup>

The main reason for Cage accepting this position was the promise of a large collection of percussion instruments and a well-equipped percussion studio. Within a few months, he had 'organized a group of players and presented the first concert of music for percussion instruments alone'.<sup>117</sup>

As mentioned earlier, part of the reason for the success of the prepared piano was that it allowed percussion music to be played under the control of a single player. Many percussion composers struggled to stage performances of their works because of the impracticality of staging such an event. Cage often stated that he never considered a composition complete until it had been performed. By working with dancers, Cage was able to overcome this problem. He said 'modern dancers [...] have always been insatiable consumers of modern music',<sup>118</sup> and that 'Modern dancers were grateful for any sounds or noises that could be produced for their recitals'.<sup>119</sup>

However, this agreement did come with its own limitations:

In writing for the modern dance, I generally did so after the dance was completed. This means that I wrote the music to the counts given me by the dancer. These counts were nearly always, from a musician's point of view, totally lacking in organization: three measures of 4/4 followed by one measure of five, 22 beats in a new tempo, a pause and two measures of 7/8. I believe this disorder led me to the inception of structural rhythm.<sup>120</sup> 'Any latent longing that I might naturally have had to master expressivity in music was dissolved for me by my connection with the modern dance. For them I had continually to make suitable and expressive accompaniments'.<sup>121</sup>

Once account of Cage's invention of the prepared piano is recounted by Bonnie Bird. Cage was composing music for a ballet based on Cocteau's script called *Les Mariés de la tour Eiffel*. The script calls for telegrams to fall to the ground. Bird wanted to represent this with dancers fluttering down to the ground down a fireman's pole. However, on investigation at a brass foundry it turned out that as the poles are made of solid brass they were too expensive. Bird came away disappointed, but with a sample of the brass pole. When she arrived back at Cornish she gave Cage the sample of brass. Cage put it in the tray with the nuts and bolts on top of the piano. As Cage started to play the warm

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<sup>116</sup> J. Cage, *Goal: New Music, New Dance* in *Silence* English Ed., London, Marion Boyars, 1968, p. 87.

<sup>117</sup> J. Cage, *A Composer's Confessions*, p. 33.

<sup>118</sup> *Ibid.*

<sup>119</sup> J. Cage, *Four Statements on the Dance*, in *Silence* English Ed., London, Marion Boyars, 1968, p. 86.

<sup>120</sup> J. Cage, *A Composer's Confessions*, P. 33.

<sup>121</sup> *Ibid.*



up chords for the dancers, the tray fell and the pole rolled into the piano. 'Once he got bored of that sound he began inserting the bolts and nuts from the tray.'<sup>122</sup>

However, Cage's own recollection of the prepared piano is different to the one given by Bonnie Bird above. In the introduction to Richard Bunker's manual *The Well-Prepared Piano* and which was later published in *Empty Words*, Cage elucidates the moment when the creation occurred. In the Cornish School was a dancer called Syvilla Fort. She had been promised 'two or three pieces written by different composers available from the music department – and John was one of them. She had to prepare the rough outline of the dance so they had something to see, and then she worked with the composers.'<sup>123</sup> This moment should not be overlooked for its importance in the creation of the prepared piano; indeed, in the future Cage would thank Syvilla Fort for her help in the creation of the prepared piano with a mesostic:

had there been two compo**S**ers  
You  
might ha**V**e asked the other one  
to wr**I**te your music  
i'm g**L**ad  
i was the on**L**y one  
**A**round<sup>124</sup>

In 1940 Fort choreographed a dance called *Bacchanale*, and had asked Cage to compose music to go with it. A *Bacchanale* is quite a barbaric dance of an African nature which is dedicated to the god of wine, Bacchus. Cage had predominantly been composing for percussion up to this point, and this type of instrumentation would suggest Africa. However, the space at the Cornish theatre had little room in the wings and no pit to incorporate the use of any kind of percussion instruments or orchestra. It did have, however, a grand piano at the front of the stage. Cage had finished his studies

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<sup>122</sup> R. Boyle, *Bonnie Bird*, p. 70.

<sup>123</sup> *Ibid.*

<sup>124</sup> J. Cage, For S. Fort, Dancer in in *Empty Words*, English Ed., London, Marion Boyars, 1980, p. 10.

with Shoenberg and had obviously adopted the twelve tone technique. He began to try and find an African tone row. Not surprisingly, he did not succeed, as Cage said 'I had no luck. I decided that what was wrong was not me, but the piano. I decided to change it.'<sup>125</sup>

Bird states that Cage had requested a gamelan orchestra for the music of *Bacchanale*, but she had to refuse because of the financial situation of the dance department. It was at this stage that the box of nuts and bolts fell into the piano.

Bird would also disagree with Cage by saying 'He went on working with it, but then he realized he wasn't going to have a grand piano but an upright in the theatre. So when he got home, where he had an upright, he began inserting old pieces of pie plates and things like that. And he went on working with it and that's how the prepared piano came [about] with *Bacchanale*'<sup>126</sup>

Whilst at the Cornish School in the summer of 1939 Cage taught four different courses 'Experimental music (for composers); Modern Dance Composition (analysis of music for modern dancer, for those without special musical experience); Creative Music Education (for elementary school teachers interested in using percussion in class); and Creative Music for Children (in which Children constructed and played simple instruments)',<sup>127</sup> along with accompanying dance classes on the piano.

This was the twenty-six year old Cage's first summer at Cornish School, but it was nineteen year old Merce Cunningham's second summer. Cunningham had received a scholarship to attend the school from Bonnie Bird, and had been asked by Cage to join the percussion orchestra that he had created. Merce thought it 'was marvellous'. Initially the connection between the two artists was an exploration of new techniques, and a need to discuss developments:

It was difficult for me at that time – probably still is – to talk with dancers. [...] They would mainly talk about the way somebody did something [...] it was always had to do with personalities. It's like gossip. That's entertaining and I like it too, but I also wanted to talk about ideas and there wasn't anybody I could talk with, except John.<sup>128</sup>

Cage and Cunningham would begin a professional and personal relationship that would continue for the rest of their lives. The first piece that Cage and Cunningham collaborated on together was *Credo*

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<sup>125</sup> J. Cage, *How the Piano Came to be Prepared*, p. 7.

<sup>126</sup> R. Boyle, p. 71.

<sup>127</sup> K. Silverman, p. 28.

<sup>128</sup> M. Cunningham, *The Dancer and the Dance: Merce Cunningham in Conversation with Jacqueline Lesschaeve* English Ed., London, Marion Boyars, 1985, pp. 42-43.

*in Us* from 1942. This was composed to the tempi and phrases given to Cage by Jean Erdman who helped Cunningham choreograph the score. As mentioned earlier in this chapter the relationship between music and dance in the 1940s had become very competitive, both mediums felt that their art should be the predominant partner in the collaboration this led to the composition of dance accompaniments being composed, where the music was written to the counts given to the composer by the dancer. Cage began devising a way of composing using a structure based on rhythm. This was the beginning of Cage's invention and use of micro-macrocosmic structure, which will be discussed in the section on early works.

The piece that Cage and Cunningham really began utilising the interdependence between the two artists was *Root of an Unfocus*, Cunningham elaborates:

The title is mine. 'Unfocus' here refers to a disturbance in the mind, an imbalance, it's a photographic term which signifies a blur, an unclarity. It was one of the first solos I made. I was still concerned with expression. It was about fear. The dance was in three parts. [...] We knew at certain structural points we would meet. It didn't always happen (because we were dividing the phrases differently) although we were both very accurate. There was a back and forth between us.<sup>129</sup>

Cage and Cunningham's first shared programme took place 5<sup>th</sup> April 1944 at the Studio Theatre, West Sixteenth Street. This first collaborative process incorporated six short prepared piano solos dances by Cunningham, divided by a set of Cage's prepared piano music alone.<sup>130</sup> The development of this new method between Cage and Cunningham lay largely in response to long held traditions and conventions relating to music and dance.

We were getting free of this business of fitting one thing to another. I had long had that idea of letting the two arts collaborate without following one another, but it was with *Root of an Unfocus* that we really made some kind of progress,<sup>131</sup>

Cunningham even played down any emotional connotations that arose through their performances saying 'they are a by-product of the selected materials and order,' so that the focus could be on the method used to create the dance rather than any implications relating to it.

Cage and Cunningham would collaborate on twelve prepared piano and dance works together. The table below details the prepared piano works that were choreographed by Cunningham. The

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<sup>129</sup> M. Cunningham, p.79.

<sup>130</sup> K. Silverman, p. 63.

<sup>131</sup> L. Kuhn, Cunningham + Cage, *Ballet Review*, 3(26): p. 82.

following information has been gained from two extremely useful resources, the Merce Cunningham Dance Company complete chronology: <http://www.merce.org/about/chronology.php> and the John Cage database produced by André Chaudron: <http://www.johncage.info/index2.html>.

<b>Prepared Piano Title</b>	<b>Dance Title</b>	<b>Composed for the Dance</b>	<b>Dancers</b>	<b>Premiere Performance Date</b>
<i>Amores (1943)</i>	<i>Amores</i>	No	Tanaquil LeClerc and Merce Cunningham	June 10, 1949 at Jean Hélion's Studio in Paris
<i>A Valentine Out of Season (1944)</i>	<i>Effusions avant l'heure / Games / Trio choreo after</i>	No	Tanaquil LeClerc, Betty Nichols, Merce Cunningham	June 10, 1949 at Jean Hélion's Studio in Paris
<i>In The Name of the Holocaust (1942)</i>	<i>In The Name of the Holocaust</i>	Yes	Merce Cunningham	February 14, 1943 at the Fine Arts Club of Chicago
<i>Mysterious Adventure (1945)</i>	<i>Mysterious Adventure</i>	Yes	Merce Cunningham	January 9, 1945 at Hunter Playhouse, New York City
<i>Root of an Unfocus (1944)</i>	<i>Root of an Unfocus</i>	Yes	Merce Cunningham	January 9, 1945 at Hunter Playhouse, New York City
<i>Shimmera (1942) (Lost work)</i>	<i>Shimmera</i>	Yes	Merce Cunningham	February 14, 1943 at the Fine Arts Club of Chicago
<i>Spontaneous Earth (1944)</i>	<i>Spontaneous Earth</i>	Yes	Merce Cunningham	April 5, 1944 at the Studio Theatre in New York
<i>The Unavailable Memory Of (1944)</i>	<i>The Unavailable Memory Of</i>	Yes	Merce Cunningham	April 5, 1944 at the Studio Theatre in New York
<i>Three Dances (1945)</i>	<i>Dromenon</i>	No	Merce Cunningham, Dorothy Berea, Shirley Broughton, Mili Churchill, Eleanor Goff, Sara Hamill, Judith Martin	December 14, 1947 at Hunter Playhouse in New York City
<i>Tossed as it was Untroubled (1943) (Meditation)</i>	<i>Tossed as it was Untroubled</i>	Yes	Merce Cunningham	April 5, 1944 at the Studio Theatre in New York, New York.
<i>Totem Ancestor (1942)</i>	<i>Totem Ancestor</i>	Yes	Merce Cunningham	October 20, 1942 at the Studio Theatre in New York
<i>Triple-Paced No. 2 (1944)</i>	<i>Triple-Paced</i>	Yes	Merce Cunningham	April 5, 1944 at the Studio

				Theatre in New York
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**Figure 8: Table displaying the collaborative prepared piano works of John Cage and Merce Cunningham**

John Cage was the founding musical director of the Merce Cunningham Dance Company. John Cage and Merce Cunningham collaborated together until Cage's death in 1992. The final collaboration between Cage and Cunningham and performed by the Cunningham Dance Company was *Beach Birds* in 1991.

## 1.5: Early Works

She was perplexed by Cage's modifying and tinkering with the strings of her piano in what must have been an early version of what he would call the "prepared piano".<sup>132</sup>

This anecdote by Mark Schindler recounting the relationship between his mother Pauline Schindler and John Cage in the early 1930s demonstrates how Cage was considering the idea of piano 'alteration' before the first official appearance of the prepared piano with the *Bacchanale* in 1940.

By examining the pre-*Bacchanale* compositions the prepared piano can be contextualised in terms of compositional styles and theories that Cage was utilising and how they, in turn, helped create the prepared piano.

Of all the pre-*Bacchanale* compositions, *Quartet* (1935), *Trio* (1936), *Imaginary Landscape No.1* (1939), *First Construction (in Metal)* (1939) and *Second Construction* (1940) are most pertinent for examination due to the different facets each piece offers to aid the invention of the prepared piano.

The two early percussion pieces *Quartet* and *Trio* are important to the history of the prepared piano because they represent Cage's first excursions into the realm of non-musical sounds in music. *Imaginary Landscape No.1* composed for percussion quartet with gramophones is the first piece which indicates Cage's re-thinking of structure in music. The percussion sextet *First Construction (in Metal)* is of primary importance as it was the first piece in which Cage demonstrated his micro-macrocosmic structure. This method of structuring was utilised by Cage throughout the decade of writing for the prepared piano. The *Second Construction* for percussion quartet utilises a *prepared*

<sup>132</sup> T. S. Hines, Then Not Yet "Cage", in M. Perloff and C. Junkerman, *John Cage: Composed in America*, Chicago/London: University of Chicago Press, 1994, p. 85.

string piano (Henry Cowell's term for a piano that is played unconventionally) even though composed two months before the *Bacchanale*.

The works Cage composed prior to his venture into percussion music were very chromatic, rhythmically complex pieces that reveal Cage's leaning towards a strict compositional system displaying little evidence of a stylistic character. Compositions such as the *Sonata for Clarinet* (1933), *Sonata for Two Voices* (1933) or the *Composition for Three Voices* (1934) show the influence of the schooling of Adolph Weiss and Arnold Schoenberg, using either variation on short motives or use of restricted repetitions of 25 notes. However, Cage's utilisation of these compositional techniques was quite short lived as a likely result of the back lash from Schoenberg's infamous comment about having 'no feeling for harmony'. It is likely that Cage began a quest to replace his lack of feeling for harmony and discovered an alternative in rhythm.

Percussion instruments served two purposes for Cage in that, by using instruments which have no pitch or relatively simple pitch, he would free himself of the constraints of harmony, but also, it allowed him to develop a system for structuring and utilising rhythm.

'I was convinced overnight that although twelve tone music was excellent theoretically, in making use of the instruments which had been developed for tonal music, it had continually to be written negatively rather than straightforwardly. It had always to avoid the harmonic relationships which were natural to tonal instruments, which instruments it did not so much as use as usurp. I was convinced that for atonal music new instruments proper to it were required.'<sup>133</sup>

As previously stated Cage's enthusiasm for percussion came from his experiences as an assistant to the abstract film maker Oskar Fischinger and the remark made by Fischinger that 'Everything in the world has its own spirit which can be released by setting it into vibration,'<sup>134</sup> 'So I gathered together a group of friends, and we began to play some pieces without instrumental indications, simply to explore instrumental possibilities not yet catalogued, the infinite number of sound sources from a trash heap or junk yard, a living room or a kitchen.'<sup>135</sup> The result of the experimentation mentioned above was probably the *Quartet* for unspecified instrumentation.

'I finished a quartet for four percussion players. I had no idea what it would sound like, nor even what instruments would be used to play it. However, I persuaded three other people to practice the music

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<sup>133</sup> J. Cage, *A Composer's Confessions*, p. 31.

<sup>134</sup> J. Cage, *Autobiographical Statement*, p. 239.

<sup>135</sup> J. Cage, *For the Birds*, p. 73.

with me, and we used whatever was at hand: we tapped tables, books, chairs and so forth. When we tired of these sounds, we invaded the kitchen and used pots and pans. Several visits to junkyards and lumberyards yielded more instruments: brake drums from auto-mobiles, different lengths of pipes, steel rings, hardwood blocks. After experimenting for several weeks, the final scoring of the Quartet was finished. It included the instruments that had been found, supplemented by a pedal timpani and a Chinese gong which lent the whole a certain traditional aspect and sound.<sup>136</sup>

It becomes obvious that through his work on the Quartet, Cage was beginning to think in terms of noise and sound, rather than standard Westernised themes as had hitherto been the case. The idea of utilising sound, and the eventual philosophy that Cage strove for, was essential to the development of the prepared piano, in that it was this invention that allowed Cage to develop his musical language to incorporate sound and silence into his music. With the *Quartet* and the work that followed the *Trio* (of which the *Waltz* movement would become the third movement of *Amores* for prepared piano), Cage was able to create basic rhythmic structures based on simple rhythmic units.

As will be alluded to later in this chapter, in 1937, Cage would write a prophecy for his music in the form of an essay entitled 'The Future of Music: Credo.' In this essay Cage expounded his views on structuring in music and the use of sounds.

The development of Cage's simple rhythmic structuring came in 1939 with *Imaginary Landscape No. 1*. This composition is the first piece in which Cage would make clear a structure based on the length of phrases. *Imaginary Landscape No. 1* is commonly known as the first notated piece for electrical instruments that had not been specifically created for the purpose of performing music. The score requires four performers, one to play the cymbal, one to play a limited piano part, performing muted notes on the inside of the piano with the palm of the hand and a gong beater sweeping the bass string register of the piano recalling Henry Cowell's deployment of such techniques. The other two players perform on frequency records on turntables (gramophones), which perform constant tones changed by the varying of the speeds (33-78RPM) of the turntables. More importantly the piece is the subject of a pre-arranged time scheme, which is the immediate precursor to the micro-macrocosmic structure that Cage utilised in many of his prepared piano pieces. The structure is divided into four large sections. The large sections are subdivided into 4 smaller parts, each consisting of 3 sections made up of five bars with an additional section consisting of one, two, three or four bars respectively. So,

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<sup>136</sup> J. Cage, *A Composer's Confessions*, p. 31.

section one consist of 16 bars, section two consists of 17 bars, section three consists of 18 bars and section four consists of 19 bars.

*Section 1 = 5: 5: 5: 5: 5:1 (16 Bars)*

*Section 2 = 5: 5: 5: 5: 5:2 (17 Bars)*

*Section 3 = 5: 5: 5: 5: 5:3 (18 Bars)*

*Section 4 = 5: 5: 5: 5: 5:4 (19 Bars)*

**Figure 9: Pre-arranged schematic for *Imaginary Landscape No.1***

As Cage points out, there were two major facts that led him to use structural rhythm as a method of ordering his music:

the physical nature of the materials with which I was dealing, and the experience I had in writing within lengths of time prescribed for me by modern dancers. I was also able to approach this problem objectively because of the aesthetic attitude to which I found myself at that time dedicated. It had nothing to do with the idea of self-expression, but simply had to do with the organization of materials.<sup>137</sup>

Cage therefore decided that it was more important for music to be structurally organised temporally rather than in any other form. Structure for Cage meant the division of a whole into parts. Cage believed that structure was a matter of 'mind' composing (opposed to 'heart' composing, which he classed as method, material and form). By method, Cage meant the note to note procedure of composition, materials are the sounds and silences that are produced from composing and form is the 'morphology of continuity'.<sup>138</sup> By this, Cage meant the observation of the development of the material. He stated in his lecture 'Forerunners of Modern Music' that 'the material of music is sound and silence. Integrating these is composing'.<sup>139</sup> It is this definition that of integrating opposites that makes the analysis of structure in Cage's music so intriguing as two direct opposites; mind and heart; or structure and form combine, to create a free flowing continuity (music).

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<sup>137</sup> J. Cage, *A Composer's Confessions*, p. 34.

<sup>138</sup> J. Cage, *Composition as Process in Silence English Ed.*, London, Calder and Boyars, 1968), p. 18.

<sup>139</sup> J. Cage, *Forerunners of Modern Music in Silence English Ed.*, London, Marion Boyars, 1969, p. 62.



In his lecture '*Defense of Satie*,' which Cage delivered as part of the Satie festival that he organised at Black Mountain College in 1948, he introduced his ideas on the importance of structure in music. He says 'Music is a continuity of sound. In order that it may be distinguishable from non-being it must have a structure; that is, it must have parts that are clearly separate but that interact in such a way as to make a whole.'<sup>140</sup> Cage insisted that music needs form and structure to become whole. He went on to say:

In the field of structure, the field of the definition of parts and their relation to a whole, there has only been one new idea since Beethoven. And that new idea can be perceived in the work of Anton Webern and Erik Satie. With Beethoven the parts of the composition were defined by means of harmony. With Satie and Webern they are defined by means of time lengths. The question of structure is so basic, and it is so important to be in agreement about it, that one must ask: Was Beethoven right or are Beethoven and Satie right? I answer immediately and unequivocally, Beethoven was in error, and his influence, which has been extensive as it is lamentable, has been deadening to the art of music.<sup>141</sup>

Cage clearly suggested that a temporal form of structure was the only way that music can be composed. Cage considered all sounds and silences to be music; all aspects of sound contain one or some part of frequency, amplitude, timbre and duration, yet it is only the temporal aspect that can facilitate silence as well, and so this was the only logical means for structuring compositions for Cage.

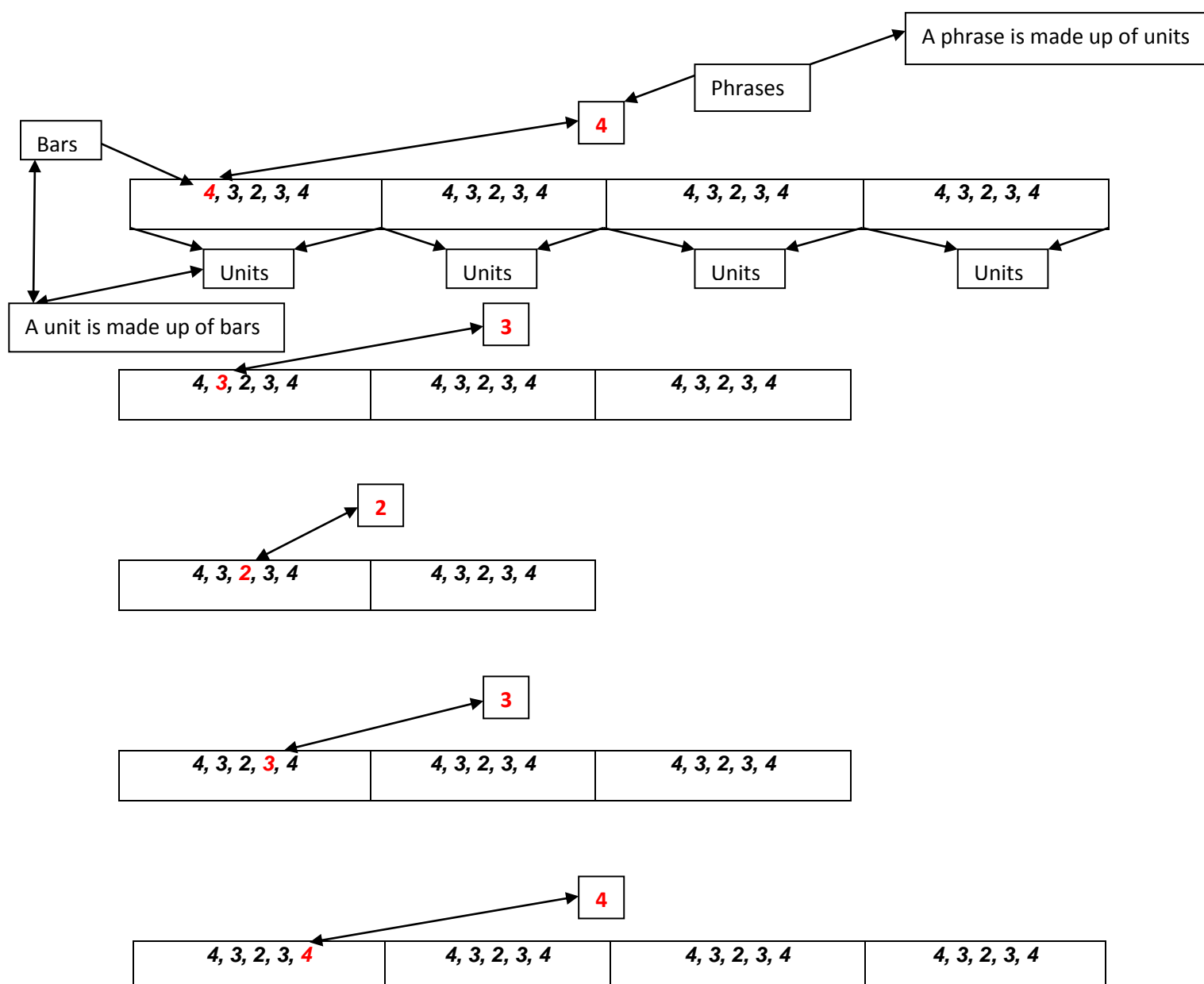
To enable Cage to facilitate his means of composition, he invented such a temporal method for structuring his music; he called this the micro-macrocosmic structure (sometimes called the square root method, due to the method of calculating the structural proportions). This essential expressed that the large scale moieties of the piece (the macro structure) mirrored the smaller moieties through arithmetical application of proportion.

With *First Construction (in Metal)* Cage was able to demonstrate definitively the process used in utilising the micro-macrocosmic structure.

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<sup>140</sup> J. Cage, *Defense of Satie* in R.Kostelanetz (ed.) *John Cage*, London: Allen Lane The Penguin Press, 1971, p. 78.

<sup>141</sup> *Ibid.*, p. 81.



**Figure 10: Schematic of micro-macrocosmic structure in First Construction (in Metal)**

James Pritchett alludes to the fact that the title construction bears resemblance to the description of music as organised sound by Varese.

*The First Construction* is based on the number sixteen, with sixteen units, each consisting of sixteen bars (made up of 4+3+2+3+4), the piece does have a 9 bar coda that sits outside of the framework for the micro-macrocosmic structure. The units, as demonstrated above, belong to a phrase that are themselves divided into 4,3,2,3 and 4, totalling sixteen. Each of the phrases are divisible by 16 also, therefore the totals of the five phrases correspond to 64, 48, 32, 48 and 64 bars. The First Construction is therefore controlled at both the micro level and macro level by the number sixteen.

This idea would engross Cage's compositions for the next decade, including many structures for the prepared piano.

In a letter to Pierre Boulez Cage would expound his theory:

The rhythmic structure is 4, 3, 2, 3, 4. (16X16). You can see that the first number (4) equals the number of figures that follow it. The first number is divided 1, 1, 1, 1, and first I present the ideas that are deployed in the 3, then those in the 2, etc. Regarding this method: there are 16 rhythmic motives divided 4, 4, 4, 4 conceived as circular series



When you are on 1, you can go 1 2 3 4 1 or retrograde. You can repeat (e.g. 11223344322 etc.) But you cannot go 2  $\leftrightarrow$  4 or 1  $\leftrightarrow$  3. When you are on 2, you can not only use the same idea but can go back to 1 using the "doorways" 1 or 4.<sup>142</sup>

Cage would further expound the delight with rhythmic structuring:

In dealing with the sounds of percussion music, one hears immediately that in the very nature of their material they are for the most part indefinite to pitch, but autonomous as to duration. For example: no human power can make the sound of the wood-block last longer than it, by its nature, is going to.<sup>143</sup>

'If one recognizes that the four physical characteristics of sound are its pitch, its loudness, its timbre and its duration, one may say that harmony and the intervallic character of counterpoint derive from no one of the physical characteristics of sounds, but rather from the human mind and its thought process.<sup>144</sup>

The *Second Construction* written in 1940 for percussion quartet again utilises the micro-macrocosmic structure: 4, 3, 4 and 5. However, more importantly in the use of the string piano Cage calls again for hand muting like in the *First Construction*, but this time he also requires a steel slide (a metal rod) to be applied to the string and for the pianist to insert a screw between A and E $\flat$  and also to mute strings with a piece of cardboard; a gong beater is also required. Interestingly, this piece was composed between December 1939 and January 1940 in Seattle, two months before the composition of *Bacchanale*, and was the first time Cage used fixed preparations inside the piano. The metal

<sup>142</sup> J-J. Nattiez, *The Boulez-Cage Correspondence*, p. 49.

<sup>143</sup> J. Cage, *A Composer's Confessions*, p. 34.

<sup>144</sup> *Ibid.*

preparations and the beater produce the effect of a gong, whilst the cardboard strip produces a thud like sound. The *Second Construction* is similar in structure and sound to the *First Construction* and often considered its *poorer little brother*.

## 1.6: Invented Instruments and Noise

Cage dealt with sounds, as he said 'If one feels protective about the word "music" protect it and find another word for all the rest that enters through the ears. It's a waste of time to trouble oneself with words. Noises.'<sup>145</sup> With this statement in mind it is important to highlight the influence that invented instruments and noise machines had on the creation of the prepared piano. This section will show that the creation of the prepared piano (an invented instrument itself), was influenced by new instruments that enabled the inventors to reclaim the art of noise in music, when asked what his purpose for writing music was, Cage replied 'I do not deal in purposes; I deal with sounds.'<sup>146</sup>

John Cage came from an inventive background. His father was a professional inventor, although Cage senior would never acquire the critical acclaim that Cage junior felt his father deserved. Cage would often assist his father in researching for some of his experiments and inventions when he was in need of financial remuneration. It may also be pertinent to suggest that, as an American, his national history was formed by new and inventive ideals. As mentioned earlier, Cage's first teacher Henry Cowell was revolutionary in his ideas for composition. Cage would even comment that 'only if I could invent something new, then would I be useful to society.'<sup>147</sup> Was this a premonition for the prepared piano?

The section will begin by tracing the development of the standard grand piano, which has mutated from its original form, through various permutations and extractions. It will show that the addition of mutes to the piano was not an entirely new convention. The section will also trace the influence that the Futurist movement particularly that Manifesto of Luigi Russolo had on Cage and assess the impact that Russolo's manifesto 'The Art of Noise' had on John Cage's creation of the prepared piano relating them directly to the prepared piano music. A comparison of Cage's own manifesto 'Future of Music: Credo' and Russolo's will expound the similarities between both parties' intentions for the creation of instruments that bring about an all sound universe. The section will also briefly trace the

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<sup>145</sup> J. Cage, 45' for a Speaker in *Silence* London, Calder and Boyars, 1968, p. 190.

<sup>146</sup> *Ibid*, p. 192 .

<sup>147</sup> D. Revill, *The Roaring Silence*, p. 51.

development of other invented instruments such as Henry Cowell and Leo Theremin's 'Rhythmicon' that may have had an effect on Cage's creation of the prepared piano.<sup>148</sup>

The addition of foreign objects into the piano is not a new idea. Many 'non-traditional' composers have attempted to alter the timbre produced by the piano for dramatic reasons, but also for less glamorous reasons.

Early jazz performers would insert drawing pins into the felt of piano hammers to alter the sound produced when the hammer hits the strings and early music societies have been known to insert similar objects to increase the percussive attack and infer the timbre of the plucking action of a harpsichord, because their seasons budget would not stretch to fund the hiring costs.

Richard Bunker points to Ravel as an example. In his opera *L'Enfant et les sortilèges* from the 1920s Ravel had used paper to prepare his piano, so he could alter the timbre produced.

The piano, as known today, has transformed dramatically from its original conception in circa 1709 when Bartolomeo Cristofori labelled his new invention the pianoforte. Three hundred years since this date there have been numerous mutations. 1771 saw the term 'grand' being applied to the piano, and 1783 saw the introduction of the sustaining pedal. 1800 brought about the first true upright piano, where the strings ran below the keyboard, whilst 1825 saw the first iron frame used in piano manufacturing. In 1828 a double layer of rabbit's fur and sheep's wool were used to felt the hammers, until this point buckskin had been used. By 1850 the range of the piano had increased to seven octaves and by 1935 Steinway had patented the capo-d'astro bar.<sup>149</sup> These are just some of the mutations that took place over the evolution of the piano that John Cage would have used to create his prepared piano. However, a look at the patent lists attached to 'the piano' draws light on some of the more radical mutations that took place to the piano, but have not stood the test of time.

In 1787 Humphrey Walton added a pedal for causing the hammer to strike one, two, or three strings. In 1788 C Clagget inserted two other bridges (besides the ordinary one) placed nearer to the hammers, but in a just proportion, according to the musical division of the strings. Metal bars press down the strings by means of pedals, causing the original bridges to lose their power, thereby producing a more acute sound as the string is shortened by the secondary bridges and metal bars. In

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<sup>148</sup> For further information on invented instruments look at <http://120years.net/intro.html>

<sup>149</sup> [http://www.uk-piano.org/history/history\\_1.html](http://www.uk-piano.org/history/history_1.html) , accessed 12/03/09 at 11.30

1790 John Hancock inserted small pieces of leather between the strings, in order to deaden one string to each note, when the player required it. He also patented at this time a flute stop for the piano. A black sticker, pressed down a palate at the bottom of pipes, admitting wind from bellows which were operated by a pedal. Jolin Conrad Becker in 1801 patented a design that produced half and quarter tones on a piano by causing the wrest pins to move partly round their centres, which altered the tension of the string. In 1845 S Crittimwell designs additional stops which he called elastic stops. These produced harmonics when pressed upon the strings. R Guichene patented the use of connecting rods which cause a chord to sound when a single key was struck. In 1860 H Viner invented a piano with two sets of hammers that were set into motion by pressing a single key. One set of hammers would strike from below the strings in an upwards action and the other would strike down onto a second set of strings that were tuned in unison, an octave above or below the upper set of strings.<sup>150</sup>

Cage's creed for the composer took a radical shift after his studies with Schoenberg. At that time, he had been dedicated to music using a twelve tone technique, or in his case a method utilising 25 tones. From 1935 Cage changed this view and called for the composer to be 'an inventor of new sounds and new instruments' and 'to invent new forms and methods to incorporate the use of these new sounds.'<sup>151</sup> It was through the promotion of percussion music that Cage discovered his primary task, that being the 'musical reclamation of noise.'<sup>152</sup>

In 1914, whilst studying with Charles Seeger at the University of California, Cowell became fascinated by the physical relationship between rhythm and harmony. He was engrossed in the way counter rhythms were expressed in ratios, and how this was similar to the way the lower reaches of the overtone series were expressed.<sup>153</sup> Cowell set about composing music that derived their proportions from the ratios of the harmonic series. Cowell cemented his ideas further in *New Musical Resources* in the section on Polyrhythm as mentioned earlier. Cowell had collaborated with a physics student and began studying the physical properties of a pair of sirens. They discovered that 'if the two sirens are tuned in the relationship 3:2, they will sound the interval of a perfect fifth, if they are both slowed down, keeping the same 3:2 relationship, they arrive at a rhythm of 3 against 2, heard as gentle

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<sup>150</sup> <http://www.uk-piano.org/history/patents.html>, accessed 12/03/09 11.30

<sup>151</sup> J. Pritchett, *The Music of John Cage*, Cambridge University Press, 1993, p. 11.

<sup>152</sup> *Ibid.*

<sup>153</sup> D. Nicholls, *American Experimental Music 1890-1940*, pp. 140-141.

bumps but also visible in tiny puffs of air through the holes in the sirens, and so easily confirmed. Tuned to any harmonic ratio, of course, the same thing happens, proving that these ratios express a single physical relationship which is heard as rhythm when slow and pitch when fast.<sup>154</sup>

In 1931 to fulfil his wish for the performance of the intricate polyrhythms created by this relationship Cowell approached Leon Theremin to build an instrument that would be capable of performing such complex rhythms. Theremin was a scientist who had previously built the 'Theremin' in 1920<sup>155</sup>, after researching proximity sensors for the Russian government. The Theremin consisted of two antennae that sensed the position of the performer's hands. The one hand controlled radio frequency oscillators and the other controlled volume. The signals were then amplified with a loud speaker.

The Rhythmicon was 'essentially a large box [...] with a piano-like keyboard of ten white keys and eight black keys equally spaced on the top. There is a volume control knob and a switch to the left of the keyboard. The left side has tempo and pitch controls made of plastic tubes projecting from holes while the right side contains a soundboard. Each key is connected to a corresponding light bulb inside the casing [...]'<sup>156</sup>

Cowell only composed two pieces for the Rhythmicon, *Rhythmicana* for Rhythmicon and Orchestra (1931) and *Music for Violin and Rhythmicon* (1932).<sup>157</sup> He felt frustrated by the constraints it had on the performance of his music. 'Since there was no way of giving melodic freedom by varying the lengths in a single part, and no method of accenting, these early quartets (*Quartet Romantic*, 1917) still could not be played on it.'<sup>158</sup>

Cage would have been aware about the creation of the Rhythmicon through his association with Cowell at the New School for Social Research, and through his reading of *New Musical Resources* in which Cowell 'suggests an instrument that could mechanically produce the intricate rhythmic ratios'.<sup>159</sup> It is likely that Cage would have been intrigued by its inventive nature and as Schedel says 'it was

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<sup>154</sup> S. Johnson, *Worlds of Ideas*, in D. Nicholls, *The Whole World of Music: A Henry Cowell Symposium*, Amsterdam: Harwood Academic Publishers, 1997, pp. 27-28.

<sup>155</sup> M. Schedal, *Anticipating interactivity: Henry Cowell and the Rhythmicon*, *Organised Sound* 7(3), p.247.

<sup>156</sup> M. Schedal, p.249.

<sup>157</sup> See <http://musicmavericks.publicradio.org/rhythmicon/> for an example of how it sounds

<sup>158</sup> M. Schedal, p.250.

<sup>159</sup> H. Cowell, *New Musical Resources* New Ed., Cambridge University Press, 1996, p. 249.

much more than a rhythm machine; it was one of the first instruments to distance gesture from sound and to use technology to enhance performers' abilities'<sup>160</sup>

As previously mentioned, Cage constructed a list of the ten most influential books on his philosophy, of which *New Musical Resources* had been one. Another (particularly chapter five) is *Towards a New Music* by Carlos Chavez. Chavez identified the use of sirens and klaxons, and all kinds of sounds present around people, such as the sounds of industry and city noises.<sup>161</sup> Luigi Russolo, the Futurist artist, poet and composer was to publish a manifesto in 1913, entitled *The Art of Noises* or *L'arte dei Rumori*, and another on Cage's top ten list. The manifesto originally took the form as a long letter to a fellow Futurist composer Francesco Balilla Pratella. In it Russolo argues that the industrial revolution taking place around everybody has created a new sonic palette, which people have become accustomed to. It was his thought that music should modernise auditory perception through a new approach to composition and instrumentation, and thus advocate the use of noise as a legitimate material for composing. His vision was that futurist composers would enhance the musical landscape by utilising electronics in composition and broadening music by allowing noise to infiltrate into regular music. He believed this was not possible with the limited use of orchestral instruments. This in turn would celebrate industry and therefore represent the future of society and music for the new century. It would be Russolo's inventing of new instruments to present his ideas and development of a new form of musical notation to allow performance of his music that would bring him to the attention of the Futurist leaders.

The Futurist movement began as a group of activists working in the arts and politics, mainly surrounding the crisis brought by the First World War which included economic, political and social. The founder of the movement Filippo Tommaso Marinetti would first publish the Futurist ideology, the *Futurist Manifesto*, in the Parisian Newspaper *Le Figaro* in 1909. The main theme of the manifesto was a total rejection of the past, and the promotion of invention, speed, war and particularly technology. Through the rejection of the past, with particular emphasis on the arts Marinetti would sanction the destruction of 'museums, libraries and academies of every kind.'<sup>162</sup> The group became

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<sup>160</sup> M. Schedal, p.247.

<sup>161</sup> D. Nicholls, *American Experimental Music 1890-1940*, p.190.

<sup>162</sup> F. T. Marinetti, *The Futurist Manifesto*, 1909, <http://cscs.umich.edu/~crshalizi/T4PM/futurist-manifesto.html> accessed 30/05/2011



very nationalistic and pro war, as Marinetti would claim that war was 'the world's only hygiene',<sup>163</sup> Because of such extreme philosophy the Futurists would become quite an isolated and intolerant movement.

Russolo, like Cage, held the belief that music had become stagnant. It was so complex that there lay no logical progression, apart from introducing noise into composition. In the *Art of Noise* Russolo would state:

We must break out of this narrow circle of pure musical sounds, and conquer the infinite variety of noise sounds [...] Let us wander through a great modern city with our ears more alert than our eyes, and enjoy distinguishing between the sounds of water, air or gas in metal pipes, the purring of motors (which breathe and pulsate with indisputable animalism), the throbbing of valves, the pounding of pistons, the screeching of gears, the clatter of street cars on their rails, the cracking of whips, the flapping of awnings and flags. We shall enjoy fabricating the mental orchestrations of the banging of store shutters, the slamming o doors, the hustle and bustle of crowds, the din of the railroad stations, foundries, spinning mills, printing presses, electric power stations and underground railroads.<sup>164</sup>

Therefore the sounds of the industrial society would 'present the musical soul of the masses.'<sup>165</sup>

To achieve the noise-sound possibilities that Russolo wanted he invented new instruments or 'noise machines' called *intonarumori*, or *intoners*. The machines were solid boxes of varying size and height fitted with large metal speakers.

Each instrument was made of a parallelepiped sound box with a speaker on its front. Inside the box, a gut or metal string was excited by a rotating wheel. The speed of the wheel was changed by the player by using a crank, while the tension of the string was varied by using a lever. As an example, the string was either steel or gut, the wheel either metal or wood, with its rim notched with small teeth or smoother, and the skins were soaked in a variety of special chemical preparations. Furthermore, the pressure of the wheel against the string, stronger than is necessary with a violin bow, created a louder and noisier sound quality.<sup>166</sup>

Many of Russolo's works were given titles such as *Awakening of a great city*, *meeting of cars and aeroplanes*, *dining on the terrace of the casino* and *skirmish in the oasis*, all suggesting noises of industry.

- Group 1: Rumbles, roars, explosions, crashes, splashes, booms

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<sup>163</sup> Ibid.

<sup>164</sup> L. Russolo, *The Art of Noise* (Futurist Manifesto, 1913), Ubu Classics, 2004, p. 7.

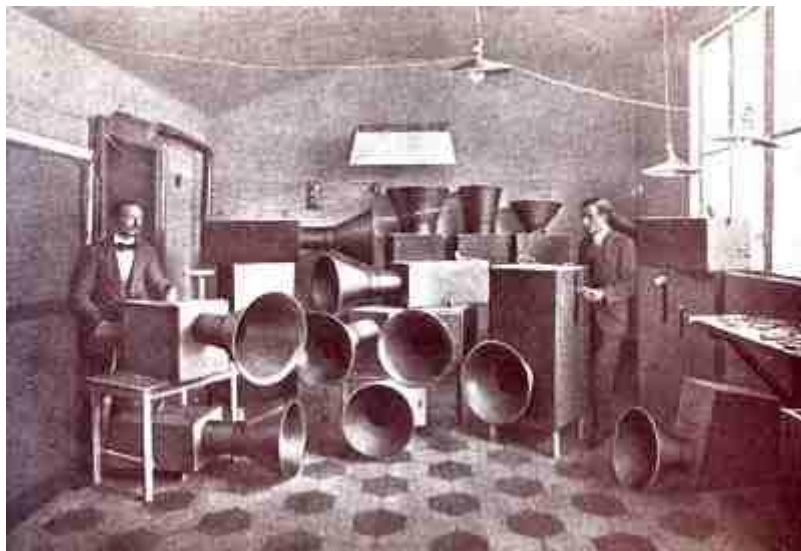
<sup>165</sup> Ibid.

<sup>166</sup> <http://www.acoustics.org/press/149th/serafin.html> accessed 12/11/2008

- Group 2: Whistles, hisses, snorts
- Group 3: Whispers, murmers, mumbles, grumbles, gurgles
- Group 4: Screeches, creaks, rustles, buzzes, crackles, scrapes
- Group 5: Noises made by percussion on: metal, wood, skin, stone, etc.
- Group 6: Voices of animals and men: shouts, screams, groans, shrieks, howls, laughs, wheezes, sobs<sup>167</sup>

The intoners were destroyed during the Second World War, but reconstructions have been made.<sup>168</sup>

The outcome for Russolo would be to jolt the listener into a new way of listening, a sentiment that Cage would adhere to strongly. Cage believed that audiences had become habitually familiar with the rules of 'traditional' music. Because of this awareness the experiences of the sounds produced had been hindered.



**Figure 11: Luigi Russolo and his assistant Ugo Piatti with their Intonarumori.**

<sup>167</sup> <http://csunix1.lvc.edu/~snyder/em/russolo.html> accessed 12/11/2008

<sup>168</sup> Detailed examples on construction and workings of the intoners can be found at <http://www.acoustics.org/press/149th/serafin.html>. Audio examples can be found at <http://www.ubu.com/sound/dada.html>.

Cage's own manifesto on music, *The Future of Music: Credo*<sup>169</sup>, draws interesting comparisons with Russolo's manifesto. The similarity lies firmly in both composers' vision for the use of noise sounds in music and the belief that they are the only logical progression for music.

Many scholars draw comparisons between the phraseology of Cage's manifesto and Russolo's.<sup>170</sup> However, it is interesting to point out a few examples of the shared sentiments of both men. Cage initiates his manifesto by realigning himself with Russolo by echoing what was mentioned previously:

I believe that the use of noise to make music will continue and increase until we reach a music produced through the aid of electrical instruments which will make available for musical purposes any and all sounds that can be heard.<sup>171</sup>

Cage mirrors Russolo even more substantially by saying:

We want to capture and control these sounds, to use them not as sound effects but as musical instruments<sup>172</sup>

However by 1948 and after the naïve realisation of the strong link between Capitalism and Futurism and also because of the support that Futurism gained from Mussolini, Cage would renounce his previous statements:<sup>173</sup> 'In view of these convictions I am frankly embarrassed that most of my musical life has been spent in the search for new materials.'

According to Cowell, Varèse was the only composer to see this style of experimentation through its climax, by combining 'an overweight of percussion instruments with a few other ones, the latter used explosively than melodically. By gradual reduction of non-percussive elements he came finally to Ionization.'<sup>174</sup> Varèse criticises the work of Russolo for being concerned with imitation.<sup>175</sup>

This section has endeavoured to examine the role of invented instruments and noise in influencing John Cage's creation of the prepared piano. John Cage said 'Many musicians, the writer included, have dreamed of compact technological boxes, inside which all audible sounds, including noise, would be ready to come forth at the command of the composer. Such boxes are still located in the future. At present the choice is either to wait and lament the fact that they aren't available now for

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<sup>169</sup> J. Cage, *The Future of Music: Credo* in *Silence* English ed., London, Marion Boyars, 1968, p.3-6.

<sup>170</sup> For a detailed investigation see D. Nicholls, *American Experimental Music 1890-1940*

<sup>171</sup> J. Cage, *The Future of Music: Credo*, p.3.

<sup>172</sup> *Ibid.*

<sup>173</sup> J. Cage, *A Composer's Confessions*, p.43.

<sup>174</sup> Henry Cowell, 'Drums Along the Pacific', *Modern Music* 18 (1940), p. 48.

<sup>175</sup> M. Hicks, p. 510.

experimental and musical purposes, or continue to work with what 'axes and buckets' can be found or made.<sup>176</sup>

The prepared piano was not created from inside a vacuum; there were many influences upon its invention, and as demonstrated in this chapter the influences seeped into the grain of the prepared piano. The resultant sound of the prepared piano, particularly the influence of noise as a crucial component of the prepared piano, and the music Cage composed for it is the subject of the subsequent chapters.

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<sup>176</sup> J. Cage, For More New Sounds, in R. Kostelanetz, *John Cage*, London, Allen Lane, The Penguin Press, 1971, p.65.

# Chapter Two: John Cage's Prepared Piano Music

## 2.1: Context

John played for class on a beat-up grand piano – the dance studios tended to get the leftovers from the music students. It wasn't in the greatest condition; I had a little box behind the piano where I kept all the nuts and bolts and things that fell off! [...] (Cage) began inserting things from the box full of nuts and bolts into the strings and getting different qualities.<sup>177</sup>

A clear aim of this thesis is to reduce the ambiguity that surrounds a performer's decision making when attempting to select preparations for performances of John Cage's solo prepared piano music. As it will be highlighted in chapter three, factors such as preparation material and material proportions play important roles on the sounds produced when the preparation is inserted between the strings of a grand piano. This chapter aims to reduce the ambiguity and hypothesise a sound that is (possibly) closer to the sound Cage heard by analysing the preparations that Cage used himself.

This chapter, therefore, serves two purposes. Firstly it provides a thorough inventory of John Cage's solo prepared piano music, aiming to be a 'one-stop shop' detailing information that will be of use to performers and scholars alike. It provides a comprehensive source incorporating for each piece such details as date of composition, particulars of publication, performance information and a short biography of the composition. The second function of chapter two is to offer suggestions for the re-creation of 'authentic' sounds, by offering a practical treatise of functionality and a physical elucidation of the preparations used by John Cage. .

The inventory takes the form of several distinct sections. Each piece is displayed in chronological order with the title of the piece and date composed at the outset. The next section takes the form of a table that gives descriptions of the preparations used as they are found directly in the score and also to which notes the preparations apply. The numbers prescribed relate to the octave that tone appears on the piano keyboard, and have been worked out from **middle C=C4**.

Performances given in the thesis always endeavour to be the premier performance, incorporating the performer(s) and dancers (where this occurs), and the place and date of the performance.

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<sup>177</sup> R. Boyle, pp. 70 -71.

Miscellaneous information will always try and incorporate the copyright holder and date, the publication numbers and publisher (this usually will include both old and new publication numbers), a dedication if any, and any other interesting facts that may be gained from the manuscripts or other sources. The 'comments' section of the inventory will include any relevant information on the table of preparations and preparations themselves.

This treatise also highlights Cage's preference of certain materials in the quest for sound mutation. It became possible to make suggestions for the recreation of Cage's preparations largely because of a single source; the preparations of the *Sonatas and Interludes*. The materials for these were collected by Cage and housed at the *John Cage Trust* in Annadale on Hudson. Cage purchased his preparations from ordinary hardware stores as he needed them. He kept two complete sets, one of which was presented to Richard Lippold as a gift, and he kept one at his loft in New York. Upon Cage's death Lippold returned his set to the Cage Trust, where both are now held. The sets are regularly borrowed to go on display at various museums. At the time of this writing the sets were on display at the Grammy Museum in Los Angeles, and at MACBA.<sup>178</sup>

Each individual tone that is prepared in the *Sonatas and Interludes* is assigned an envelope in which all materials for the preparation of that tone are kept. On each envelope Cage initially details what tone is to be prepared with what measurements the preparations should be positioned at inside the piano (which string [1,2,3] of that particular tone should be prepared and its distance from the damper.) Furthermore the envelope has added in pencil a detailed description of the materials used for the preparations. This appears to be added at a later time, as the original description is in pen and the latter is in pencil. The latter explanation is helpful, as the previous description merely suggests a generic term for the preparation, i.e. screw, bolt, whereas the newer annotations describe the size and shape of the material. What this enables the analyst to do is decipher the ambiguity that was presented previously. A particular example that highlights the indistinctness arises when Cage describes a preparation as a 'furniture bolt'. It is not clear exactly what a furniture bolt was and in fact how it differed from a normal bolt.

In all solo prepared piano compositions apart from two Cage does not specify size or shapes of preparations. It is therefore the information added later in pencil that reveals the most interesting

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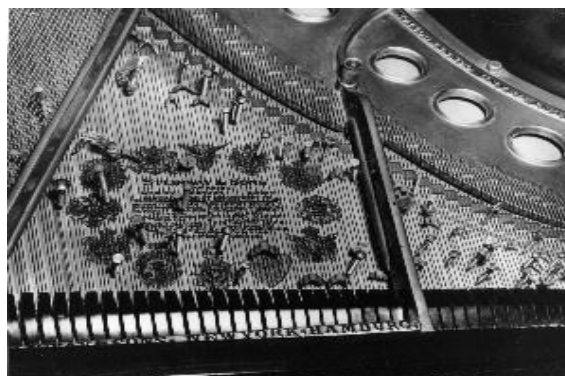
<sup>178</sup> Laura Kuhn, interview with the author, July 2008.

information for suggesting specific sizes to be utilised when preparing the piano. The solutions stated in this chapter have been decided through informed decisions via this resource. There are obviously still some grey areas and these will be discussed when the need arises.

The two works where Cage does detail size and shape are '*Prelude for Meditation*' where details are noted of two stove bolts and wood screws and *Two Pastorales* where Cage notes Stove Bolt (flat head) 21/4 x 5 1/16, Cup point screw set 3/4 x 3/8, U bolt 2 x 5/16, Machine screw (oval head) 3/4 x 6/32 and a strip of canning rubber. The detail Cage gives for *Prelude for Meditation* for example is for the gauge of the bolt and screws (how this is discovered is demonstrated later in this chapter), but Cage still does not give a description as to what a stove bolt actually is. The details Cage informs us of are 1/4" and 1 1/2" for the stove bolts and No.12 1 1/2" long for the screws.

In all of the pieces for prepared piano there are numerous different terms for the word screw e.g. screw, wood screw, long screw, big screw etc, again by utilising what Cage originally called the preparations with what he later added as a clarification on the envelopes of the preparations analysed it is possible to judge what preparation he was implying.

However, certain problems do arise. The most obvious is when Cage uses preparations in a work other than the *Sonatas and Interludes*, as the only source of data I can employ is that gained from the *Sonatas and Interludes*. For example when Cage calls for 'weather stripping', When Cage gives this I have had to make another informed decision from utilising comments and remarks from performers who regularly perform work where weather stripping is called upon.



**Figure 12: An example of Cage's preparations inside a piano (Courtesy of the John Cage Trust, © John Cage Trust).**

## 2.2: Overview of Pieces and Preparations

The table below summaries the extent to which each piece is prepared; by utilising this table performers will be able to gauge the difficulty of preparing the piano for a particular piece and the duration of time it might take to prepared – the more preparations, the longer it will take. Also included in the table are prepared piano works that are not focussed on in this thesis; this is largely due to the fact that they may be for duo prepared piano or involve other instruments and instrumentalists. However, it will demonstrate the pieces Cage was composing at the same time as his solo prepared piano music – these are highlighted in yellow. The table also includes pieces that do not contain any prepared piano but are important compositions in Cage's oeuvre; these are highlighted in green. There are two prepared piano pieces that are recorded but the scores have been lost. These pieces are *Shimmera*, composed in 1942 for a dance by Merce Cunningham and *Lidice*<sup>179</sup> a prepared piano piece composed for a dance of the same name by Marie Marchowsky; the title refers to the Czech village of the same name invaded in 1942, these are highlighted in blue.

Title of Composition (Chronological Order)	Year of composition	Number of Preparations in Composition	Non Solo Prepared Piano Works or Important Works
	(1939)	Use of a Muted Piano	<i>Imaginary Landscape No.1</i>
	(1939)	Use of a Metal Pipe, Gong Beater inside piano	<i>First Construction (in Metal)</i>
	(1940)	Unknown	<i>Imaginary Landscape No.2</i>
	(1940)	Use of a Bolt and Cardboard inside piano	<i>Second Construction</i>
<i>Bacchanale</i>	(1940)	12	
<i>Primitive</i>	(1942)	13	
<i>In the Name of the Holocaust</i>	(1942)	12	
<i>And the Earth Shall Bear Again</i>	(1942)	11	
	(1942)	Use of Drawing Pins in hammers of piano	<i>Credo in US</i>
	(1942)	Lost Work - Dance for Merce Cunningham	<i>Shimmera</i>
	(1942-1943)	Cloth	<i>Four Dances</i>
<i>Our Spring Will Come</i>	(1943)	8	
<i>Totem Ancestor</i>	(1943)	11	
<i>Amores – Movements I &amp; IV</i>	(1943)		

<sup>179</sup> <http://www.johncage.info/index2.html> accessed 30/05/2011



<b><i>Tossed as it is Untroubled</i></b>	(1943)	8	<b><i>She is Asleep</i></b>
	(1943)	12 Duet for Voice and Prepared Piano	
<b><i>A Room</i></b>	(1943)		<b><i>Lidice</i></b>
	(1943)	Lost Work	
<b><i>A Valentine out of Season (Music for Xenia to play on a prepared piano)</i></b>	(1944)	13 (4 double)	<b><i>A Book of Music (Duo)</i></b>
	(1944)		
<b><i>Root of an Unfocus</i></b>	(1944)	10 (2 double)	
<b><i>Prelude for a Meditation</i></b>	(1944)	4	
<b><i>Spontaneous Earth</i></b>	(1944)	14 (2 double)	
<b><i>The Perilous Night</i></b>	(1944)	36 (10 double)	
<b><i>The Unavailable Memory of Triple Paced (Second Version)</i></b>	(1944)	5 3	
	(1944-1945)		<b><i>Three Dances (Duo)</i></b>
<b><i>Daughters of the Lonesome Isle</i></b>	(1945)	61 (22 double)	
<b><i>Mysterious Adventure</i></b>	(1945)	46 (7 double, 6 triple)	
<b><i>Sonatas and Interludes</i></b>	(1946-1948)	67 (2 double, 6 triple)	
<b><i>Music for Marcel Duchamp</i></b>	(1947)	9	
<b><i>Works of Calder</i></b>	(1949-1950)	54 (10 double, 4 triple)	<b><i>Concerto for Prepared Piano and Chamber Orchestra</i></b>
	(1950-1951)	Use of the I Ching	
<b><i>Two Pastorales</i></b>	(1951)		<b><i>Waiting Water Music</i></b>
	(1952)	Free Choice 4 preparations	
<b><i>31'57.9864'' and 34'46.776''</i></b>	(1954)	5 different groups of preparations. Metal, wood, material, plastic, other	

**Figure 13: Table summarising the extent to which each piece is prepared**

## 2.3: Grouping of Preparations

The materials used for preparations can be grouped into distinct groups. There are two different kinds of groups tabled below. First is a table listing all of the preparations required for the performance of all solo prepared piano pieces ordered according to the material from which they are constructed (figure 13). This table has been devised by analysing all of Cage's preparation tables for his prepared piano music. The second table (figure 14) is ordered according to the amounts of each preparation needed; these categories are listed as mostly metallic, mostly non-metallic or mostly equal (where there is a relatively even spread of both metal and non-metal preparations). This

timetable will therefore also highlight the overall sonic effect that is produced by the preparation within that piece. For example, if the piece is located in the mostly metallic section of the table the sonic result will produce a metallic sounding effect, a lot like the sound of a bell or in some circumstances where metal rings are used, a tambourine. When non-metallic preparations are used the effects result in a thud or dull sound largely due to the fibrous or absorbent nature of the material that the preparations are made from. However, the sonic result produced by the preparations is not only the result of the material that the preparation is made from; the other important factor is the pitch at which the preparation is situated. If a preparation is located mid-range of the piano, it is a stronger sound than if the preparation is at a higher range due to the type and resonance of the string.

*[Note that Cage used abbreviations or different names for the same preparations, these have been identified in bold and italics.]*

<b>Non Metal Preparations</b>	<b>Bolts</b>	<b>Screws</b>	<b>Nuts/Other Metal Objects</b>
Weather stripping	Small bolt <b>SM bolt</b>	Wood screw	Nuts
Woollen material	Long bolt	Screw	Penny
Bamboo	Large bolt <b>LG bolt</b>	Small screw <b>SM screw</b>	
Plastic	Bolt	Large screw <b>LG screw</b>	
Rubber	Thin bolt	Thick screw	
Rubber washer	Medium bolt	Hooks	
<i>Rubber ring</i>	<b>MED bolt</b>		
Wood	Stove bolt		
Cloth	Typewriter bolt		
Eraser	Big bolt		
Felt	Long SM bolt		
Plastic bridge	Octagonal bolt		
	Headless bolt		
	Furniture bolt		
	<b>Screw eye</b>		
	Black bolt		
	Short bolt		

**Figure 14: Table analysing and categorising all of Cage's preparation for his prepared piano music**

<b>Mostly Metallic</b>	<b>Mostly Non Metal</b>	<b>Equal</b>
<i>Primitive (1942)</i>	<i>Bacchanale (1940)</i>	<i>Tossed as it is Untroubled (1943)</i>
<i>In the Name of the Holocaust (1942)</i>	<i>Triple Paced Number 2 (1942)</i>	<i>A Valentine out of Season (1944)</i>
<i>Totem Ancestor (1942)</i>	<i>The Unavailable Memory of</i>	<i>Three Dances (1945)</i>

(1944)		
<i>And the Earth Shall Bear Again</i> (1942)	<i>The Perilous Night</i> (1944)	<i>Works of Calder</i> (1949-1950)
<i>Our Spring will Come</i> (1943)	<i>A Book of Music</i> (1944)	<i>34'46.776 for a Pianist</i> (1954)
<i>Root of an Unfocus</i> (1944)	<i>Mysterious Adventure</i> (1945)	<i>31'57.9864 for a Pianist</i> (1954)
<i>Prelude for Meditation</i> (1944)	<i>Music For Marcel Duchamp</i> (1947)	
<i>Spontaneous Earth</i> (1944)		
<i>Daughters of the Lonesome Isle</i> (1945)		
<i>Sonatas &amp; Interludes</i> (1946-1948)		
<i>Concerto for Prepared Piano and Chamber Orchestra</i> (1951)		

**Figure 15: Table categorising all of the materials used in Cage's prepared piano music**

What is interesting about the table above is that it demonstrates that Cage was not specific about a certain type of preparation at a specific period in history. The table demonstrates that Cage would use any preparation rather than utilising a particular sort of preparation. *A Valentine out of Season* is difficult to allocate. It has double preparations on each string, one being metal and the other non-metal, one is no more prominent than the other.

## 2.4: Descriptions given by Cage on the envelopes of the *Sonatas & Interludes*

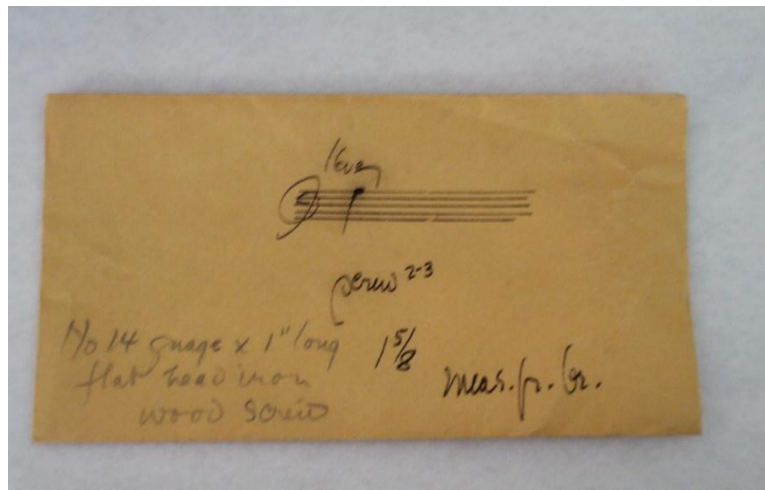
When John Cage composed the *Sonatas & Interludes* he constructed several 'kits' for performing this piece. It is not known for definite how many 'kits' Cage put together. However, Christian Wolff recalls that:

'Once upon a time one could buy the Sonatas and Interludes with all the preparations - from the New Music periodical edited and published by Henry Cowell. Which, in 1950, I did. Some year later Cage couldn't find his preparation kit and asked if I had one. I did and gave it to him, and never got it back.'<sup>180</sup>

<sup>180</sup> Email to Philip Thomas from Christian Wolff 10/03/2011



**Figure 16: The box containing the 'kit' for the *Sonatas & Interludes*, housed at the John Cage Trust**



**Figure 17: An Example of the envelopes that form the kit and where Cage describes the preparation inside**

For most of the preparations this elucidates exactly what Cage required for each preparation – however, there are still some queries.

Initially the term Carriage Bolt needed further investigation. However, after a brief search on the internet it became obvious that the term Carriage Bolt is quite universal and can be defined as a type of bolt with a round head and a square neck that prevents the bolt from turning while the nut is tightened. In the US and Canada it is referred to as a Carriage Bolt, however, in other countries it is also referred to as a Coach Bolt; Cage often uses a combination of both terms, but it is evident that he means the same thing. Figure 17 is a typical image of a Carriage bolt.



181

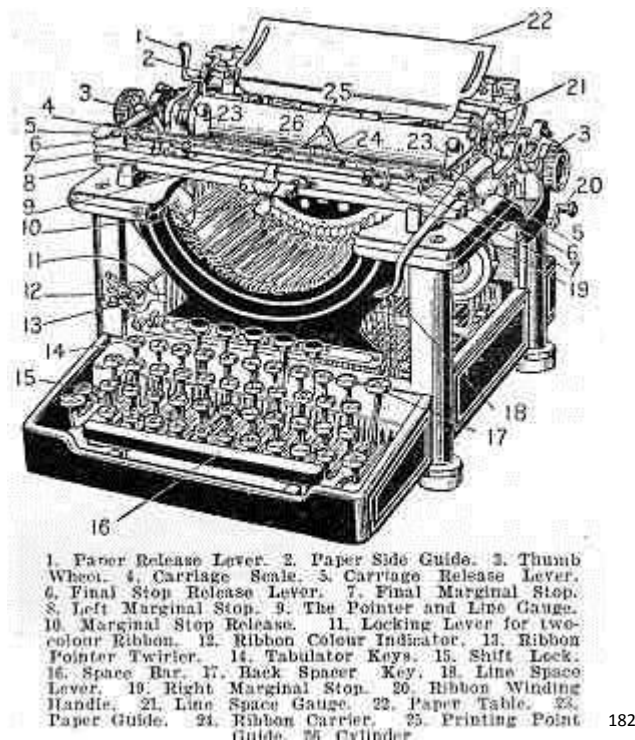
**Figure 18: A typical image of a Carriage Bolt**

The fact that the Carriage bolt could also be referred to as a coach bolt is quite a persistent problem. Different countries have different names for the same objects. Obviously because Cage was American the terminology he used referred to the American description of the materials. English composer Christopher Fox recounted a similar experience in one of his pieces in which he used prepared a piano. Fox required 'Blu Tac' as a preparation for his piece '*Leap Like the Heart*' and in the United Kingdom 'Blu Tac' is a brand name for an adhesive putty used to stick posters and displays to walls. However, when the Toronto based ensemble Arraymusic wanted to perform this piece, they required clarification of what this material was; it transpired that Blu Tac in Canada is known as 'Sticky Putty'.

It is, however, far more elusive to find a definition of a Typewriter Bolt. Initial investigations led to an exploded diagram of an 'old-fashioned' typewriter as in figure 19, but this did not give any indications

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<sup>181</sup> [www.usifaz.com/Web%20Site%20Pics/Screws/Carriage%20Bolt.gif](http://www.usifaz.com/Web%20Site%20Pics/Screws/Carriage%20Bolt.gif) - accessed 08/03/2011



**Figure 19: An exploded view of a traditional type-writer**

After researching the various parts of the typewriter one would have to make an educated guess as to the definition of the typewriter bolt. Therefore it could be suggested that it would be something pertaining to holding the carriage fast horizontally or for holding the key assembly onto the base, an item like the angle-threaded bolt in the following image:



**Figure 20: Parts of a vintage typewriter, the angle-threaded bolt is what this author believes to be an example of a typewriter bolt**

<sup>182</sup> <http://www.probertencyclopaedia.com/j/Typewriter.jpg> - accessed 08/03/2011

<sup>183</sup> <http://www.etsy.com/listing/64412058/vintage-typewriter-parts-gears-wheels> accessed 08/03/2011



The largest omission from the following table is a description of the preparation that Cage calls 'weather stripping'. The reason it is omitted from this table is that it was not included in Cage's kit at the John Cage Trust nor does Cage describe what it is on any of the envelopes.

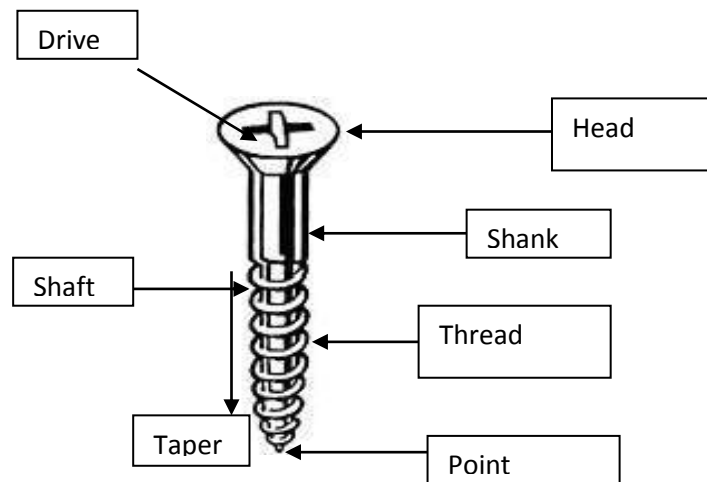
Non Metal Preparations	Bolts	Screws All screws, unless otherwise stated, Cage describes as 'flat head iron wood screw'	Nuts/Other Metal
<b>Jar Rubber –</b> <i>(N.B. This kind of rubber is used as the seal in clip preserving/storage jars. The rings can be purchased from 'Le Parfait'.)</i>	<b>Med Bolt</b> – 13 gauge 1 ½ long (washer head furniture bolt)	No. 9 x 1 ¾"	Square Iron Nut
	<b>Med Bolt</b> – 1 ¼ long (washer head furniture screw)	No. 10 x gauge ¾"	
	<b>Sm. Bolt</b> – 3/16 (carriage bolt x ¾ long)	No. 10 x gauge 1 ½"	
	<b>Furniture Bolt</b> – 8-32 x 1" (eye bolt or machine screw eye)	No. 11 x gauge 1"	
	<b>Bolt</b> ¼ x 1 ½ (rd head iron stove bolt)	No. 12 gauge x 7/8"	
	<b>LG Bolt</b> – 5/15 x 1 ½ (machine bolt)	No. 12 gauge x 1"	
		No. 12 gauge x 1 ½"	
		No. 12 gauge x 1 ¾"	
		No. 12 gauge x 2"	
		No. 14 gauge x 1"	
		No. 14 gauge x 2"	
		Rd. Screw No. 10 x 1" long (rd head iron wood screw)	

**Figure 21: Descriptions given by Cage on the envelopes of the Sonatas & Interludes**

## 2.5: Definitions of Screws and Bolts

Screws consist of a cylindrical shaft that tapers to a point at one end with a thread formed on it and a head at the other end. The thread is also known as the inclined plane and is helically disposed around a cylinder or shaft. The head is of a larger diameter than the body of the screw cannot be driven deeper than the length of the shaft. Majority of screws are tightened clockwise known as a right-hand thread.

### A Typical Screw



Common screws and bolts usually have a head that serves as a stop and may have an unthreaded shoulder portion beneath the head. The most common material for them to be constructed from is steel.



### Wood Screws

Wood screws are classified by the type of drive, shape of head and length, and are sized by gauge numbers and length.





## Machine Screws

These are different from wood screws as they do not taper to a point, they are threaded the entire length of the shaft. Machine screws are generally used with a nut.



## Set Screws (Cage also refers to these as cup point set screws)

Machine screws with no head for screwing all the way into threaded holes.

There are no universal definitions for the distinction between screws and bolts. However screws are normally threaded fasteners with tapered shafts and bolts are normally larger threaded fasteners with no taper on the shaft.

## Terminology regarding screws and bolts

### Body

The cylindrical part of the fastener that has the thread around it.

### Head

The top of the fastener, it can be countersunk or sit on top of the material. It usually is where the drive design element is that which drives or extracts the fastener)

### Pitch

The distance from one thread to the next along the length of the fastener.

### Shank

The smooth part of the bolt above the threads. This is also referred to as the body.

Screws have several different types of head as well. Through my research I have found that Cage utilises four different kinds of screw head. These are:

**Button**



**Round**



**Truss**



**Flat**



Flat – This is the most common type Cage uses, it is also known as a counter-sunk head. It is of a conical shape with flat outer face and tapering on the inner face, which allows it to sink into the material it is fastening to.

### **Carriage bolt or Coach Bolt**

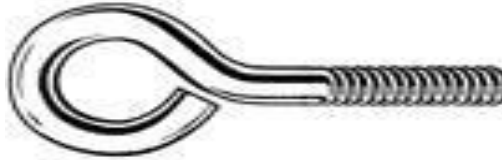


This has a domed or countersunk head, and the shaft is topped by a short square section under the head. The square section grips into the part being fixed (typically wood).

## Stove Bolt

Similar to above, but with a metal thread instead of a wood thread.

## Eye Bolt (Screw Eye/Eye Screw)



Screw with a looped head. Larger ones are sometimes called lag eye screws. Eye bolts are designed to be used as an attachment point, particularly for something that is hung. (Please note that Cage refers to these as Furniture Bolts). Typically a Furniture Bolt is a long thin bolt with an Allen key head, used for connecting large parts of furniture together.

## Measuring Screws and Bolts

### Gauge

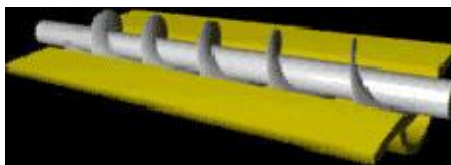
Cage specifies the type of screw by gauge number and length. To work out the gauge, the diameter of the head needs to be measured in sixteenths of an inch, subtracting one from that answer and doubling it. That is the gauge number.

For example:

If the head is a  $\frac{1}{4}$  of an inch, that then equates to four sixteenths;

Subtract one away and that equals three. Double the three, which is six and that gives the gauge number.

### Thread Count/Pitch Count



**Figure 22: An example of the thread on the shaft of a bolt or screw**

There are many systems for specifying the dimensions of screws, but it is likely that the system that Cage would have encountered is the Unified Thread Standard. This is the common system used in the USA. In the UTS system sizes of screws larger than a  $\frac{1}{4}$ " are designated as  $\frac{1}{4}$ " – 20,  $\frac{1}{4}$ " – 28,

etc. the first giving the diameter of the screw in inches and the second number giving the number of threads per inch.

In general screws and bolts are measured from where the materials surface is assumed to be, to the end of the fastener. So, for fasteners where the head usually sits above the surface, the measurement is from directly under the head to the end of the fastener. For fasteners that are designed to be countersunk, the measurement is made from the point of the head where the surface of the material is, to the end of the fastener. Exceptions to these rules are the eyebolt or eye screw which is measured from under the eye.

From the analyses conducted at the John Cage Trust, it was possible to measure the weight for each preparation. The table below highlights the weight of each of the preparations used by Cage in the Sonatas & Interludes, thus providing performers with a suggestion of how heavy each of their preparations should be.

Cage's description of preparation	Weight in grams
<b>Screws</b>	
<b>All screws, unless otherwise stated, Cage describes as 'flat head iron wood screw'</b>	
No. 9 x 1 ¾"	4
No. 10 x gauge ¾"	3 (6 rungs)
No. 10 x gauge 1 ½"	4
No. 11 x gauge 1"	3
No. 12 gauge x 7/8"	4 (7 rungs)
No. 12 gauge x 1"	4 (7 rungs)
No. 12 gauge x 1 ½"	6 (10 rungs)
No. 12 gauge x 1 ¾"	7 (11 rungs)
No. 12 gauge x 2"	8 (13 rungs)
No. 14 gauge x 1"	6 (6 rungs)
No. 14 gauge x 2"	9 (11 rungs)
Rd. Screw No. 10 x 1" long (rd head iron wood screw)	4
<b>Bolts</b>	
<b>Med Bolt</b> – 13 gauge 1 ½ long (washer head furniture bolt)	4

<b>Med Bolt</b> – 1 ¼ long (washer head furniture screw)	6
<b>Sm. Bolt</b> – 3/16 (carriage bolt x ¾ long)	3
<b>Furniture Bolt</b> – 8-32 x 1" (eye bolt or machine screw eye)	5
<b>Bolt</b> ¼ x 1 ½ (rd head iron stove bolt)	9
<b>LG Bolt</b> – 5/16 x 1 ½ (machine bolt)	18
<b>Nuts</b>	
Square Iron Nut	4

**Figure 23: Cage's descriptions of screw/bolts/nuts and their weight**

## 2.6: The Prepared Piano Works

The following section lists all of the prepared piano works in chronological order and divided into solo pieces, prepared piano pieces for two pianos and pieces composed after 1951. The first column in the following table describes the type of preparation used described by Cage in his table of preparations for each piece. The second column, titled 'Cross – Reference Position' denotes the relevant preparation that is located at the end of this chapter and contains a picture and the specifics of each preparation; each preparation has a letter which represents the measurements for that part of the preparation. This letter can be cross-referenced with the tables that follow the images of each of the preparations. Each of the preparations specified (unless stated) are measurements and pictures taken from the preparations used in Cage's *Sonatas and Interludes* which are housed at the John Cage Trust. The third column – notes to be prepared, refers to the pitch of the note to be prepared and the specific octave.

### 2.6.1: Solo Prepared Piano Works 1940-1950

#### ***Bacchanale* (1940)**

##### **Notes and Preparations**

Materials used for preparation	Cross – Reference Position	Notes to be prepared
Weather Stripping (Denoted as a fibrous material)	P	A3, Bb3, B3, C3, Db3, D3, Eb3, G3, Ab4, Bb4, C4
Small Bolt Screw with nuts	C H, F	F4 Bb4

Cage calls for the preparation of 11 different strings. 10 strings (all between strings 1-2) prepared with weather stripping. A small bolt to be placed between strings 2-3. A screw with nuts between strings 1-2 on the same strings as weather stripping situated between strings 2-3 (Bb4).

## First Performances

First performed at the Cornish School (Seattle, W.A), April 28<sup>th</sup>, 1940 as a dance accompaniment with Syvilla Fort dancing and John Cage playing prepared piano.

## Misc. Info

© Henmar Press Inc, 1960. Edition Peters, No. 6784. Also published in *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a [2000]. *Bacchanale* is circa six minutes and is dedicated to Syvilla Fort.

## Comments

Commonly known as the first occurrence of the prepared piano, *Bacchanale* was first performed at the Cornish Theatre, Seattle, Washington; April 28<sup>th</sup> and June 5<sup>th</sup> 1940, at the request for music to accompany the dance of the same name by Syvilla Fort with John Cage accompanying at the prepared piano. However, the Edition Peters catalogue<sup>184</sup>, compiled by John Cage and Robert Dunn from 1962 States that the piece was composed in 1938, whereas the manuscripts states 'Seattle, 1940'. Cage states in his writings, most notably in the introduction to Richard Bunger's text *The Well Prepared Piano* and re-published in his collection *Empty Words* in the chapter entitled '*How the piano came to be prepared*' that Syvilla Fort came to him three to four days before the performance to compose music for her dance *Bacchanale*. Therefore I would presume that it is likely that March 1940 is the date of the composition. The title page of the manuscript in John Cage's hand states: '*For Syvilla Fort*' and at the end of the score: '*Seattle, March 1940*'. The manuscript also details what appear to be the rehearsal times: Thurs after 1.10, Fri 10.00, Sat 10.00 and Sun lighting. One would expect the lighting to be done at the dress rehearsal (normally the day before) or less likely on the morning of the performance. The manuscript also states in Cage's hand '*For now for all normal screws use No.10, 1 ½, and for now for small screws use No.12 1.*' There is the possibility that Cage added these remarks after the first performance of *Bacchanale*, when he was recording it with Jeanne

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<sup>184</sup> J. Cage and R. Dunn, *John Cage*, New York, Henmar, 1962.

Kirstein who was the pianist on the first recording, as there is no table of preparations with the original manuscript.

*Bacchanale* also consists of nine pause bars in total. In the manuscript Cage has marked 'take 3' straight after the pause bar before the slow section begins. At the first pause bar of the slow section Cage adds '**hold???**'. Also, on bar 132 after the pause Cage writes '**take 5**'. The most likely reason for these pauses and Cage's comments is due to the style of the dance. At this point in the dance Fort was likely to strike and hold a pose, which must have been adhered to by Cage in the performance.

*Bacchanale* consists, generally, of a very thin texture. The predominant activity in the piece focuses on the left hand, which is dominated by a trill on A3 and Bb3, with the A being unprepared, but the Bb being heavily prepared, with strings 1-2 having weather stripping inserted between them, and strings 2-3 being prepared by a screw with nuts. Although Cage does intersperse the minimalist tendency of the trill with new ideas they are demonstrated very briefly and only act to break up the monotony of the trilling. Unless at a pause the longest notes in the piece are dotted quavers, and the piece is dominated by semi-quavers. There are a limited number of different pitches utilised in the composition of *Bacchanale* with no more than six.

*Bacchanale* can be divided into three main sections; fast, slow, fast or ternary A, B, A. The three main sections are subdivided further, as shown below, by the insertion of double bar lines. The phraseology of *Bacchanale* seems to alternate between the numbers 20 and 30, both of which form an axis around the number ten, with an extension created in the last phrase.

$$30+20+30+20+30+10+30+10+30+30+43^{185}$$

## ***Primitive (1942)***

### **Notes and Preparations**

Materials used in preparation	Cross – Reference Position	Notes to be prepared
Screws and bolts	H, E	A2, Ab3, C3, Db3, Ab4, D4, E4, F4, G4, A5, E5
Small Screws	K	E4, F4

<sup>185</sup> T. Levitz, Syvilla Fort's African Modernism and John Cage's Gestic Music: The Story of *Bacchanale*, *The South Atlantic Quarterly* 104(1): Winter 2005: p. 137.

Primitive is prepared with entirely metal preparations. Practically every note played is prepared, which demonstrates the limited number of pitches used in this piece. Cage calls for the preparation of 11 different strings.

## First Performance

*Primitive* was composed to accompany a dance by Wilson Williams<sup>186</sup> on December 24<sup>th</sup>, 1942 in New York.

## Misc. Info

© Henmar Press Inc, 1960. Edition Peters No. 66756. Also in published in *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a [2000]. *Primitive* is circa 4 ½ minutes.

## Comments

There is no table of contents, only Cage 'Performance Notes', and no definitive description of size or shape of mutes for preparations; Cage only supplies a generic term for the description, e.g. 'small screw'. He does, however, suggest the type of noise that he requires to be produced as a 'metallic sound'. The title page of the score also states 'for string piano'. This shows the direct link to Henry Cowell.

Cage also adds 'Play as usual on keyboard', which suggests that this may be the first for the instrument after *Bacchanale*, as Cage feels the necessity to describe how one would perform on the instrument as if it were a new invention.

*Primitive* is constructed of short sections, and features a simply melody again with the focus in the left hand, like *Bacchanale*, which consists of ostinato patterns and octave displacement. The simple melody becomes increasingly accented throughout, beginning with *legatissimo* to accents on practically every single note towards the end of the piece. The dynamics steadily increase throughout the piece from *p* to *fff*.

## In the Name of the Holocaust (1942)

### Notes and Preparations

Materials used in preparation	Cross – Reference Position	Notes to be Prepared
Screws or Bolts	H, E	Db2, D3, G3, D4, E6, F6, G6,

<sup>186</sup> Title page of the manuscript says 'music for the dance that was made by Wilson Williams'



Small Screws	M	A6 G3, A4
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*In the Name of the Holocaust* features the same preparations as *Primitive*, and consists of entirely metal preparations. A similar number of pitches are prepared with none different pitches. Cage calls for the preparation of 9 different strings, but gives no suggestion as to whether between strings 1-2 or 2-3.

## First Performances

*In the Name of the Holocaust* was first performed on February 14 1943, at the arts Club of Chicago in Chicago, Illinois, to a dance by Merce Cunningham, with Jean Erdman dancing and John Cage at the piano.<sup>187</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No.66756, edited by Richard Bunker. Also published in *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a [2000]. *In the Name of the Holocaust* is circa 3 ½ minutes and was completed on Boxing Day (December 26) 1942.<sup>188</sup>

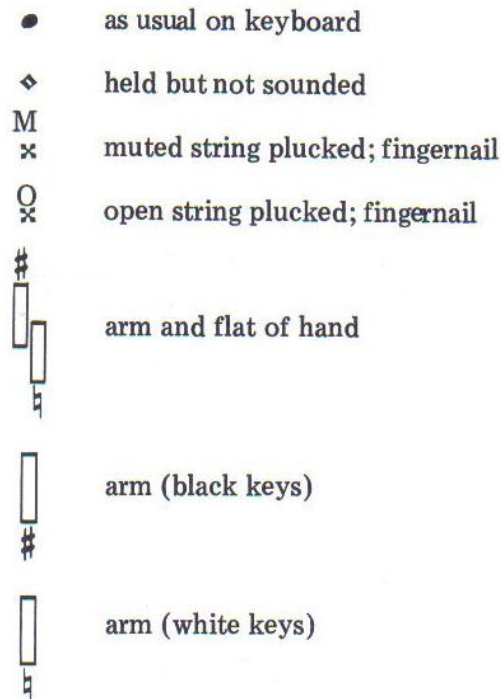
## Comments

The Music was composed for the dance of the same name by Merce Cunningham.<sup>189</sup> There is no table of contents, only Cage 'Performance Notes', and no definitive description of size or shape of mutes for preparations; Cage only supplies a generic term for the description, e.g. 'small screw'. He does, however, suggest the type of noise that he requires to be produced as a 'metallic sound'. This is the first and only prepared piano dance accompaniment in which Cage uses extended keyboard techniques, again harking back to his influence from Henry Cowell.

<sup>187</sup> Merce Cunningham Dance Company Archive: A Complete Chronology: [www.merce.org.archive\\_chronology.html](http://www.merce.org/archive_chronology.html).

<sup>188</sup> D. Revill, p. 82.

<sup>189</sup> In an interview between Cage and Leng Tan on the DVD *'Margaret Leng Tan: Sorceress of the New Piano and The Maverick of The Piano: Two films by Evans Chan* (Mode Records, Mode 194: 2008), Leng Tan suggests to Cage that the title of *In the Name of the Holocaust* relates to the Holy Spirit and War, Cage replies in his typical tongue in cheek manner that he hadn't thought of that but if that's what she thinks then it must be true.



**Figure 24: Performance instructions from *In the Name of the Holocaust* (Copyright © (1977) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved**

David Revill suggests that the identity of this piece comes from Cage's 'appreciation of the chaos of war, and a belief in personal relationships as its antidote.'<sup>190</sup> Revill also draws connections from the title with the word Holocaust being coupled with a phrase that is linked to the Holy Ghost. Dianova believes that the title (along with several of Cage's other prepared piano titles) derives from James Joyce's *Finnegans Wake*, in which the sentence taken from the Wake reads 'In the name of the former and of the later and of their holocaust. Allmen.'<sup>191</sup> Dianova also suggests that the term 'holocaust' had not been used as a term to describe the treatment of Jews by the Nazi's until December 5, 1952 in a newspaper article; this was three weeks before the completion of Cage's piece.<sup>192</sup>

With this in my mind, it is interesting to look at the effects created by the preparations and music. The music begins quietly with muted strings, but quickly becomes articulated with large quantities of notes accented with *ffz* particularly with G4 and A4 in the bass being prepared with bolts and screws, and accompanied with large forearm clusters, creating the imagery of exploding bombs and holocaust.

<sup>190</sup> D. Revill, p. 82.

<sup>191</sup> T. Dianova, *John Cage's Prepared Piano: The Nuts and Bolts*, Canada, Mustasis Books, 2008, p.101.

<sup>192</sup> *Ibid.*

## And the Earth Shall Bear Again (1942)

### Notes and Preparations

Material used for preparation	Cross – Reference Position	Notes to be prepared
Small Screw	M	F#4, E4, C#4, Bb4
Bolt	E	F#4, E4, Bb3
Large Screw	J	F3
Long Bolt	D	C3
Two thickness of woollen material	R	G2-C2 – Over 1 under next etc
Large Piece of Bamboo		Between C1-C#1
Piece of Plastic	K	A1 & B1 under Bb1
Screw	H	C#4, Bb4

Cage calls for the preparation of 15 different strings. 10 preparations between strings 1-2 prepared with small screw, large screw, bolt, long bolt, bamboo, plastic and wool. Four preparations are to be placed between strings 2-3; screw and bolt. Cage also introduces a new instruction where he asks for the preparation (long bolt and bamboo) to 'touch the sounding board of the piano', greatly altering the effect of the normal sound of the preparation.

*And the Earth Shall Bear Again* is prepared with mostly metal, which focus on the centre pitches of the keyboard. Cage introduces some new materials in this piece wool, bamboo and plastic. The new preparations focus on the bass register of the piano.

### First Performance

Music for the dance first danced by Valerie Bettis, December 6 1942 at the 92<sup>nd</sup> YHMA; NY City<sup>193</sup>

### Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6811. Also published in *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a [2000]. *And the Earth Shall Bear Again* is circa 3 minutes.

### Comments

The notation for preparation is more precise in *And the Earth Shall Bear Again* with columns describing the preparations for strings 1-2 and strings 2-3. Cage denotes in this piece the notes that are left unprepared or as he describes them, open. All preparations are given an accurate preparation distance from the damper in inches. This process would soon become common practice in the prepared piano music of Cage. This appears to be the first example of such descriptive

<sup>193</sup> <http://www.johncage.info/index2.html> accessed 30/05/2011

notation. *And the Earth Shall Bear Again* could be divided into three sections A, B, A with a mini coda, and subdivided again by Cage with double bar lines, as shown below.

The middle section bars 64-77 is the most interesting as it utilises prepared notes in the bass register with the left hand (long bolt) and non-prepared notes in the treble register in the right hand. The mini coda also incorporates the same prepared and unprepared notes.

Cage also utilises a similar trill in the left hand similar to earlier prepared piano pieces prepared with a long bolt touching the sounding board, while the right hand accents break up the monotony.

## Totem Ancestor (1942)

### Notes and Preparations

Materials used for preparations	Cross – Reference Position	Notes to be prepared
Screw or bolt	H, E	C6, F5, C5, F4, D4, C4, Bb4, Eb3
Screw with nuts (free to rattle)	H, F	G4
Double weather stripping	P	Bb3, A3

The preparation of *Totem Ancestor* in this 2005 version of the score is not as elaborate as previous prepared piano pieces, and is prepared with predominantly metal preparations. This is because it has been simplified in the editing stage by Margaret Leng Tan in a bid to make it more accessible for performers to obtain the correct preparations. (The original preparations can be found in the laban-notated version below). Between strings 1-2 wood Cage requires only weather stripping. Between strings 2-3 he requires the remaining metal preparations. In the manuscript of *Totem Ancestor* Cage writes 'preferably metal washers on screw between screw head and strings.' He also qualifies: 'place strings (bolts) or nails between the strings of the following.' Although this may not initially seem interesting, it demonstrates how Cage experimented (improvised) with the preparations and sounds.

*Totem Ancestor* is also published separately in Laban dance notation by Lena Belloc. The score consists of the symbols associated with Laban-notation, but it also consists of the prepared piano music and preparation table. The preparation table is extremely interesting. The published version appears in Cage's infamous neat handwriting, including the table of preparations, but this table is extremely detailed. Initially there is a simple sketch of the strings of a piano, highlighting where the

strings, dampers and keyboard begins. It also describes where the preparations should be placed. The table describing the preparations is also very detailed, describing and naming the exact type of material and its size, for instance instead of just 'screw' as appears in the original manuscript there is 'wood screw #14 2"' and 'Wood screw #9 2" with square nut ¼ - 20.' The other major difference is the measurement from the dampers. In the original score Cage states that they should be 'circa 2"', but in the Laban score he changes these to 1" and 1 ½". The preparations listed below are suggestions made from the *Sonatas and Interludes* 'kit'.

Materials used for preparations	Cross – Reference Position	Notes to be prepared
Wood Screw #14 2"	J	C6, F5
¼" Stove Bolt	B	C5
Wood Screw #9 2" with Square Nut ¼ - 20	H, F	G5
8/32 Machine Screw	K	G5
¼" Stove Bolt 2"	B	F4, D4, C4, Bb4, Eb4
Weather Stripping (N.B. not Double.)	P	Bb3, A3

In this version Cage asks for 11 strings to be prepared. Between strings 1-2 wood screw #9 and weather stripping. Between strings 2-3 he requires the remaining metal preparations.

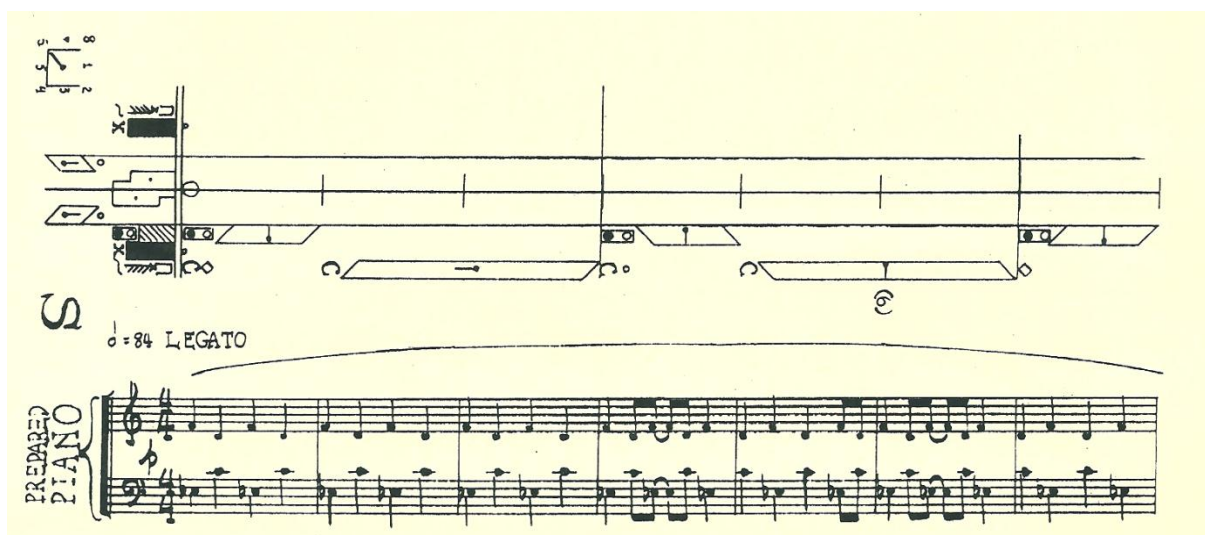


Figure 25: *Totem Ancestor* – Laban Notation (Copyright © by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved)

## First Performance

Studio Theatre, New York City, October 20<sup>th</sup> and 21<sup>st</sup>, 1942<sup>194</sup>

<sup>194</sup> Merce Cunningham Dance Company Archive: A complete Chronology

## Misc Info

© Henmar Press Inc, 2004. Edition Peters No. 6762. Also published in, *John Cage Works for Piano, Prepared Piano and Toy Piano Volume 4: 1933-1952*, No. 68030, [2005] edited by Margaret Leng Tan. *Totem Ancestor* is circa 2 minutes and is dedicated to Merce Cunningham. Laban Notation Version Edition Peters No. 6762A.

## Comments

*Totem Ancestor* is the first piece that Cage applied the term 'Prepared Piano' and stopped using the term 'String Piano' used by Henry Cowell.<sup>195</sup> The choreography by Merce Cunningham is the only choreography that still exists from the 1940s. The phraseology of the piece corresponds to that of the dance. The version prepared by Margaret Leng Tan in the 2004 Peters Edition is an 'amalgam of the C. F. Peters previously published version from 1960 with a more detailed 1942 manuscript version of the score made to synchronise with the Laban-notated dance score.'<sup>196</sup> The Laban score also includes a unique diagram of how to prepare the strings for this piece.

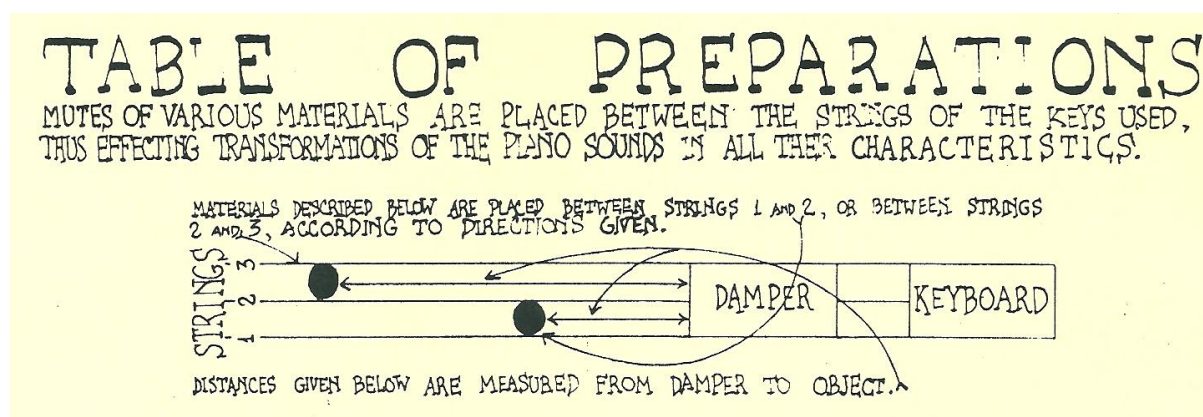


Figure 26: *Totem Ancestor* – Laban Notation – Preparation Diagram

## Our Spring Will Come (1943)

### Notes and Preparations

Materials and Preparations	Cross – Reference Position	Notes to be Prepared
Bamboo strips ½" in width	O	Under D3, over Cb3 & Eb3, under F3, G3 & A3 Over F#3, G#3, A#4, under Ab4, Bb4, Cb4
Screw with two nuts	H, F	over A4, B, C#4 F4, Ab5, E5, C6

<sup>195</sup> R. Bunker, Prepared Piano: The First 40 Years, p. 83.

<sup>196</sup> J. Cage, *Works for Prepared Piano and Toy Piano, Volume 4, 1933 -52*, ed. M. Leng Tan, New York/London Edition Peters, 2005 , p. iii.

<b>Screw</b>	H	G5, C6
<b>Hook screw</b>	I	G5
<b>Bolt</b>	E	F4, Ab5, E5

In the manuscript the preparation ‘screw with two nuts’ originally calls for ‘screw with nuts’. The manuscript describes ‘mutes for grand piano’. This is interesting with respect to what Bonnie Bird has said, that Cage originally prepared on an upright piano. He states that the preparations in this piece are specifically for a grand piano, where the previous prepared piano pieces do not have any specifications. Cage calls for the preparation of 20 different strings. 8 strings prepared with bamboo, screws and screws with nuts between strings 1-2. Bolt, hook screw and screw with two nuts to be placed between strings 2-3. The metal preparations focus on the higher pitches of the piano and the wood prepares the lower pitches of the piano.

## First Performance

Originally composed to accompany a dance of the same name by Pearl Primus.<sup>197</sup> The probable first performance was 23<sup>rd</sup> April, 1944 at the 92<sup>nd</sup> Street YHMA (New York, NY) with Sarah Malament (piano) along with recitation of the poem by Langston Hughes about the condition of black people in the United States (c.f. program, Dance Collection, NYPL)<sup>198</sup>

## Misc. Info

© Henmar Press Inc, 1977. Edition Peters No. 66763. Also published in, *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a, [2000]. *Our Spring Will Come* is circa four minutes.

## Comments

Dianova recounts a story of Cage and Primus’ first meeting for the composition of *Our Spring Will Come*:

When she was creating [the solo] she grunted and hummed, whispered, sang, and spoke as she gave herself to movement. John Cage came along to watch. When Pearl took time out, he opened the grand piano and affixed his pocketful of clamps and assorted hardware to certain strings like a plumber installing pipe joints. The “composition” that resulted was an uncanny percussive equivalent of Pearl’s dialogue with herself.<sup>199</sup>

<sup>197</sup> Manuscript says ‘Music for the dance by Pearl Primus’ and NYC 1943.

<sup>198</sup> [www.catalog.nypl.org](http://www.catalog.nypl.org) accessed 30/05/201

<sup>199</sup> T. Dianova, p. 113.



The manuscript also states that it was edited in 1977 by Richard Bunger. When I asked Richard about his editing he said:

I tried to be as faithful as possible to the manuscripts in helping CF Peters prepare the pieces for publication. I clarified some ambiguities and created cleaner manuscript copies by hand (which you probably saw at the NYPL) to help the publisher. The final publications still contain some mistakes that their copyists never corrected because they didn't give me the opportunity to proof their work. Most notably, there is a full page of measures missing (!! ) in the piano part of one of the pieces, as proven by the corresponding percussion part and an analysis Cage's rhythmic structure!! These measures ARE included in my recording of the piece made at Capitol Records in LA but not yet released (25 years later!!!). Because of the time lapse since then, I'd have to go back into my archives to figure out which piece this is. My vague memory tells me it's in the first movement of a piece for piano, percussion (and voice?).<sup>200</sup>

The Motivation behind Primus' choreography often revolved around oppression, racial issues and prejudice, and the theme behind *Our Spring Will Come* is no different. In a review from Dance Magazine in November 1944 Virginia Kelly writes a review of a performance given by Primus that incorporated *Our Spring Will Come*:

It is reassuring to find a sincere young artist, Pearl Primus, getting the break she deserves...in a ten-day run at the Belasco Theatre. In a day when we have such sophisticated and distorted interpretations of both the primitive and the Negro point of view, it is of immeasurable value to see the real thing presented by a gifted young dancer who has a beautiful personality and amazing technical equipment with which to tell her story. The half of the program devoted to the modern American Negro expresses all the charm, richness, sweetness and heart-rending tragedy of the race. These include: "Negro Speaks of Rivers," "Slave Market," "Strange Fruit," "Study in Nothing," "Rock Daniel," "Mischievous Interlude," "Hard Time Blues," and "Our Spring Will Come."<sup>201</sup>

*Our Spring Will Come* is a fragmented piece. Of particular interest is the long held note A5 unprepared accompanied in the left hand with accented prepared G4, Ab4 and Bb4 with bamboo.

## Amores – Movements I & IV (1943)

### Notes and Preparations

Materials used in preparations	Cross – Reference Position	Notes to be prepared
Screw	H	B5, C5, Eb5, E5, Eb7
Rubber	G	E4, A5, B7
Two Screws, one with loose nuts	H, F	G4, F#5
Bolt	E	F2, G2, Db, A4, Bb4, E4, B5

<sup>200</sup> Interview with the author

<sup>201</sup> [www.thefreelibrary.com/Reviews+of+the+century-2053980470](http://www.thefreelibrary.com/Reviews+of+the+century-2053980470) accessed 30/05/2011



Movements one and four of *Amores* have 18 keys prepared in total, with nine screws, eight bolts, two nuts and three strips of rubber. In the performance instructions to *Amores* Cage mentions that if a screw is 'too small in diameter, an undesired metallic buzz will occur when the proper key is played' Cage also comments in these instructions on the use of bolts in the lower registers 'because of their greater diameter, necessary in muting their longer strings to achieve the desired result: a sound resonant, rich in harmonics and free from metallic buzzing.' Interestingly Cage specifies alternatives if the correct material for muting cannot be found 'if rubber cannot be obtained, absorbent paper or cloth, folded several times, may be substituted', as long as the sound produced is a thud rather than rich in harmonics.

## First Performance

Museum of Modern Art, 11 West 53<sup>rd</sup> Street, New York, February 7<sup>th</sup> 1943, with John Cage at the prepared piano.<sup>202</sup> *Amores* was choreographed by Merce Cunningham and performed in Paris, June 10 1949.<sup>203</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6264. (N.D). Movements I and III of ***Amores*** are circa nine minutes and is dedicated to Rue Shaw.

## Comments

***Amores*** consists of four movements. I and IV are for prepared piano solo, and II and III are for percussion quartet. Cage gives detailed instructions at the beginning of the piece. This is the first prepared piano piece where Cage describes a desired result. He says 'an instrument having convincingly its own characteristics, not even those suggesting a piano, must be the result.' Although Cage does specify that position and size of mutes are to be determined by experiment, it does appear that Cage hints at his preferred effect. In an interview with a reporter from the New York Times Cage said that *Amores* is 'intended to arouse, shall we say, the feelings of love.'<sup>204</sup> Revill makes the suggestion that the piece has a direct link to Cage's later interest in the philosophy of Asia by

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<sup>202</sup> J. Cage and R. Dunn, *John Cage*, p. 33.

<sup>203</sup> Merce Cunningham Dance Company Archive: A complete Chronology

<sup>204</sup> D. Revill, p. 83.

expressing a 'combination a combination of the erotic and the tranquil, two of the permanent emotions of traditional Indian wisdom.'<sup>205</sup>

## ***Tossed as it is Untroubled* (1943)**

### **Notes and Preparations**

<b>Materials used for preparation</b>	<b>Cross – Reference Position</b>	<b>Notes to be prepared</b>
Large screw	J	C5, Eb5
Small screw	K	C5, Eb5
Weather stripping (fibrous material)	P	E3, A4, Bb4, Db4, Eb4
Screw wrapped with weather stripping	H, P	Eb2

*Tossed as it is Untroubled* has eight prepared notes in total, predominantly prepared with weather stripping. The other notes prepared C5 and Eb5 are heavily prepared with large and small screws, however, they do not appear in the piece as much as the weather stripping.

### **First Performance**

The first performance was given Studio Theatre New York City April 5 1944 with John Cage and Merce Cunningham.<sup>206</sup>

### **Misc Info**

© Henmar Press Inc, 1960. Edition Peters No. 6722. Also published in, *John Cage Prepared Piano Volume 1: 1940-1947*, No. 67886a, [2000]. *Tossed as it is Untroubled* is circa three minutes and is dedicated to Merce Cunningham.

### **Comments**

*Tossed as it is Untroubled* is also known as *Meditation*, at some point it took the name of the dance *Tossed as it is Untroubled* choreographed by Merce Cunningham. Cage describes the piece as 'a

<sup>205</sup> *Ibid.*

<sup>206</sup> Merce Cunningham Dance Company Archive: A complete Chronology

lively dance in periodic rhythm written in the rhythmic structure 7 times 7. The piano preparation is not elaborate.<sup>207</sup>

## ***A Room* (1943)**

### **Notes and Preparations**

<b>Materials used for preparations</b>	<b>Cross – Reference Position</b>	<b>Notes to be prepared</b>
Long bolt	D	E $b$ 4, F4
Large bolt	B	D4, E4
Penny	S	D3
Weather stripping	P	D3
Rubber	G	G5
Bolt	E	F4
Bolt with rubber	E, G	E4
MED. Bolt	A	D4, E $b$ 4

*A Room* is prepared almost exclusively with metal, apart from the use of rubber on one note. There are eight different prepared tones in total. *A Room* introduces the use of a penny (US Penny). In the UK the closest coin that could be used is the five pence piece. *A Room* can be performed with or without preparations.

### **Misc Info**

© Henmar Press Inc, 1968. Edition Peters No. 6790. Also published in, *John Cage Piano Works: 1935-1948*, No. 67830,[2000]. *A Room* is circa two minutes.

### **Comments**

*A Room* is the third part of an unfinished work '*She is Asleep*'. Details of positioning for pitch of preparations are given in alto clef in the separate publication, the only prepared piano piece to do so, but in the later published collection it is in the treble clef. *A Room* was composed in New York.

The music is written entirely on a single stave, notated in the alto clef and has *ppp* as its dynamics for the entirety of the piece

<sup>207</sup> J. Cage and R. Dunn, p. 16.

The rhythmic structure of the piece is allocated 2(4, 7, 2, 5, 4, 7, 2, 3, 5).<sup>208</sup>

## ***A Valentine out of Season (Music for Xenia to play on a prepared piano) (1944)***

### **Notes and Preparations**

Materials used for preparations	Cross – Reference Position	Notes to be prepared
Rubber	G	Bb
Weather stripping	P	D, Eb, F
Slit bamboo	O	Gb
Bolt	E	G, A, B, C
Penny	S	D, Eb
Large bolt	B	F
Wood	Q	Gb

As this piece was composed for Cage's then wife Xenia to perform on a grand piano the preparation used in *A Valentine Out of Season* are not extensive, with only nine different tones prepared. However, each note is prepared with two preparations located at different positions along the string. There are two distinct sounds produced by the preparations; one metallic, rich in harmonics and the other a thud like sound produced by the less rich tones of weather stripping and rubber. Interestingly metallic and non-metallic are located at opposite ends of the strings.

### **First Performances**

Premiered on December 19<sup>th</sup>, 1948 at the Carnegie Recital Hall in New York performed by John Cage.<sup>209</sup>

### **Misc Info**

© Henmar Press Inc, 1960. Edition Peters No. 6766. *A Valentine out of Season* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *A Valentine out of Season* is circa three minutes and is dedicated to Xenia Cage.

### **Comments**

*A Valentine out of Season* was written for Xenia before the couple divorced, and was composed in New York. The piece was later utilised for the dance by Merce Cunningham called *Effusions avant l'heure* and subsequent versions are entitled *Games* and *Trio*, all appeared in 1949. Cage notes that

<sup>208</sup> John Cage, *A Room*, (New York: Edition Peters, N.D.), p. C.

<sup>209</sup> J. Cage and R. Dunn, p. 19.

‘difficulties of preparation and performance were intentionally avoided.’<sup>210</sup> There is no octave specified for the positioning of the preparations, as there had been in the previous two pieces, but positioning regarding the distance from the damper is accurate to within 1/8 of an inch. The clue to the relatively simple directions can be found in the title. It was a piece for Xenia to play, who, one would presume, didn’t have as much experience at preparing pianos and John Cage might have done.

## ***Root of an Unfocus* (1944)**

### **Notes and Preparations**

<b>Materials used for preparation</b>	<b>Cross – Reference Position</b>	<b>Notes to be prepared</b>
<b>Screw</b>	H	B5, A#6, B6, C#6
<b>Long Bolt</b>	D	Bb2, D3, F3, B4
<b>Weather stripping</b>	P	D3, F3

*Root of an Unfocus* consists almost exclusively of metal preparations with two occasions of weather stripping. Bolts are placed in the bass register of the piano and screws in the treble register, all positioned between strings 2-3. Two occasions occur when Cage also requires a long bolt touching the sounding board. Cage requires weather stripping inserted between strings 1-2. The preparation style is almost identical to *Totem Ancestor*, with predominantly metal preparations and two occasions of weather stripping. Incidentally, this is the first occasion where Cage specifies the distance from the damper as ‘end of string’. The screws occur rarely and only in the treble end of the register and in a small cluster.

### **First Performances**

First performed on April 5<sup>th</sup> 1944 at the Studio Theatre, New York, to a dance of the same name by Merce Cunningham.<sup>211</sup>

### **Misc Info**

© Henmar Press Inc, 1960. Edition Peters No. 6743. *Root of an Unfocus* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Root of an Unfocus* is circa four minutes and is dedicated to Merce Cunningham.

<sup>210</sup> John Cage, *A Valentine out of Season* (New York, Edition Peters, 2000).

<sup>211</sup> J. Cage and R. Dunn, p.17.

## Comments

*Root of an Unfocus* can be divided into three major sections with a coda. Section one comprises of seven parts which consists of seven bars each, and is dominated by D3 and F3 in the left hand prepared by bolts. Section two comprises a sparse middle section with frequent alternating of  $\frac{3}{4}$  and  $\frac{4}{4}$  prepared again with bolts on D3 and F3. The third section revolves entirely around D3 and F3 alternating minims again prepared with a bolt and a long bolt on displaced octaves Bb3 and Bb4. Rhythmic structure is that corresponding to the dance by Merce Cunningham. Cage describes the piece as 'dramatic in character'.<sup>212</sup>

## *Prelude for a Meditation* (1944)

### Notes and Preparations

Materials used for preparation	Cross – Reference Position	Notes to be prepared
2 Stove bolts (1/4" and 1 1/2")	B	C3, A5
2 Wood screws (No. 12 1 1/2" long)	J	A6, E6

*Prelude for a Meditation* is a tiny piece, the shortest of all the prepared piano pieces. It consists of four notes and a very simple rhythm consisting predominantly of semi-breves. Each of the four notes are prepared with metal preparations. The pedal is held throughout. When the left and right hand play together they perform in unison. All preparations are placed between strings 2-3. This is the first piece where Cage specifies precisely the size and type of preparation that should be used for preparing the piano. Dianova believes that of the four notes (apart from A5) 'belong to the initial part of the Fibonacci sequence on A from the second octave'.<sup>213</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6742. *Prelude for a Meditation* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Prelude for a Meditation* is circa one minute.

## Comments

The rhythmic structure of *Prelude for a Meditation* is 5 times 5.<sup>214</sup> *Prelude for a Meditation* is the shortest of all the solo prepared piano compositions, consisting of a single page of music, as the title

<sup>212</sup> *Ibid.*

<sup>213</sup> T. Dianova, p. 122

<sup>214</sup> J. Cage and R. Dunn

would suggest it has a meditative quality conjured through the static chords and depressed sustain pedal; the metallic sounding preparations give the feeling of a Buddhist calling to prayer and the gong like bells used to call worshippers. The music has been described as similar to Satie and is considerably different to the energetic dance and percussive pieces that Cage had previously composed. It leads one to believe that a 'silent prayer' is beginning to develop in the thinking of Cage.

## ***Spontaneous Earth* (1944)**

### **Notes and Preparations**

<b>Materials used for preparations</b>	<b>Cross – Reference Position</b>	<b>Notes to be prepared</b>
<b>Screw with weather stripping cover</b>	H, P	E1, C#1, B1
<b>Bolt</b>	E	G2
<b>Long bolt</b>	D	Bb3, G3, D3
<b>2 Screws</b>	H	B3
<b>Weather stripping</b>	P	Ab4
<b>Large screw with rubber ring</b>	J, T	A4
<b>Large bolt</b>	B	Db4, G4
<b>Screw</b>	H	A4
<b>Small slit of bamboo</b>	O	G4

*Spontaneous Earth* is predominantly prepared with metal, along with weather stripping, a rubber ring and bamboo. The preparations are focused around the bass end of the keyboard. There are two alternating sections in *Spontaneous Earth* consisting of all bass notes in the first section and bass and treble notes in the second section; the second section also brings in the appearance of large bolts.

### **First Performance**

First performed 5<sup>th</sup> April, 1944, at the Studio Theatre, New York, to a dance of the same name by Merce Cunningham.<sup>215</sup>

### **Misc Info**

© Henmar Press Inc, 1960. Edition Peters No. 66753, edited by Richard Bunger. *Spontaneous Earth* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Spontaneous Earth* is circa three minutes.

<sup>215</sup> Merce Cunningham Dance Company Archive: A complete Chronology

## Comments

*Spontaneous Earth* is based around the bass register of the piano. The music has little development and is very repetitive; there is little use of the sustaining pedal compared to other prepared piano pieces. Dianova believes that the title derives from the E.E. Cummings poem 'O Sweet Spontaneous Earth'.<sup>216</sup> However, Revill believes that the titles from the pieces in 1944 are 'an allegory of (a) pivotal moment in his development,<sup>217</sup> the pivotal moment being the breakdown of his marriage to Xenia leading to separation in 1945 and other orientations made in Cage's personal life.

## *The Perilous Night* (1944)

### Notes and Preparations

Materials used in preparations	Location	Notes to be prepared
Rubber	G	E5 (15ma), B5 (15ma), E6, B6, F#4
Weather stripping	P	D6, Ab6, E5, Bb5, E4, D4, G3, D3
Screws and nuts	H, F	D6, Bb5, Ab5, G4, Db4
Screw	H	B6
Bolts and nuts	E, F	Ab6
Bolt	E	E5, Eb4, F3, D3
Small bolt	C	Db5
Bamboo slit	O	Eb4, F3
Double weather stripping	P	Db4, Bb4
Screw and rubber washer	H, T	Bb4
Screw and weather stripping	H, P	F2, D2, Bb2, Ab2
Wood and cloth	Q, L	E1 & F1

Although *The Perilous Night* is extensively prepared with 25 notes prepared in total; 11 of those strings prepared twice, the sonic effect of the piece falls largely into the non-metallic sounding, and this is due to the large amount of preparations involving weather stripping. Metal and non-metal preparations, however, are located close together on the same string.

### First Performance

First performed at the Studio Theatre, New York City, April 5<sup>th</sup> 1944, with John Cage at the piano.<sup>218</sup>

### Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 66753. *The Perilous Night* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *The Perilous Night* is circa twelve

<sup>216</sup> T. Dianova, p. 121.

<sup>217</sup> D. Revill, p. 84.

<sup>218</sup> J. Cage and R. Dunn, p. 17.



minutes. It has six movements. Movement I is circa two minutes and 30 seconds long, II is circa one minute long, III is circa four minutes and 20 seconds long, IV is circa one minute and 20 seconds long, V is circa 50 seconds long and VI is circa three minutes and 30 seconds long.

## Comments

*The Perilous Night* is the first large-scale concert work for prepared piano. Cage adds a note which does not appear in any other prepared piano score: 'these measurements apply to a Steinway L, M, O, A or B'.<sup>219</sup> The piece has twenty-six prepared notes. In an interview with Daniel Charles, Cage comments that the materials chosen for preparation. He tells of the advice his mother had given him 'that the effects would be better if I put natural things in the piano'.<sup>220</sup> The title of the piece takes its name from an Irish Folktale that Cage had read from a collection of myths by Joseph Campbell. The story concerned 'a perilous bed which rested on a floor of polished jasper'.<sup>221</sup> The piece was written at a time when Cage was experiencing issues in his personal life, and so he also comments that 'the music tells of the dangers of the erotic life, the misery of "something that was together and is split apart" and "the loneliness and terror that comes to one when love becomes unhappy"'.<sup>222</sup>

## *The Unavailable Memory of (1944)*

### Notes and Preparations

Materials used in preparation	Cross – Reference Position	Notes to be prepared
Wood	Q	F1
Screw and weather stripping	H, P	Bb2
Weather stripping	P	Bb3, F2
Rubber	G	Eb3

*The Unavailable Memory of* consists of one metal preparation combined with weather stripping; weather stripping dominates the preparations. Cage does not specify between which strings the preparations should be positioned. The numbers of pitches in this piece are extremely limited and can all be located in the bass register of the piano.

<sup>219</sup> John Cage, *The Perilous Night* (New York: Edition Peters, 2000), p. 59.

<sup>220</sup> J. Cage, *For the Birds*, p. 38.

<sup>221</sup> D. Revill, , p. 85.

<sup>222</sup> *Ibid.*

## First Performance

*The Unavailable Memory* was first performed at the Studio Theatre, New York City, April 5<sup>th</sup> 1944, with John Cage at the piano.<sup>223</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 66764, edited by Richard Bunker. *The Unavailable Memory of* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000].

*The Unavailable Memory of* is circa two minutes.

## Comments

*The Unavailable Memory of* is a limited piece of music. It is composed predominantly in the mid register of the bass of the piano. However, there is a striking F an octave below the stave prepared with wood. The piece was composed for a dance of the same name by Merce Cunningham and the personality of the piece lies heavily within the dance. Dianova states that Cunningham describes the dance as a Waltz which is 'an important detail to consider, since the musical score offers no tempo or character indications.'<sup>224</sup>

## Triple Paced (Second Version) (1944)

### Notes and Preparations

Materials used for preparations	Cross – Reference Position	Notes to be prepared
Cloth	L	Insert cloth between strings of white keys only G5-G6 8VA, G3-G4, G1-G2 8BA

The only preparation used in *Triple Paced* is a piece of cloth that is to be inserted between the strings of white keys only. The result would be a thud sound, similar to a piece of folded paper or thin piece of rubber.

## First Performance

Studio Theatre, New York City, April 5<sup>th</sup> 1944, John Cage and Merce Cunningham<sup>225</sup>

<sup>223</sup> Merce Cunningham Dance Company Archive: A Complete Chronology

<sup>224</sup> T. Dianova, p. 106.

<sup>225</sup> Merce Cunningham Dance Company Archive: A Complete Chronology

## Misc Info

© Henmar Press Inc, 2004. *Triple Paced* (Second Version) is published in *John Cage Works for Piano, Prepared Piano and Toy Piano Volume 4 1933-1952* No. 68030, [2004], edited by Margaret Leng Tan. *Triple Paced* (Second Version) is circa two minutes.

## Comments

'The 1<sup>st</sup> and 2<sup>nd</sup> versions of *Triple-Paced* (1943 and 1944 respectively) were made for dances by Merce Cunningham. Besides containing different material, they are also timbrally distinct from each other. Version 1 drawing on keyboard and string glissandi and version 2 relying on muted strings. Both versions, however, contain the same number of bars and share an identical metric structure.'<sup>226</sup>

Dianova draws attention to the being three clear sections in this one movement piece. In the first section there are two elements that are explored and consistently alternated; repeated major chords in the outer register of the piano, and ascending and descending diatonic (mixolydian) scales, regular or broken into steps of thirds. The second and third section of *Triple-Paced No. 2* explores the same pitch material in different rhythms and paces.<sup>227</sup> *Triple Paced No. 2* is the only solo prepared piano piece that is spread over three staves.

## Daughters of the Lonesome Isle (1945)

### Notes and Preparations

Materials used for Preparations	Cross – Reference Position	Notes to be prepared
Small Bolt + nut(s)	C, F	D3, E3
Bolt	E	D3, D#3, E3, C4, F4, G4, A5, B5
Rubber	G	D3, D#3, E3, F#3, G3, B4, C#4, E4, F#4, G#4, C5, C#5, D#5
Screw and nuts	H, F	D#3, D5
Long bolt	D	F3, F#3, 4, A#5
Large bolt	B	G#3, A4, A#4
Thick screw		G#5, C#6
Typewriter bolt	I	D4, D#4, F#5
Small bolt	C	A#5, C6
Medium bolt	A	C5, D#6
Thin bolt		D5, D#5, G5
Screw	H	C#5, E5, F5, F#5, G5, G#5, A6, A#6, B6, C6, D6, D#6, E6

<sup>226</sup> John Cage, *Works for Prepared Piano and Toy Piano, Volume 4, 1933 -52*, p. iii.

<sup>227</sup> T. Dianova, p. 119.

*Daughters of the Lonesome Isle* is extensively prepared with 39 prepared notes and twelve preparations. This work is a metallic prepared piece with a lone instance of a rubber preparation. Strings 1-2 are prepared with rubber, small bolt and rubber, screw with nuts, screw, long bolt, medium bolt and a thin bolt. Strings 2-3 are prepared with bolt, long bolt, large bolt, typewriter bolt, thick screw, thin bolt, small bolt and medium screw.

## First Performance

John Cage, Sarah Lawrence College, Bronxville, New York February 27<sup>th</sup> 1946. Music to the dance by Jean Erdman.<sup>228</sup>

## Misc Info

© Henmar Press Inc, 1979. Edition Peters No. 6785. *Daughters of the Lonesome Isle* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Daughters of the Lonesome Isle* is circa twelve minutes.

## Comments

Cage describes this piece as a piece of atmospheric character, conventionally notated. Its phraseology is that of the dance by Jean Erdman for which it was written<sup>229</sup>

The themes and choreography of the piece are portrayed by three identically dressed dancers that represent aspects of the female psyche; the mother, the youthful virgin and the woman of experience.

The Jean Erdman archivist describes the dance and Cage's accompanying music:

The movement themes are an amalgam of world cultures from Hawaiian hula to Brazilian samba, and are developed musically, intertwining like a Bach fugue. The commissioned score by John Cage utilizes his ground breaking prepared piano, which changes a solo prepared piano into an exotic sounding orchestra. The costumes, designed by Erdman and executed by Elizabeth H. Parsons, highlight the hourglass form of the female figure. A striking example of Erdman's choreographic approach in which expressive content emanates from the interweaving of changing dynamic rhythms and textures, this work has been described by former Balanchine ballerina, Violet Verdy as "a jewel of true modernism."<sup>230</sup>

## Mysterious Adventure (1945)

### Notes and Preparations

Materials used for preparations	Cross – Reference Position	Notes to be prepared
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<sup>228</sup> J. Cage and R. Dunn, p. 16.

<sup>229</sup> *Ibid.*

<sup>230</sup> [www.jeanerdmance.com/Repertory\\_Daughters.html](http://www.jeanerdmance.com/Repertory_Daughters.html)

<b>Rubber</b>	<b>G</b>	E $b$ 3, E3, F3, F#3, G3, A $b$ 4, A4, B $b$ 4, B4, C4, D $b$ 4, D4, E $b$ 4, E4, F4, F#4, G4, A5, B5, E5, F#5, A6, B6, E $b$ 6
<b>Screw</b>	<b>H</b>	G3, D $b$ 4, D4, E4, F4, F#4, G#5
<b>Screw with nut</b>	<b>H, F</b>	G#5
<b>Big bolt</b>	<b>B</b>	E $b$ 3, G3, A $b$ 5, B $b$ 5
<b>Thin bolt</b>	<b>D</b>	E4
<b>Wood</b>	<b>R</b>	E $b$ 4
<b>Long bolt</b>	<b>D</b>	F#3, D4
<b>Rubber-wrapped wood with bolt</b>	<b>G, E</b>	A $b$ 4
<b>Medium bolt</b>	<b>A</b>	D $b$ 4
<b>Small bolt</b>	<b>C</b>	A4
<b>Bolt</b>	<b>E</b>	A4, A $b$ 4, F3

*Mysterious Adventure* has 27 notes prepared in total. The preparations are mostly metallic apart from the addition of the rubber which prepares the largest number of notes and rubber wrapped wood. The metal preparations consist mostly of bolts.

## First Performances

First Performed in New York 9<sup>th</sup> January 1945 at Hunter Playhouse, New York City to a dance of the same name by Merce Cunningham.<sup>231</sup>

## Misc Info

© Henmar Press Inc, 1979. Edition Peters No. 6787. *Mysterious Adventure* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Mysterious Adventure* is circa eight minutes.

## Comments

The piece is divided into five short movements; played without a break, however. The delineation of sections is marked with rehearsal letters instead of double bar lines as in previous solo prepared piano pieces. Dianova links the title to Irish mythology and compares it to *Daughters of the Lonesome Isle* which was composed in the previous month.<sup>232</sup> The texture of the piece is quite sparse and the limitation of different preparation objects does not offer any distinctiveness in the timbral texture either. The structure follows the rhythmic structure given to Cage by Merce Cunningham.

## Sonatas and Interludes (1946-1948)

<sup>231</sup> J. Cage and R. Dunn, p. 17.

<sup>232</sup> T. Dianova, p.129.

## Notes and Preparations

Materials used for preparation	Cross – Reference Position	Notes to be prepared
Screw	H	A4, Bb5, F5, F#5, A6, C6, C#6, E6, F6, F#6, G6, Ab7, Bb7, C#7, Eb7, E7, F7, A8
Med. bolt	A	Ab4, Bb4, B6, A7, G7
Sm. bolt	C	D7
Furniture bolt + 2 nuts	I, F	F6
Furniture bolt	I	Db5, D5, G#5, Eb6, C7
Rubber	G	Ab4, Bb4, B4, C4, Db4, D#4, G4, G#4, Bb5, Eb5, E5, G#5
Plastic	K	D4, D#4, G4, G#4
Screw + 2 nuts	H, F	F6
Screw + nuts	H, F	A4
Long bolt	D	G3
L.G. bolt	B	G3, A4
Bolt	E	D3, Ab4, B4, C4, Db4, B5, C5
Screw + rubber	H, G	D3 (8va 6as)
Eraser (Am Pencil Co. S346)	N	D3 (16va 6as)

The preparations for the *Sonatas and Interludes* are the most extensive used for any of the solo prepared piano pieces. There are 14 different types preparations used and 45 notes prepared in total; 15 strings with two or more preparations attached to them. The *Sonatas and Interludes* is one of the only solo prepared piano pieces that do not use weather stripping at all. Higher registers are prepared with metallic objects and lower with rubber or eraser, due to the diameter of the lower strings.

## First Performances

Maro Ajemian, Town Hall NYC April 14<sup>th</sup> 1946 (4 Only)

John Cage Black Mountain College Black Mountain NC Spring 1948<sup>233</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6755. *Sonatas and Interludes* are circa seventy minutes and is dedicated to Maro Ajemian

## Comments

The *Sonatas and Interludes* is largely considered Cage's magnum opus for the instrument, and a masterpiece of pianistic writing in its own right. It finally drew Cage to the attention of the concert going American public, as the critic for the New York Times commented at the premiere, the 'work left

<sup>233</sup> John Cage and Robert Dunn, p.17.

one with the feeling that Mr Cage is one of this country's finest composers and that his invention has now been vindicated.<sup>234</sup> The National Academy of Arts and Letters awarded Cage a thousand dollar prize for 'having extended the boundaries of musical art.'<sup>235</sup> Cage states that the formation of the idea to compose the *Sonatas and Interludes* came after a remark by a friend called Edwin Denby who believed that:

short pieces can have in them just as much as long pieces can, led me two years ago to start writing twenty short *Sonatas and Interludes* which I have yet to finish. They have all been written in my new apartment on the East River in Lower Manhattan which turns its back on the city and looks to the water and the sky. The quietness of this retreat brought finally to face the question: to what end does one write music? [...] We began to read the works of Ananda K Coomaraswamy and we met Gita Sarabhai who came like an angel from India.<sup>236</sup>

It was through Sarabhai, (whom had approached Cage for lessons in Western counterpoint, and whom Cage had agreed if Sarabhai taught him about Indian music), that Cage believed he discovered the true purpose of music, to 'sober and quiet the mind, thus rendering it susceptible to divine influences,'<sup>237</sup> Cage's alliance with Sarabhai took him on a journey into Indian philosophy; beginning with the copy of *The Gospel of Sri Ramakrishna*, as a gift from Sarabhai. The introduction into Indian philosophy led Cage to discover *The Transformation of Nature in Art and the Dance of the Shiva* by Coomaraswamy, which enabled Cage to link spirituality and art intimately and thus influence his musical thinking, and that art should 'imitate nature in her manner of operation.'<sup>238</sup> The link between art and spirituality presented itself in the *Sonatas and Interludes* as Cage attempted to express in music the permanent emotions of Indian tradition; the heroic, the erotic, the wondrous, the mirthful, sorrow, fear, anger, the odious and their common tendency toward tranquillity.

The structure of the *Sonatas and Interludes* is the first to utilise fractionised numbers in the micro-macrocosmic structure, Cage would say of the composing of the *Sonatas and Interludes* that:

only structure was organized, quite roughly for the work as a whole, exactly, however, within each single piece. The method was that of considered improvisation (mainly at the piano, though ideas came to me at some moments away from the instrument. The materials, the piano preparations, were chosen as one chooses shells while walking along a beach. The form was as natural as my taste permitted; so that where, as in all of the *Sonatas* and two of the *Interludes*, parts were to be repeated, the formal concern was to make the progress from the end of a section to its beginning seem inevitable.<sup>239</sup>

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<sup>234</sup> J. Pritchett, *The Music of John Cage*, p. 35.

<sup>235</sup> C. Tomkins, p. 103.

<sup>236</sup> J. Cage, *A Composers Confessions*, p. 41.

<sup>237</sup> C. Tomkins, p. 99.

<sup>238</sup> J. Pritchett, *The Music of John Cage*, p. 37.

<sup>239</sup> J. Cage, 'Composition as Process' in *Silence* English Ed., London: Calder and Boyars, 1968, p. 19.

## ***Music for Marcel Duchamp (1947)***

### **Notes and Preparations**

Materials used for preparation	Location	Notes to be prepared
Rubber	G	D5
Weather Stripping	P	D3, E3, F3, A4, Bb4, Db4, Db4
Small Bolt	C	D5

Music for Marcel Duchamp is predominantly prepared with weather stripping which mutes the one melodic line in the piece. The piece explores the use of silence, when rests punctuate the single melodic passage. However, the silences are not true silences as the sustain pedal is held throughout the piece, and therefore, for instance in bar 8, a weather stripping prepared Db carries on into bars 9 and 10.

### **First Performances**

Performed by William Masselos 1948, and later choreographed by Merce Cunningham.<sup>240</sup>

### **Misc Info**

© Henmar Press Inc, 1979. Edition Peters No. 6728. *Music for Marcel Duchamp* is also published in *John Cage Prepared Piano Volume 2: 1940-1947*, No. 67886b, [2000]. *Music for Marcel Duchamp* is circa five minutes.

### **Comments**

*Music for Marcel Duchamp* was written for film 'Dreams That Money Can Buy' by Hans Richter, a surrealist film that consists of sections designed by different artists. Cage composed the music for the Duchamp designed section, hence the title of the music. The large scale structure of *Music for Marcel Duchamp* is based on 11 sections of 11 bars (11 x 11 extended), with the rhythmic structure of 2, 1, 1, 1, 3, 1, 2, 1. The original score was written in the alto clef. Cage states that 'the performance depends on the sustaining of resonances with the pedal.'<sup>241</sup> This piece although quite short and frugal in preparations and music development, demonstrates Cage's maturity at composing for the instrument. It is a piece that could be described as reserved and 'classy'.

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<sup>240</sup> J. Cage and R. Dunn, p. 16.

<sup>241</sup> *Ibid.*



## Works of Calder (1949-1950)

### Notes and Preparations

Materials used for preparation	Location	Notes to be prepared
Long bolt	D	G3, Bb4
Octagonal bolt	B	Ab4
Bolt	E	A4, C4, C#4, D4, Eb4, E4, Gb4, Ab4, Bb5, C5, C#5, E5, Bb6, C#6, Eb5 (15ma)
Screw	H	A4, Ab5, E5, F5, Eb6, A6(15ma)
Bamboo	O	Bb4, B4, C4, G4, bb5
Short bolt		B4
Rubber	G	C4, Eb4, E4, A5, E5, Fs5, G5, A6, D6
Weather stripping	P	C#4, D4, A5
Hook		Eb4, F4
Wood	Q	A5
Furniture bolt	I	D5
Small bolt	C	Eb5, C6
Screw eye	I	Ab6, B6, B7

The scale of preparation is on par with the *Sonatas and Interludes*. It is entirely notated on one stave.

The idea of silence as an integral part of composition, instead of just rests, is carried on in Works of Calder as it was in Music for Marcel Duchamp. The measurements of the preparation were originally intended for use of a Steinway model O.<sup>242</sup>

### First Performance

Woodstock 1951 with John Cage at the prepared piano<sup>243</sup>

### Misc Info

© Henmar Press Inc, 2004. *Works of Calder* is published in *John Cage Works for Piano, Prepared Piano and Toy Piano Volume 4 1933-1952* No. 68030, [2005], edited by Margaret Leng Tan. The film that *Works of Calder* accompanies is circa 20minutes.

### Comments

In 1949 the Swiss filmmaker, Herbert Matter, approached Cage to provide the music for his documentary vignette on Alexander Calder. *Works of Calder* won the prize for the best musical score at the First Art Film Festival in America, held in Woodstock, New York, in September 1951, the music that accompanied the film was performed by Cage himself. *Works of Calder* was previously

<sup>242</sup> John Cage, *Works for Prepared Piano and Toy Piano, Volume 4*, p. v.

<sup>243</sup> *Ibid.*

unpublished. In the published edition Margaret Leng Tan describes the relationship between the plot of the film and the prepared piano music:

Part I of the tri-partite film (...) focuses of a young boy's discovery of the natural universe. In the middle section the boy happens upon Calder working in his studio (...). In keeping with Calder's activity, the prepared piano timbres have given way to percussive metal sounds enhanced by discreet electronic effects. Cage may have improvised the percussion interlude; in any event, no score survives. In part III the prepared piano's rhythmically structured sequences complement the elegant movement of Calder's mobiles and constellations now seen in natural surroundings, suggesting a parallel between the play of natural movement in part I and those of the mobiles (...) With regard to the score itself, the vertical dotted lines showing the nine eighth-note subdivisions of the bars have been preserved as in the original manuscript. This published version remains faithful to Cage's spatial configuration with the exception of page 69, the beginning of the fourth system, page 73, the end of the fourth system. On account of the density of material, the 9/8 measure that previously occupied the single system is now divided into two systems of four and five eighth note subdivisions.<sup>244</sup>

## 2.6.2: Music for Two Prepared Pianos

The music that Cage wrote for two prepared pianos was exclusively for the Julliard trained American enigmas Robert Fizdale and Arthur Gold. It is a commonly held belief that Fizdale and Gold modernised music for two pianos and they became great advocates of music for two pianos by some of the leading contemporary composers of their time including, along with Cage, Samuel Barber and Francis Poulenc. Although both Fizdale and Gold lived well into the 1990s, Gold began to develop problems with his hands and so the two began a career as TV cooks.

### *A Book of Music (1944)*

#### Preparations and Notes [PIANO ONE]

Materials used for Preparation	Location	Notes to be Prepared
Rubber	G	D6, G#5, B5, C5, Eb3
Penny	S	A6, A5, D4
Weather Stripping	P	F5, E5, G4, E4, D#4, D4, Bb4, A4, G3,
Wood	Q	B5, E4, C4, F3
LG Bolt	B	Ab5, C#4
Screw	H	F#4, F4
Bamboo Wedge	O	F#4
Bolt		F4
Slit Bamboo	O	C4, F3
Bolt with Weather Stripping	E,	G1

<sup>244</sup> John Cage, *Works for Prepared Piano and Toy Piano, Volume 4, 1933 -52*, pp. iv – v.

## Preparations and Notes [PIANO Two]

Materials used for Preparation	Location	Notes to be Prepared
Slit Bamboo	O	D6,
Wood	Q	D6, Bb4, A4, F2
Bolt	E	C6, C4
Rubber	G	A6, E5, A5, G4, F#4,
Penny	S	G#5, F5, D#4
Screw	H	C5, B5
Weather Stripping	P	C5, F4, E4, D#4, C4, Bb4, A4, G3, F3
Bamboo Wedge	O	B5
LG Bolt	B	F4
Long Bolt	D	F2

*A Book of Music* was composed in New York City, May - August, 1944<sup>245</sup>

Although *A Book of Music* has a similar array of preparations as *The Unavailable Memory Of* and *The Perilous Night* (composed at the same time), it is unlike the previous pieces, being virtuosic in terms of how it is prepared. Each preparation is located at the same distance on the string for each piano, but each preparation required is a different material. Interestingly, Cage also makes a comment on the score about working with the penny and wedge preparations: 'measure to center of penny and axis of wedges; to edge of other mutes'<sup>246</sup>

Piano One in *A Book of Music* is prepared with 23 prepared notes and ten preparations. This work is largely equal in terms of the metallic and non-metallic materials it is prepared from. Piano Two in *A Book of Music* is prepared with 21 prepared notes and ten preparations.

Cage would later write about *A Book of Music* that *A Book of Music* was less concerned consciously with my personal feelings,<sup>247</sup> and:

The *Book of Music* was [...] concerned with my idea about Mozart, that his music strictly adheres to these different kinds of scales: the chromatic, the diatonic, and that consisting of the larger steps of thirds and fourths [...] The two pianos are prepared at the same points on the strings but with different materials [...] The absence of harmony in my music frequently suggests to the listeners oriental music. Because of this the *Book of Music* was used [...] with the hope of convincing the natives [of the South Pacific] that America loves the Orient.<sup>248</sup>

<sup>245</sup> J. Cage, *A Book of Music*, Edition Peters No. 6702 (N.D).

<sup>246</sup> Ibid.

<sup>247</sup> J. Cage, *A Composer's Confessions*, p. 40,

<sup>248</sup> Ibid.

Pritchett notes that the work is formed 'almost entirely of different types of scales and arpeggios' and although Cage varies the repetition with different patterns, Pritchett ultimately feels the piece is too busy and therefore becomes 'taxing'.<sup>249</sup>

## First Performances

January 21, 1945 at the New School for Social Research in New York, performed by Robert Fizdale and Arthur Gold.

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6702 (N.D). *A Book of Music* is circa thirty minutes.

Part I is circa twelve minutes and part II is circa eighteen minutes

## Comments

Commissioned by and dedicated to Robert Fizdale and Arthur Gold. Cage adds an extra note to the performer 'Measure to the center of penny and axis of wedges; to the edge of other mutes'<sup>250</sup>. *A Book of Music* is divided into two parts. Part one is further subdivided into four smaller parts that Cage delineates with a double bar line. Part one has a rhythmic structure of 2:3:2:3 and 2:7:2:3:3 delineated by rehearsal numbers and a tempo of minim = 60. Part Two is also subdivided, this time into three smaller sections. Section one begins on page 21, section two on page 28 and section three on page 56. Section one has a tempo of minim = 176 and the rhythmic structure can be worked as 5:21:5:7 and 5:21:5:7:7, once again Cage delineates these with rehearsal markers. Section two also has a tempo marking of minim = 176. Cage intersperses the second and third sections with five short miniatures for the pianists to alternate, these have a slower tempo marking of minim = 132; Cage composed three miniatures for the secondo pianist and two for the primo pianist. Section three has a tempo marking of minim = 176. Cage mentions that:

the number of sections is 31 and each section has 31 measures except when the tempo changes. The number of measures the changes accordingly, thus showing that actual time-lengths is the basis of this plan rather than arbitrary numerical relationships.<sup>251</sup>

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<sup>249</sup> J. Pritchett, *The Music of John Cage*, p. 28.

<sup>250</sup> J. Cage, *A Book of Music*, Edition Peters No. 6702 (N.D).

<sup>251</sup> J. Cage, *A Composer's confessions*, p.40.

## Three Dances (1945)

### Preparations and Notes [PIANO ONE]

Materials used for Preparation	Location	Notes to be Prepared
Thin Bolt	C	E6, C5, A5,
Bolt	E	E6, C5, Bb5, G3, F3
Long SM Bolt	C	C6, E5, B5
Furniture Bolt	I	B6, A6, E5, D5.
MED Bolt	A	G#5
SM Bolt	C	G5, Db5, A5
SM Screw + Nut	K, F	G5
MED Bolt + 2 Nuts	A, F	G5
SM Screw	K	F5
LG Screw	J	F5, Ab5
Screw	H	Db5, G4, F4, D4, A4, E3
Rubber		B5, Bb5, Ab5, G4, F#4, F4, D#4, D4, C4, B4, A4, G3, F#3, E3, Ab3, G2, F2, A1
Penny	S	F#4, E4, D#4, C4, B4, G3, F#3
Weather Stripping	P	Db4, Bb4, Ab4
Screw + Nut	H, F	Db4, Bb4, Ab4
Screw + WS	H,	Ab3, G2
Screw + Nuts + WS	H, F,	F2, A1
LG Bolt	B	E3
Plastic	L	D2

### Preparations and Notes [PIANO TWO]

Materials used for Preparation	Location	Notes to be Prepared
Thin Bolt	C	Eb6, F#4, Eb4
Long SM Bolt	D	Eb6, A5,
Rubber (thin)	G	D6, C#6, C6,
Rubber	G	G#5, F#5, E5, D5, C#5, B5, A5F#4, E4, Eb4, Db4, D4, C4, Bb4, Ab4, F3, A1
SM Bolt	C	D6, C6, F#5,
Screw	H	C#6, B6, A6, G#5, Eb5, D5, B5, Db4, C4, Ab4
Screw + Nut	H, F	C#6, F#5, B4,
SM Screw	K	B5
Furniture Bolt	I	Bb5, F5, C5, F4
Screw + Nuts + WS	H, F,	E5, F4
MED Bolt	A	E5, A5
Bolt	E	C5, G4, F#4, F4, E4, Eb4, Db4, C4
Penny	S	C#5, D4,
Typewriter Bolt		B5
Weather Stripping	P	B4, A4
LG Bolt	B	Bb4, F3
SM Bolt + Nuts	C, F	A4
Long Bolt	D	Ab4
Screw + WS	H,	A3, D2, C#2
Plastic	L	A1

*Three Dances* were composed in New York City, December 1944 - October 1945<sup>252</sup>.

There are 36 notes on each piano prepared with an extensive array of preparations required. The final dance provides great effect by mixing prepared sounds with unprepared sounds. This is the first occasion where Cage asks for two thicknesses of rubber, initially Cage asks for rubber thin in his instructions and then changes to just rubber. This could suggest two things; one – Cage got tired of writing the word ‘thin’ after the word rubber each time or two; he actually wanted a different thickness of rubber. Both possibilities have been highlighted. However, I believe Cage would have stipulated two different thicknesses of rubber if he did require this (as he has done with two thickness of woollen material in *And the Earth Shall Bear Again*); therefore, the initial suggestion is the mostly likely.

## First Performances

December 11, 1946 at the Carnegie Chamber Music Hall in New York City, performed by Maro Ajemian and William Masselos<sup>253</sup>

## Misc Info

© Henmar Press Inc, 1977. Edition Peters No. 6760 *Three Dances* are circa twenty minutes.

## Comments

Commissioned by Robert Fizdale and Arthur Gold

The third of the *Three Dances* opens with a quotation from Virgil Thomson's Symphony on a Hymn Tune. The main theme is derived from the hymn 'How Firm a Foundation, with another hymn Yes, Jesus Loves Me featuring prominently also, (Cage mentions that due to the preparations Thomson never recognised this fact).<sup>254</sup> *Three Dances* was also choreographed by Merce Cunningham in 1947 and titled *Dromenon*; it premiered at the Hunter Playhouse in New York City on 14 December 1947.<sup>255</sup>

In the *Three Dances* Cage sets about developing his rhythmic structuring schemes. He wanted to 'compose works in which such tempo changes do not destroy the structural proportions (in pieces like

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<sup>252</sup> J. Cage, *Three Dances*, Edition Peters No. 6760, (N.D).

<sup>253</sup> <http://www.johncage.info/workscage/3dances.html> - accessed - 14/04/2011

<sup>254</sup> J. Cage, *Composer's Confessions*, p. 41.

<sup>255</sup> <http://www.johncage.info/index2.html> - accessed - 18/04/2011

the First Construction (in Metal) the tempo remains constant throughout). When the tempo changes the phrase lengths change as well, becoming longer as the tempo increases and shorter as it decreases.<sup>256</sup> Therefore when the tempo is minim = 88 the rhythmic structure us 2, 3, 2: 2, 6, 2 : 2, 7, 2.<sup>257</sup>

### 2.6.3: Prepared Piano Works Composed After 1950

There are two solo prepared piano pieces and a *Concerto* for Prepared Piano and Chamber Orchestra composed after 1950. However, the style of composition is different to the prepared piano pieces that precede them. Beginning with the *Concerto for Prepared Piano and Chamber Orchestra* Cage begins to utilise chance methods and the I Ching as a means of composition. Both *Two Pastorales* and the number pieces 31'57.9864" and 34'46.776" utilise chance based techniques in their composition; for this reason, this thesis does not include them in its analysis. However, below is a brief synopsis of each piece.

#### *Two Pastorales* (1951)

##### Preparations and Notes

Materials used for Preparation	Location	Notes to be Prepared
Stove Bolt (flat head) 21/4 x 5/16	B	E4
Cup point set screw 3/4 x 1/4	U	Eb4
US Penny	S	D4
Stove Bolt (round head) 1 1/2 x 3/16	C	Db4
Cup point set screw 3/4 x 3/8	U	C4
U bolt 2 x5/16	V	
Machine screw (oval head) 3/4 x 6/32	A	F#2, D2
Strip of canning rubber	G	Db4
Oval Hd. Machine Screw 3/4 x 6/32	A	C4

*Two Pastorales* has a very accurate description of the type of preparation Cage specifies. In this piece Cage specifies two new preparations that have not been used in the solo prepared piano music previously – cup point set screw and U bolt. Cage requires the use of a cymbal beater as well, the

<sup>256</sup> J. Pritchett, *The Music of John Cage*, p. 28.

<sup>257</sup> <http://www.johncage.info/index2.html> - accessed - 18/04/11

stick, he states 'may be used where 'wood' in the first *Pastorale* and a bass drum stick, two whistles and a 25 cent piece for the pizzicato on page 21 for the second *Pastorale* is notated.'<sup>258</sup>

## First Performances

David Tudor, Cherry Lane Theatre, New York City, February 10<sup>th</sup>, 1952<sup>259</sup>

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6765(2) (N.D). *Two Pastorales* are circa fourteen minutes.

## Comments

The *Two Pastorales* are dated November 9<sup>th</sup> 1951 and January 31<sup>st</sup> 1952.<sup>260</sup> The first *Pastorale* served as an accompaniment to a dance entitled Idyll by Merle Marsicano which was performed at the YMCA at Lexington and 92<sup>nd</sup> from the date given on the score.

The notation of durations is in space where 2 ½ cm = a quaver. The composing means involved chance operations derived from the I Ching. The Second *Pastorale*, though using the same fairly simple piano preparations, also makes use of two whistles [when, relate to music of changes, describe preparations]. The rhythmic structure of both *Pastorales* is 2, 3 ½, 5 ½ expressed in changing tempi. The instructions given by Cage at the beginning of the score are extremely detailed; Cage adds in the score that 'a number repeated at the succeeding structural point indicates a maintained tempo, Accelerandos and ritards are to be associated with the structure, rather than with the sounds that happen in it.'<sup>261</sup> The score is notated in space where 2 ½ cm represents a crotchet. Cage also notates with extreme detail the pedal markings; detailing all the variations he requires within the piece. Cage re-uses a technique he hadn't used since the composition of *In the Name of the Holocaust*, where he indicates tone clusters as in the works of Cowell, and he also uses the technique of depressing keys without sounding them. *Two Pastorales* is notated in space/time notation.

## Concerto for Prepared Piano and Chamber Orchestra (1951)

### Notes and Preparations

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<sup>258</sup> J. Cage, *Two Pastorales*, Edition Peters No. 6765(2) (N.D), p. III.

<sup>259</sup> J. Cage and R. Dunn, p. 19.

<sup>260</sup> J. Cage, *Two Pastorales*, p. III.

<sup>261</sup> *Ibid.*



Materials used for Preparation	Location	Notes to be Prepared
Screw	H	C8, E7, B7, Eb6, C6, F#5, F5, E4
Bolt	E	Eb6, C6, A#6, A6, G5, D5, C#5, C5, B5, A#5, G#4, F#4, F4, E4, D4, B4, G#3, F3, D3, C#3, G#5, G#5
Furniture Bolt	I	E5, A5, F#3
Stove Bolt	B	D#5, F#4, E4, D4
Headless Bolt	U	B5
Rubber	G	B5, D#3
Longer Bolt	B	A5
Black Bolt	A	D#4
Bolt on Wood on SB	E	D#4
Thinner Bolt on WS on SB	P	C#4
LG Bolt on WS on SB	P	C#4
Felt	R	C#4
Penny	S	C#4
Plastic Bridge	L	C#4, C4, B4, A#4, A4, G#3, G3, F#3
SM Bolt	C	F#3
LG + Long Bolt	B	E3
Short Bolt	C	E3
Rubber Bolt	W	A3, G#2, F#2, B2, F2, C#2
Bolt in Thin Rubber Casing	E	A2, Ab2, G1, Gb1, F1, E1
Plastic	L	F1-Gb1
Bolt with Rubber	E, G	A1-Bb1
Bolt with WS	E, P	

The *Concerto* is scored for Solo Prepared Piano, Piccolo, Flute, Oboe, Cor Anglais, two Clarinets, Bassoon, French Horn, Trumpet, Tenor Trombone, Bass Trombone, Tuba, four percussionists playing glockenspiel, xylophone and electronic devices including buzzer, radio, amplified coil of wire and a recording of a generator,<sup>262</sup> Celesta, Harp, and full string section.<sup>263</sup>

The look of the score is different to all of Cage's other prepared piano scores. Compared to others it is rather 'messy' and Cage also uses a different pen compared to his previous scores. One could speculate that this had something to do with Cage's emotional state when composing this piece of music; during a stressful time in his life. As Silverman points out as Cage was composing the *Concerto* he had:

[...] in mind *The Perilous Night*. He put into the piece some of the anguish at the time over his breakup with Xenia, but discovered listening to it heard "a woodpecker in a church belfry" In a society where people moved in different directions speaking different languages, he wondered could he speak personally but understandably through music?<sup>264</sup>

Cage set about trying to answer this question through the movements of the *Concerto*.

<sup>262</sup> J. Pritchett, From Choice to Chance p. 55

<sup>263</sup> J. Cage, *Concerto for Prepared Piano and Chamber Orchestra*, Edition Peters No. 6706 (N.D).

<sup>264</sup> K. Silverman, p.100.

The *Concerto* is the only piece where Cage actually stipulates which rung of the screw that the performer should wind the preparation down to. From the research conducted in chapter three we can decipher that Cage required a sonorous sound. This occurs when the screw is wound down further. The *Concerto* also contains the first instance of the use of a preparation that Cage describes as 'Plastic Bridge'. However, he does not give a reference to what the plastic bridge is in any description at all; even Bunker's Well-Prepared Piano makes no reference to this preparation. James Pritchett quotes a letter from Cage to Boulez from 1950, saying

The piano preparation has many microtonal pitch relations, brought about by an object, the height of which can be controlled, that rests of the sounding board and becomes a bridge (making the strings other and similar lengths).<sup>265</sup>

Dianova encountered similar problems with her first performance of the *Concerto*; asking the Steinway piano technician who had been assigned to assist her in preparing the piano for performance he said '[...] the piano just like the other string instruments, has a bridge, and so the object would have to resemble that bridge and be positioned in a similar fashion'.<sup>266</sup>

Dianova goes on to explain:

I had a small plastic ruler [...] We patiently trimmed the ruler to fit under the exact number of strings indicated, [...] then the piano technician, with the help of a pair of special, very thin pliers, slowly started tilting it upwards until it was perpendicular to the strings [...].<sup>267</sup>

## First Performances

There are conflicting arguments regarding the first performance of the *Concerto*. The earliest date is given as January 24, 1952 at a concert in New York City (part of the Music in the Making Series), with David Tudor playing the prepared piano and the chamber orchestra conducted by David Broekman. However an alternative date can be found as October 12, 1952 at Cooper Union in New York, again performed by David Tudor.<sup>268</sup> A third event is given by David Revill with Cage himself as the soloist premiering the *Concerto* at Julius Hartt School of Music in Hartford, Connecticut alongside the Hartt Chamber Orchestra under the direction of Moshe Paranov, no date is given for the performance, however.<sup>269</sup>

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<sup>265</sup> James Pritchett From Choice to Chance pg.55

<sup>266</sup> T. Dianova, p. 148.

<sup>267</sup> *Ibid.*

<sup>268</sup> <http://www.johncage.info/index2.html> - accessed - 18/04/2011

<sup>269</sup> D. Revill, p. 131.

## Misc Info

© Henmar Press Inc, 1960. Edition Peters No. 6706 (N.D). The *Concerto for Prepared Piano and Chamber Orchestra* is circa twenty-two minutes.

## Comments

The *Concerto for Prepared Piano and Chamber Orchestra* is dated February 1951 (NYC)<sup>270</sup>.

The *Concerto* followed the composition of the String Quartet in Four Parts in which Cage concentrated heavily on the use of gamuts of sound:

I have finished my Quartet. 4 parts: quietly flowing along, gently rocking, nearly stationary and Quodlibet. It uses a gamut of assorted sounds, single and accords, which are always played on the same strings of the instruments. There is no counterpoint and no harmony. Only a line in rhythmic space. (2 ½ :1 ½ 2 : 3 6 : 5 ½ :1 ½ ). Now I shall start work on the *Concerto* for Prepared Piano, percussion orchestra and strings plus perhaps a few of the other instruments.<sup>271</sup>

The three movements in the *Concerto* are based around a 'power struggle' between the piano and the orchestra; Cage creates this by using a 14x6 grid in a checker board combination of sounds (which in the String Quartet were described as gamuts of sounds), 'there are 2 such charts (one for the orchestra & one for the piano) bringing about the possibility of 'given' relationships',<sup>272</sup> between the piano and orchestra. In a letter to Boulez, Cage would describe the process he used in the composition of the *Concerto*:

[There are] 14 different sounds produced by any number of instruments [...] constitute the top row of the chart and favour (quantitatively speaking) the flute. The second row in the chart favors the oboe and so on. [...] I made moves on this chart of a "thematic nature" but, as you may easily see, with an "athematic" result.<sup>273</sup>

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<sup>270</sup> J. Cage, *Concerto for Prepared Piano and Chamber Orchestra*

<sup>271</sup> J-J. Nattiez, *The Boulez-Cage Correspondence*, p. 55.

<sup>272</sup> Ibid., p.78.

<sup>273</sup> Ibid., p.93.

In the first movement the struggle is noticed in the abstract as Cage uses the systematic procedure to compose the orchestral part but freely composes the piano part with no chart. The entire first movement only uses two moves, 'e.g. down 2, over 3, up 4 etc.'<sup>274</sup>

In the second movement, the disparity between the piano and orchestra is closed as the piano part is composed with the use of a chart, also having the same number of elements as the orchestra. However the chart is utilised through the means of a series of circles that diminish in size which Cage sometime draws on the sounds of the orchestra and sometimes on the sounds of the piano. This method begins to highlight the path to chance composition and diminishes the composers' choice as was employed in the first movement.

Cage set aside the completion of the *Concerto* before he started the third movement in order to compose the Sixteen Dances for Cunningham. However, by the time he returned to the piece Christian Wolff had presented Cage with a copy of the I Ching (Chinese Book of Changes) as a thank you for teaching him composition for free. Christian Wolffs' parents, Kurt and Helen Wolff owned the publishing House Pantheon Books, and also published a series of works called the Bollingen Series, that included an English translation of the I Ching. Cage was intrigued by the similarity of his grid technique used in the first two movements and the organisation of the hexagrams in the I Ching (64 (8X8 hexagrams). Cage used the I Ching by utilising three coin tosses, for instance:

[...] if 3 heads appear it is a 6 (☰) (female moving towards male; if 2 heads & a tail, it is a 7 (☲) (male not moving) [...] I then established that the piano was male and the orch. Female and proceeded by tossing coins found what sounds [...] remained from the charts of the second movement and which ones [...] had to be freshly invented [...]<sup>275</sup>

This unites both orchestra and piano, (the only time we hear both playing together); bringing together two parts that were at once opposed to one another; one might suggest parallels to Cage's life also. What is essential to understand about the last movement is the transition between what Cage had been considering as freedom (the accretion of habits and tastes) to a new freedom concerning sounds only; an idea that would dominate Cage's oeuvre for the rest of his life and bring about the composition of such significant pieces of music like the *Music of Changes* and 4'33". Cage would go on to clarify his feelings to Daniel Charles:

The *Concerto for Prepared Piano and Chamber Orchestra* is an example of the lack of resolution I felt at that time, around 1950-1951, between letting the aggregates of sounds emerge by themselves, by the technique of direct inscription onto the diagrams. And continuing to experiment with my own personal

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<sup>274</sup> Ibid.

<sup>275</sup> Ibid., p. 94.

tastes. These are the two poles of that *Concerto*. [...] at that moment I had decided to accept rather than seek to control. [...] At the same time I grant more and more space to silences. Which may signify that I ceased being a composer. The silences speak for me, they demonstrate quite well that I am no longer there.<sup>276</sup>

As William Brooks mentions 'it is a small step in practice, though a large one philosophically, to substitute for the discipline of systematic moves on charts the discipline of chance operations.'<sup>277</sup>

The tempo of the *Concerto* is minim = 54-56 and the rhythmic structure remains constant throughout at 3, 2, 4: 2, 3: 5. Adding the sections it can be seen that the *Concerto* consists of 23 groups of 23 bars each, arranged into seven sections of varying lengths.<sup>278</sup> Cage imposes a three movement structure on top of the standard rhythmic structure. The first movement uses the first three sections (3, 2, 4), the second movement uses the second set of sections (4, 2, 3) and the final movement uses the last section only (5).<sup>279</sup> As can be seen the mirror image of the first two groups of sections is reminiscent of the *First Construction (in Metal)*. The completion dates for each of the three parts of the *Concerto* is: August 1950 (part 1); October 3, 1950 (part 2); New York City, February 1951 (part 3).<sup>280</sup>

## **31'57.9864'' and 34'46.776'' (1954)**

### **Preparations**

<b>Materials used for Preparation</b>
<b>Metal (M)</b>
<b>Wood (W)</b>
<b>Cloth, Fibre or rubber (C)</b>
<b>Plastic, glass or bone (P)</b>
<b>Other and Free (X)</b>

Various materials [listed above] are placed between the strings of a grand piano at points chosen by the pianist. In the course of the performance, preparations are added and subtracted, added to and subtracted from preparations, and moved along the strings.<sup>281</sup>

These compositions are a 'variant of the point – drawing system.'<sup>282</sup> Cage does not specify what preparations to use in these compositions; instead he describes the type of material that should be

<sup>276</sup> J. Cage, *For the Birds*, p. 104.

<sup>277</sup> W. Brooks, Choice and Chance in Cage's Recent Music in P. Gena and J. Brent, *A John Cage Reader: In Celebration of his 70<sup>th</sup> Birthday*, New York, C.F. Peters Corp., 1982, p. 85.

<sup>278</sup> J. Pritchett, From Choice to Chance: John Cage's *Concerto for Prepared Piano*, *Perspectives of New Music*, 26(1): Winter, 1988: p. 56.

<sup>279</sup> *Ibid.*

<sup>280</sup> *Ibid.*, p. 55.

<sup>281</sup> Cage's performance instructions for both pieces

used. Four categories have been encountered before in the solo prepared piano works, although Cage has never before suggested using glass or bone! The fifth kind of preparation Cage leaves to the choice of the performer. *31'57.9864"* and *34'46.776"* are the first solo prepared piano pieces where Cage requires preparations to be added or subtracted during the performance of the piece preparations can be subtracted partially or completely during performances, Cages identifies such points in the score. If the performer is put in a position where they cannot follow the instructions given by Cage, he also makes allowances 'If in the case of a notated impossible change the pianist may act in one of various ways, for example, (1) alter the direction to one within his powers, (2) ignore the direction, (3) keep it altering the time, etc.'<sup>283</sup> The performer is also called upon to create superfluous noises outside the remit of the piano. The performer is given freedom as to where the preparations are to be placed and again adds to Cage's relinquishment of compositional control – drawing the performer into this equation also. The music is uniquely notated on staves and tram lines which depict the various factors that could affect the production of the sound; duration is notated in clock time.

## First Performances

Commissioned and performed at Donaueschinger Musiktage October 17<sup>th</sup> 1954. *31'57.9864"* was performed by John Cage and *34'46.776"* was performed by David Tudor. They were premiered in the United States in New York City December 15<sup>th</sup> 1954.<sup>284</sup>

## Misc Info.

© Henmar Press Inc, 1960. Edition Peters No.6780 and 6781 respectively, N.D. Durations of pieces correspond to titles, and are dedicated to Paul and Vera Williams.

## Comments

The last piece composed for prepared piano. Prepared notes are only listed, along with a suggested list of preparations; however, exact choice of preparation and position within the piano is left to the performer. These are the only prepared piano pieces where Cage indicates that the preparations should change by adding or removing the preparations during the performance, and also moving the preparations along the strings. Completed on October 2<sup>nd</sup> 1954 at Stony Point and dedicated to his

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<sup>282</sup> D. Nicholls, *John Cage*, Urbana/Chicago, University of Illinois Press, 2007, p. 66.

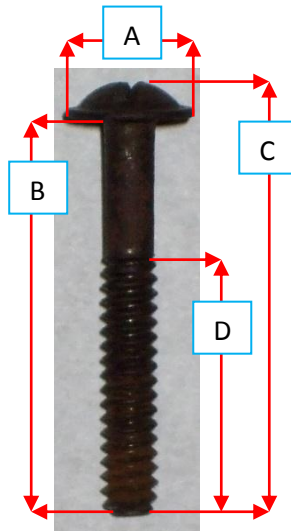
<sup>283</sup> J. Cage, *31' 57. 9864" for a Pianist* (New York/London: Edition Peters, N.D.), p. ii.

<sup>284</sup> D. Revill, p. 183.

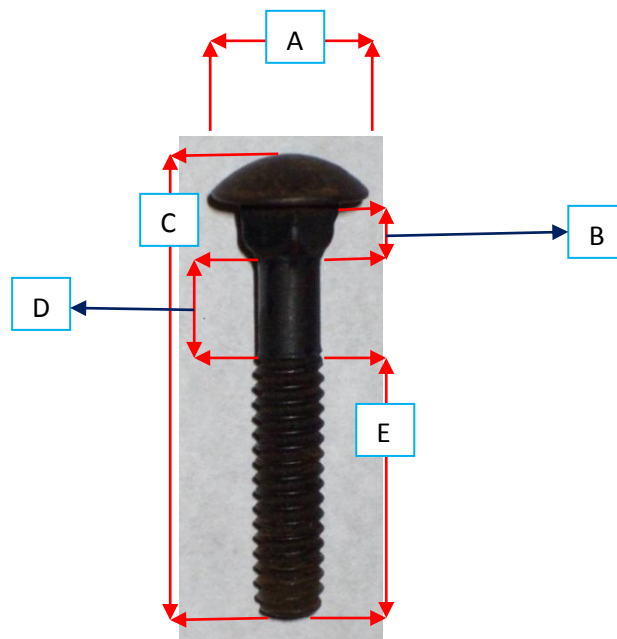
new Landlords Paul and Vera Williams. 31'57.9864" and 34'46.776" are notated in space/time notation.

## 2.7: Preparation Specifications

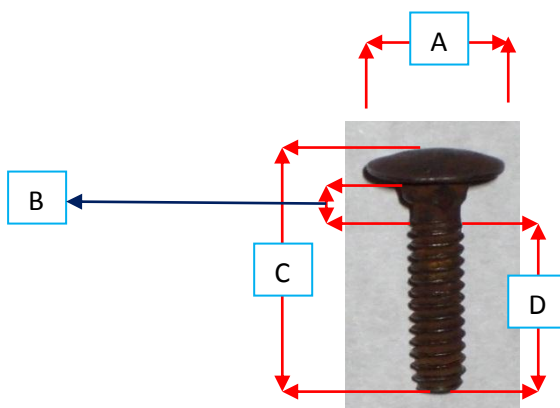
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B.

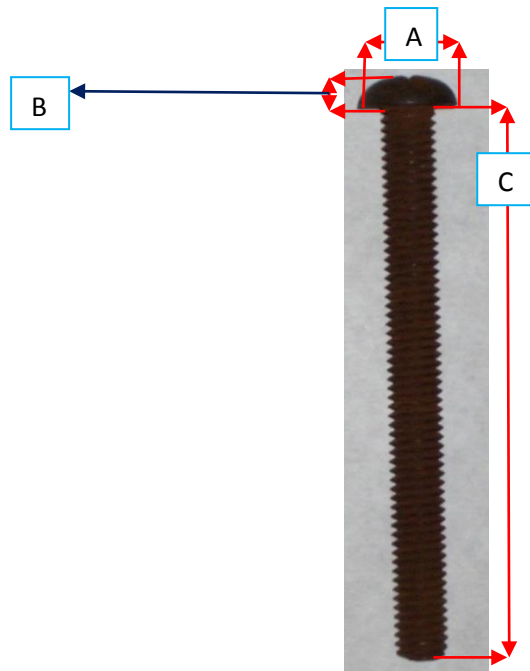


C.

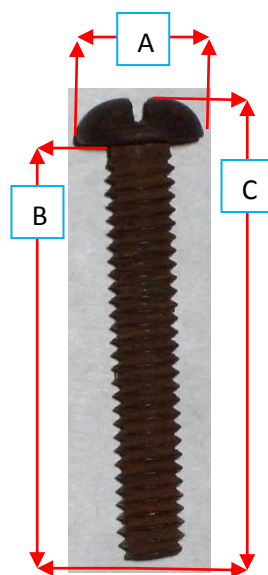




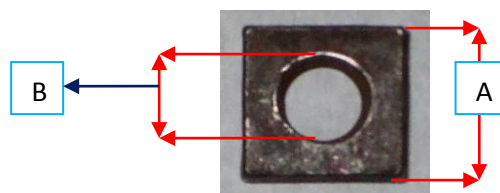
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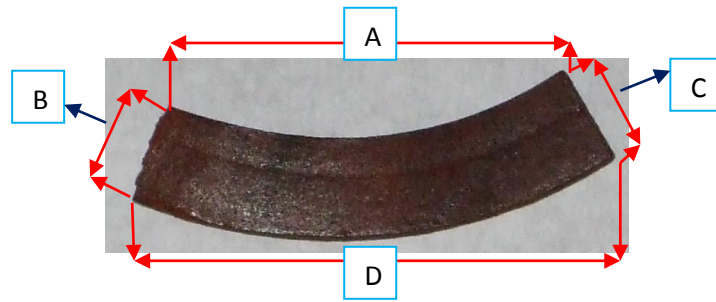
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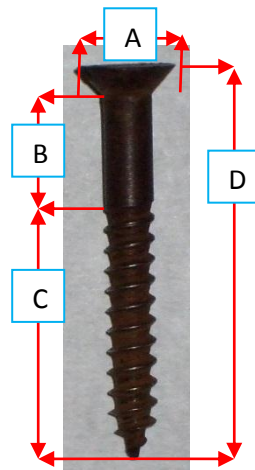
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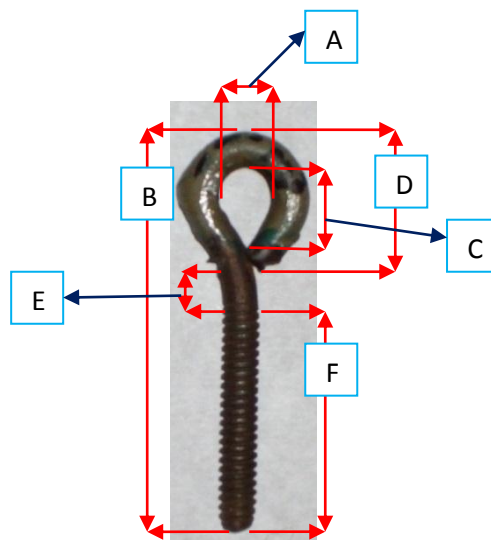
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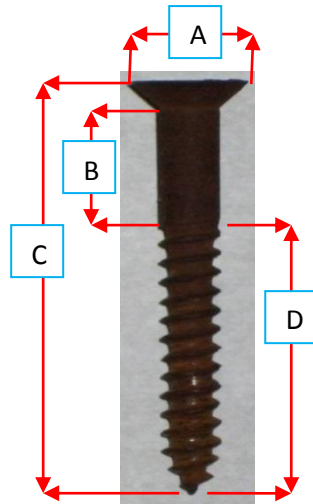
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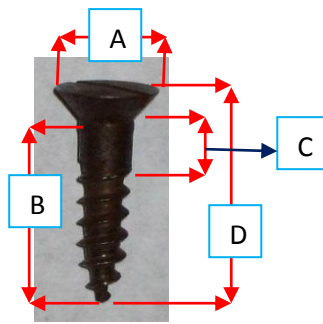
I.



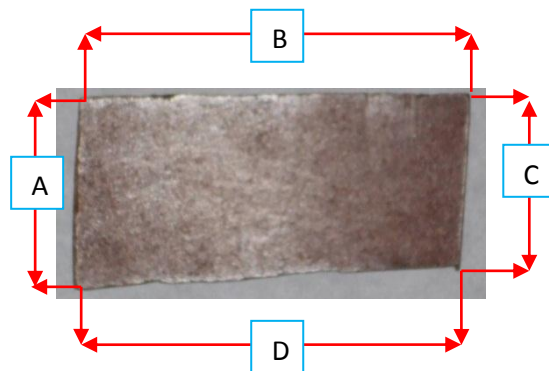
J.



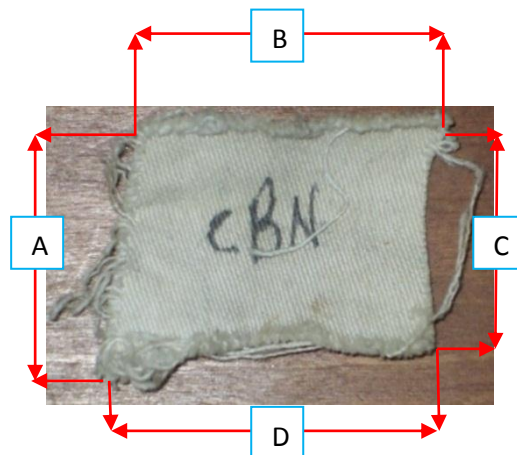
K.



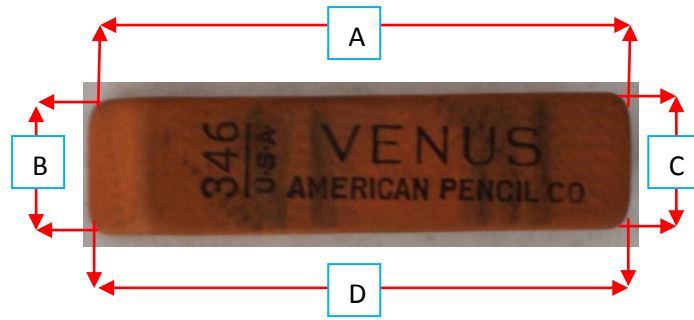
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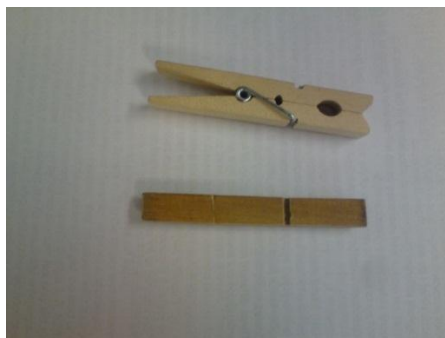
O.



P.



Q.



R.



S.



T.



U.



V.



W.

X.



Location	Common Name	Exact Name	A Meas.	B Meas.	C Meas.	D Meas.	E Meas.	F Meas.	Weight
A.	[Med. Bolt]	Machine Screw x 1" long rd head	0.9CM	1.2CM	3.4CM	2.2CM	N/A	N/A	4g
B.	[LG Bolt] (Big Bolt)	Carriage Bolt 1 ½	1.8CM	0.5CM	4.0CM	1.0CM	2.4CM	N/A	17g
C.	Sm. Bolt	3/16 carriage bolt x ¾ long	1.0CM	0.3CM	1.8CM	1.5CM	N/A	N/A	3g 15rung
D.	[Long Bolt]	11 gauge x 1" long flat head iron wood screw	0.9CM	0.2CM	7.8CM	N/A	N/A	N/A	3g
E.	[Bolt]	¼ x 1 ½ rd head iron stove bolt	1.1CM	3.8CM	4.0CM	N/A	N/A	N/A	9g 29 rung
F.	Nut	Square Iron Nut ¼ /20	0.9CM	0.6CM	N/A	N/A	N/A	N/A	4g
G.	Rubber	Rubber	5.7	4.5	0.7	0.7	N/A	N/A	9g
H.	Screw	No. 10 x 1 ½ flat head iron wood screw	1.8CM	0.5CM	4.0CM	1.0CM	2.4CM	N/A	4g 14 rung
I.	[Furniture Bolt, Machine Screw Eye]	Eye bolt 8-32 x 1" Long	0.7CM	4.0CM	0.9CM	1.4CM	0.4CM	2.3CM	5g
J	Large	No. 12 x 2 flat head iron	0.9CM	1.4CM	4.9CM	3.3CM	N/A	N/A	8g

	<b>Screw</b>	<b>wood screw</b>							13 rung
<b>K.</b>	<b>Small Screw</b>	<b>11 gauge x 1" long flat head iron wood screw</b>	0.9CM	1.6CM	2.3CM	0.6CM	N/A	N/A	3g
<b>L.</b>	<b>Plastic</b>	<b>Plastic</b>	2.2CM	4.6CM	2.0CM	4.6CM	N/A	N/A	
<b>M.</b>	<b>Cloth</b>	<b>Cloth</b>	3.0CM	4.2CM	3.0CM	4.2CM	N/A	N/A	
<b>N.</b>	<b>Eraser</b>	<b>Venus American Pencil Co. No.346 USA</b>	6.5CM	1.5CM	6.5CM	1.5CM	1.0CM	N/A	11g
<b>O.</b>	<b>Bamboo</b>	<b>Bamboo Slit</b>							
<b>P.</b>	<b>Weather Stripping</b>	<b>Weather Stripping (Including Double Weather Stripping)</b>							
<b>Q.</b>	<b>Wood</b>	<b>Wood</b>							
<b>R.</b>	<b>Woollen Material</b>	<b>Felt</b>							
<b>S.</b>	<b>Penny</b>	<b>U.S. Penny – Cent (English Five Pence Piece)</b>							
<b>T</b>	<b>Rubber Washer</b>	<b>Rubber Washer</b>							
<b>U</b>	<b>Cup Point Set Screw</b>	<b>Cup Point Set Screw</b>							
<b>V</b>	<b>U Bolt</b>	<b>U Bolt</b>							
<b>W</b>	<b>Rubber Bolt</b>	<b>Rubber Bolt</b>							
<b>X</b>	<b>Kit Box</b>	<b>Box that the preparations were stored in by John Cage.</b>							

Preparations O-W were not in the Sonatas and Interludes kit at the John Cage Trust. Therefore the preparations have been chosen after discussions with professional pianists.

# Chapter Three: Piano, Strings and Preparations

## 3.1: Physical relationships between piano, strings and preparations

There are not only differences in screws or bolts but also in pianos (of the same make and size). I would say then that using my table as a set of suggestions, chose [sic] objects that do not become dislodged or in other ways stand out of the music. You will often be able to tell whether your preparation is good or not if the cadences “work”.<sup>285</sup>

The prepared piano is unique in that, the sound that is produced is in no way reflected by the written score. What the performer sees on the page is not what the audience will hear in performance. Cage came to realise that in order for the music to be performed, there must be a certain amount of experimentation on the part of the performer, just as in the same way Cage had initially experimented to discover the type of sound which he required when composing the piece. In experimenting the performer must first realise the relationship between the music and the preparations (that is, what sounds are likely to be produced when the piano is prepared). For a performer to approach this task with no background knowledge of the sounds produced by the preparations would more than likely produce a flawed performance, as Cage mentions in the above quote ‘choose objects that do not [...] stand out of the music.’

For such a realisation, a pianist must first recognise the physical relationship between the piano, its strings and the effects a preparation imposes upon both. Chapter three therefore uniquely deals with the problems that are associated by a pianist when preparing a piano for performance; including deciphering ambiguity of Cage's preparations chart and demonstrating the differences that minor adjustments can have on the sound produced; ‘the prepared piano also makes possible the use of microtones, that is, pitch differences less than our conventional half-tones’<sup>286</sup>

The pianist will become familiar, as Cage did, with the essential elements of preparing a piano.

I learned many essential things about the prepared piano only in the course of the years. I did not know, at first, for instance, that very exact measurements must be made as to the position of the object between the strings and I did not know that, in order to repeat an obtained result, that particular screw or

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<sup>285</sup> John Cage, text published in CD Booklet *Sonatas and Interludes* played by Mario Ajemian New York 1995 Composers recording inc., CD 700

<sup>286</sup> J. Cage, *A Composers Confessions*, p. 36.



bolt, for instance, originally used, must be saved. All I knew at the beginning was the pleasure I experienced in continual discovery.<sup>287</sup>

## 3.2: Preparing the Piano

### Process of preparing

It appears that the process for preparing pianos was one of taste and experimentation for Cage. Cage said, when describing the choice for preparations of the *Sonatas & Interludes*, 'the materials, the piano preparations were chosen as one chooses shells while walking along a beach', and 'all factors of the piano preparation, objects and their positions, were found experimentally. They present a choice determined by taste rather than reasoned relations. In most cases, the preparation preceded the composition. In the course of writing, however, it was sometimes found desirable to introduce an additional mute.'<sup>288</sup> Although there was never a vast array of *different types* of preparations in the history of Cage's prepared piano music, each new piece had its own unique blend and gamut of sound. The most commonly used devices ranged in size and shape and different materials, such as metal (screws, bolts, nuts, coins), wood (bamboo, wooden wedges), plastic and rubber (pencil erasers, wedges). *Bacchanale* and *Totem Ancestor* have identical preparations with weather stripping, bolt, screw and nuts, but *Amores* and *Root of An Unfocus* also have a similar preparation set as *Bacchanale* and *Totem Ancestor* and would therefore produce similar sounding effects. *Primitive* and *In The Name of The Holocaust* have identical preparations, being prepared with screws and bolts. *Daughters of the Lonesome Isle*, *Sonatas and Interludes* and *Works of Calder*, all have massive sets of preparations ranging from 54 to 67. However, all three seem to have very similar preparation materials, all including long bolt, small bolt, bolt, screw and furniture bolt (typewriter bolt).

The idea of constant experimentation is emphasised in an interview Christian Wolff gave with David Patterson. He begins by describing Cage's Monroe Street Apartment where he could see all the way to the Brooklyn Shipyards. He says, 'I think it was summertime, so the windows were open, and I was trying out preparations on the piano. At one point I hit the key of a prepared sound, and this absolutely unbelievable sound came out. And Cage squawked in the next room "how did you do

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<sup>287</sup> *Ibid*, pp. 36-37.

<sup>288</sup> J. Cage, *Composition as Process*, p. 19.

that?" And suddenly we realised that the moment I'd hit the key, a boat whistle had gone off on the river. [...] The ultimate extension of a prepared piano.'<sup>289</sup>

Due to the close relationship between Cage and Cunningham and the nature of the compositions (being composed for dances), it could be assumed that Cunningham or the dancers themselves may have had a decision in the sounds that were accompanying them. However, this is not the case at all. Kuhn intimates that there was a clear boundary between choreographer/dancer and musician.<sup>290</sup>

A performer should always begin with Cage's directions, utilising the name of the preparation, paying particular attention to the material that the preparation is made from. Performers should also begin with the measurements given by Cage in his notation. Once the preparation has been carefully positioned, a performer can then begin to experiment with the preparation and the sound that it produces. In some cases, as will be discussed later on in this chapter, it will be essential to experiment with the positioning of the mute, particularly with a piano where the strings are overlaid.

## **Aural Perception of preparations**

We can gather the effects of different kinds of preparations from aural perception. The description of the aural effects is a general representation and depends on numerous factors. These factors will be examined later in this chapter. Many pianists are wary of consequences that might arise in naming sounds, 'I am reluctant to describe the effect with words every sound is different and not to be defined with words.'<sup>291</sup>

Preparations can be roughly placed into one of four categories: metal, wood, plastic and material. Metal objects, which include objects such as screws, nuts, bolts and coins. Philip Thomas describes the effect of screws as tending 'to have more of a twang, with a little metallic rattle. An edge to the sound. [...] While 'bolts this is the most sonorous sound, like gong, javanese gamelan, etc. Beautiful.'<sup>292</sup> Thomas adds that coins sound more like the bolt, but with a touch of screw - a bit of twang, but quite metallic gong-like. Henck does not adhere to any particular brand or make of screw

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<sup>289</sup> D. W. Patterson, Cage and Beyond: An Annotated Interview with Christian Wolff, *Perspectives of New Music* 32(2): June, 1994: p. 59.

<sup>290</sup> *Ibid.*

<sup>291</sup> Yuji Takahashi, email interview with the author

<sup>292</sup> Philip Thomas, email interview with the author

he gets 'Just what I get in a hardware store.'<sup>293</sup> Bunker 'wherever possible, use[s] the materials specified. E.g. screw sizes are given; bolt sizes are given by Cage. Where the gauges of these materials are not given, a pianist selects for best "sound/resonance" and best choice for the particular piano they are preparing. The question however is, what *is* the best sound? One would surmise that the best sound is one that produces the most sonically interesting noises – those that include numerous harmonics – and possibly those which are furthest away from the original note produced by the piano.

The second category, material, consists of objects such as cloth or felt. Richard Bunker always uses 'piano felt' i.e. the same felt used by piano tuners and technicians, applied in the same manner that a piano tuner applies the felt.<sup>294</sup>

The third category is plastic, which is interwoven between the strings of the piano. Cage asks for plastic strips or specifically, in the *Concerto for Prepared Piano*, a plastic bridge. The most suitable type of plastic for these purposes is a plastic rule.

The type of sound produced by the fourth category, wood, depends on the density of the wood. Cage used different types of wood in his prepared piano music including bamboo, that is, quite a brittle wood and softer wood. Thomas says wood is 'often quite sonorous, in a 'xylophone' kind of way - i.e. the sonority doesn't last long, it dies pretty quickly, but it does have a quite immediate rounded sound. Bamboo again, quite sonorous, much like wood (as above), has resonance which lasts a little longer.'<sup>295</sup> For Bunker 'Bamboo. A unique sound. Wow!'<sup>296</sup>

No one piano is the same, the effect on the sound between pianos is tremendous, and Cage realised this. Cage used a six-foot Steinway model O during his experimentations, but many modern pianos such as Yamahas and different models of Steinway have different features. Notably the string crossing in the lower register of the piano means that many preparations which Cage specifies simply will not fit. Many piano dampers differ as they begin and finish in different places. This means that the measuring system Cage utilised is only accurate for the Steinway Model O.

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<sup>293</sup> Herbert Henck, email interview with the author

<sup>294</sup> Richard Bunker-Evans, email interview with the author

<sup>295</sup> Philip Thomas, interview with the author

<sup>296</sup> Richard Bunker-Evans, email interview with the author

The only way to reproduce the sound that Cage heard would be to use *his* piano, his preparations, his measurements and to hear through his ears. However, there may still be issues, such as the natural processes that happen to all things, like ageing; the piano would be a different piano now, than the one he used when preparing his pieces. Pianists must decide on a piano that they think is the most 'compatible' for preparation. Henck says that he 'would always prefer the largest available instrument, because the resonances and colours are proportionally richer' and its 'easier to find good sounding points on the strings. Moreover there is more space for the preparations'.<sup>297</sup> However, 'it normally depends on the organizer of the concert [...] and you as a pianist should be very careful that you don't use a brand new instrument. [...] There is always the possibility that metal parts in the preparation (like screws and bolts) might damage the strings. Very good piano tuners said he couldn't tune the strings afterwards anymore properly [...] the tuning wouldn't be stable anymore. Because there might be very tiny, microscopic scratches in the strings and they might change the sound in a very microtonal way.'<sup>298</sup>

Richard Bunger found that 'small-to-mid-size grand pianos were best for preparation rather than concert grands. I surmised that this is because the ratio of string-mass-to-preparations is simply too great in a concert grand in anything but the highest registers'<sup>299</sup>

A brief search on the Steinway website reveals details and differences between each of their models of grand pianos. Each of the differences will have an effect on the production of sound when preparing a piano for performance. The Model O Steinway is known as the 'Living Room' grand. It is interesting that Bunger believes that small – to – mid- size grand pianos are the best for preparing. The Model O fits right in the middle of that description, it is not the biggest but not the smallest either. Steinway describes the sound produced by this 180cm grand piano as 'particularly warm and rich',<sup>300</sup> The Model S is described by Steinway as the 'Baby grand'. The model S would lend itself to preparation well because it has a lower string to mass ratio, but still produces a rich tone associated with much larger pianos. Two other models of Steinway would suggest to be good candidates for being prepared; the Model C and Model M as both pianos are in the mid-range size category, and

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<sup>297</sup> Herbert Henck, email interview with the author

<sup>298</sup> Ibid.

<sup>299</sup> Richard Bunger-Evans, email interview with the author

<sup>300</sup> Steinway website accessed 13/04/11

both have a 'rich and responsive' action, able to produce a large sound when required. This would be particularly beneficial to the prepared piano player in the upper registers of the piano.

### 3.3: Analysis of notation of preparation materials

'[...] I think anyone will have to remark eventually on the fact that all of the performances are different, because my table of preparations is not precise'<sup>301</sup>

In *Bacchanale*, Cage used a chart to notate the materials to be used in preparation and which tones were to be prepared. Cage gave the tone to be prepared in a separate column using stave notation. This cannot be misunderstood, it is what it describes. The next column is material used for preparing that tone. *Bacchanale* has a very limited number of materials, three different types in fact: a small bolt, weather stripping and a screw with nuts. As was mentioned earlier however, the notation of the preparations is different to that which Cage had intended when it was first composed.

This is where the confusion begins to enter the equation. To create the transformation of sound which Cage intended the correct materials must be used. First Cage asks for a 'small bolt'. How small? How heavy? What size of head on the bolt? How far does the bolt have to be inserted between the strings? On which rung of the bolt thread should the string grip?

Secondly, Cage asks for 'weather stripping'. The asterisk in the score denotes it is a fibrous material. Some performers take it to represent a type of roofing felt. Richard Bunker, in his manual *The Well Prepared Piano*, describes it as being made from compressed hair and he substitutes it for piano felt. However, Cage calls for felt in other prepared piano pieces such as the *Concerto for Prepared Piano and Chamber Orchestra* (1951). Even so, how thick should it be? Should any overlap occur at the edges? What is known is that it is a material that no longer exists, or is not manufactured anymore. This raises more questions. Plastic and rubber objects include various types of rubber strips and jar seals, wedges or strips of plastics and weather stripping. Cage utilised weather stripping in practically all of his prepared piano pieces. Weather stripping is an ambiguous material and difficult to define, as it is no longer available. Hebert Henck uses a 'kind of plastic' for weather stripping.<sup>302</sup> The

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<sup>301</sup> W. Duckworth, *An interview with John Cage*, p. 19.

<sup>302</sup> Herbert Henck, email interview with the author

transformation that Philip Thomas aims for when using his weather stripping, is 'something that tends to have quite a bit of pitch, microtonally adjusted, with a little twang and quite like muting the string with the finger and he says he uses fibrous strips to create this sound.'<sup>303</sup>

Thirdly, Cage requires a screw with nuts. Similar questions may be asked of this preparation: how big a screw and how far should it be wound between the strings?

The third column in the *Bacchanale* preparation notation chart is clear and denotes between which strings the preparation should go.

The final column in the *Bacchanale* chart is important as it denotes the distance from the damper the preparation should be positioned. For the small bolt, Cage gives a measurement of circa three inches from the damper and states that all other preparations are to have 'position and size of mute determined by experiment.'<sup>304</sup> What does determined by experiment mean? There are no guidelines as to what the objective of the experiment is. This comment brings further questions into the equation. Essentially it asks for the performer to make a value judgement as to what the 'best' type of sound is. One would assume, however, that the experiment needs to take into account some factors before distinguishing the correct position for the preparation. Firstly, one must look at the music. Although the music does not essentially represent what is heard, not all the notes in the vicinity of the preparation may be prepared. Secondly, if Cage has given directions for the other preparations, what has the eventual sonic outcome of these been? Again, these may guide the performer to creating an informed decision. Thirdly, what kind of sound does the performer want? Do they want a sound full of harmonics and overtones or one that is dull sounding? If the latter is the answer, for instance, then they must position the preparation nearer the Capo d'Astro bar or the bridge, so as to create a deadening effect and reduce the vibrations

In *And The Earth Shall Bear Again*, Cage uses the same chart technique as analysed in *Bacchanale*, but this time is more precise, giving accurate measurements for the positioning of the preparations. He also gives further detail of positioning with regard to the three strings of a note in a piano 'over one, under two etc.' Detailed footnotes are given with regard to extra effects, adding further features to sound mutation. For example 'touching sound board (protect sounding board with thin wood (e.g.

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<sup>303</sup> Philip Thomas, interview with the author

<sup>304</sup> J. Cage, *Bacchanale* in *Prepared Piano Music Volume 1, 1940-1947* (edition Peters, N.D).

matchbox wood) or thick paper). Realistically, the fact that Cage asks for wood or thick paper, is not to produce an added sonic effect, simply to protect the sound board from being damaged.

Cage keeps the chart simple by adding an extra column for which number of the string is to be prepared, i.e. one for strings one to two and one for strings two to three. This may also illuminate that Cage was beginning to get more adventurous with preparations and the amounts of preparations, increasing the gamut of sound at his disposal.

However, the ambiguity of materials' description is still present, with materials described as 'long bolt' and 'bolt', etc. He adds three new materials in this piece 'two thicknesses of woollen material', 'a large piece of bamboo, and 'a piece of plastic'.

In two more pieces from the same period, *In the Name of the Holocaust* and *Primitive*, Cage uses a different technique to notate the preparations. Instead of a chart, he uses a stave with the notes to be prepared on, stating 'place screws or bolts between the following strings'. And with additional notes to be prepared, he states: 'place small screws (in addition to above) between the following, in such a way that they give a metallic rattle sound'. There are no indications with regard to specifications on distance or string positioning. However, what is different about these pieces (and may account for the vagueness in description of positioning and material) is, that with both pieces Cage gives detailed notations for playing the piece, in a Henry Cowell-esque way. In *Amores* Cage goes as far to explain the effects that he requires from the preparations, but still does not give precise measurements, calling once again for experimentation.

Later pieces continue with a similar method to that described in *And the Earth Shall Bear Again*, with minor alterations fitting specific pieces.

*The Perilous Night* is the first, large scale concert work for the prepared piano, and has six movements. The chart technique is used to notate the preparations. However it is on a grander scale with more preparations used to transform the sound than used before. No new materials are used apart from wood and cloth and a rubber washer. The two most striking differences with regard to the preparations in this score come in the small print. One states that the measurements apply to a particular group of pianos, Steinway models L, M, O, A or B. This is furthered by a marking next to one preparation which gives exact measurements between the damper and the bridge and a note

which says 'adjust accordingly.' Defining which pianos the measurements relates to, is a real insight into Cage's thinking at the time.

The *Sonatas & Interludes* are the magnum opus for the prepared piano. The piece has sixty-eight preparations listed in the preparation table. The distances given for positioning are accurate to within 1/16 of an inch, and footnotes are given in case adjustments need to be made for differences between pianos, but there is still ambiguity in the definition of preparation materials. In a single case, the type of pencil eraser that Cage requires is specified and he gives the manufacturers name and stock number, 'AM Pencil Co. No.346'. However, in all other cases, no specification is given.

Perhaps this is an important point to note. Was it that the actual materials were not so important to Cage, compared to the effect that is reliant on the positioning of the preparation? From the statements that Cage made about the inadequacy of many performer's preparations of the prepared piano one could assume that it was the sonic effect, produced by the positioning of the preparation, which took priority in Cage's prepared piano compositions. Cage was the composer who wanted to free sounds from the constraints of taste. At the point of composing many pieces of prepared piano music Cage was also still intrigued with the advocacy of percussion instruments and their ability to produce sounds that many 'conventional' instruments could not – hence the creation of the prepared piano.

### **3.4: Science of preparing a string**

#### **How a preparation affects a string**

It has already been stated that Cage's prepared piano is different from the early attempts made by other composers. The biggest difference is that Cage inserted materials between the strings, instead of placing materials on the surface. By adding an object between the strings when the string is struck, there is a combination of vibrations from the strings and from the material inserted.

The addition of a preparation to a piano string adds a small amount of weight to that string. This has consequences when the string is set in motion by being struck by the hammer. The increase in mass of the string means that the pitch of that string will be lower. The decrease in pitch will vary as to the extent of the weight of the preparation. However, by adding mass to the string, it also becomes elongated. The elongation of the string means that the pitch should rise. This leads to some



interesting questions that will be discussed later in the chapter. As Richard Bunger suggests; the addition of a mute along the string is a similar effect to that of a guitar player putting a *capo* on the neck of their guitar, 'by shortening the sounding length of the string.'<sup>305</sup> If a guitarist places a finger on a fret, it shortens the string on one side of that position. By placing this kind of 'stop' on the guitar it means that the string will only vibrate one side of the guitarist's finger and not on the other side and because the side of the string that does vibrate is shorter, it will produce a higher pitch. When a pianist adds a preparation to the string the preparation will have a similar effect. However, it will not stop the string from moving completely on one side because A) the preparation is not fixed or immovable and B) because the preparation will vibrate to some extent itself, dependent on size and weight. This is another interesting problem; because the preparation also vibrates, it can transfer some of its own vibrational energy to the string and possibly other strings as well. This will also be taken into context when looking at sympathetic vibrations. Further to this however, is the activity that is sent along the string by the preparation, which will also have its own vibrational energy.

Position along the string is an essential characteristic that must be examined. By placing a preparation along certain points, such as the nodal point of the string, distinct harmonics will be produced. The type of preparation that is inserted at that point will affect the clarity of the harmonic produced. If there are objects that are made of an absorbent material like felt, or weather stripping, then the higher partials of the harmonic are likely to be dampened, because the material is absorbing the vibrational energy. Not only does it absorb the clarity of the harmonic, it will shorten the decay of the sound. James Pritchett points out that this is not so obvious when high registers are prepared due to the shortness of decay in them anyway.

The felt that covers the hammers has a dramatic effect on the resulting partials produced. If the felt on the hammer is hard with little elasticity it will excite higher partials of tone produced and give a brighter tone to the sound. A procedure used by piano technicians known as voicing (which pricks the felt on the hammer head) weakens the higher partials and therefore produces a mellower tone, preferred by some pianists.<sup>306</sup> The harder the hammer, the weaker the fundamental tone, because the upper partials overpower the fundamental tone.

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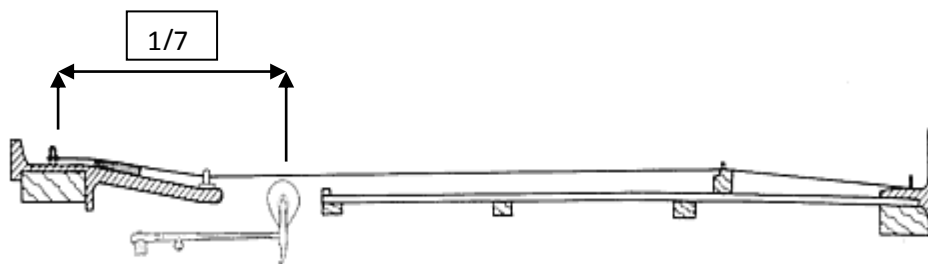
<sup>305</sup>R. Bunger. p. 74.

<sup>306</sup>J. R. Pierce, *The Science of Musical Sound revised Ed.*, New York, W.H. Freeman and Company, 1992, p. 188.

When the felt on the hammer is soft with a high level of elasticity, the contact time with the string is increased as the motion upon the felt has time to spread before the hammer returns to its resting position. This means the string is not set into motion with such a jerk, but increases gradually and continuously in velocity during the contact.<sup>307</sup> The discontinuity of the motion is consequently much less, diminishing as the softness of the hammer increases and the force of the higher upper partial tones is correspondingly decreased.<sup>308</sup>

Heavier hammers have thicker layers of felt as in hammers for the lower octaves – because of this it takes longer before it rebounds from the string. The hammers in the upper octaves are lighter and have thinner layers of felt.

In pianos the positioning of the hammer is important. The point at which the hammer strikes the string is between  $\frac{1}{7}$  to  $\frac{1}{9}$  the length of the string from the keyboard end of the piano.



**Figure 27: Illustration demonstrating the striking point of a hammer on the string**

As a result of the collision between the hammer and string a wave is created that travels in both directions along the string, from the collision point. Because the point of collision is normally  $\frac{1}{7}$  the way along the string at the aggraffe end of the piano, the vibration travelling in that direction hits the aggraffe and is reflected upside down, travelling to the right restoring the string to its equilibrium.

A definitive pitch is produced when a stretched string is in an optimum state; that is, subjected to constant tension when struck and the string vibrates with a particular frequency.

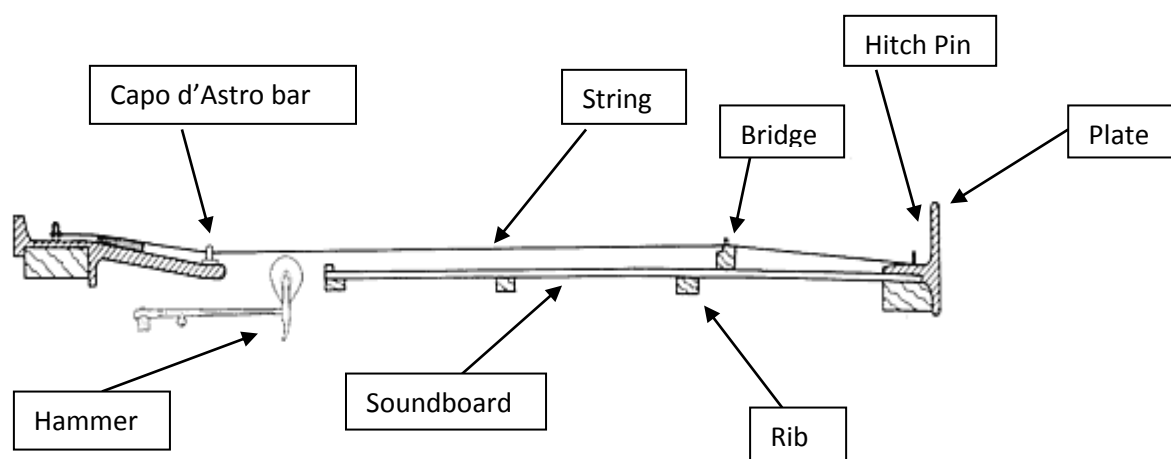
<sup>307</sup> Hermann Helmholtz, *On the Sensations of Tone* 2<sup>nd</sup> Eng ed. (New York: Dover Publications, 1954), p. 75.

<sup>308</sup> *Ibid.*

Frequency and therefore pitch, is related to the number of vibrations the string completes per second. Frequency is proportional to the reciprocal length of a stretched string. This changes when a string length is altered by a preparation.

### 3.5: The mechanics of the piano

It is important to understand the physical relationship between the preparations and the piano. To fully comprehend this relationship one must first acknowledge the significance of how the piano strings react when they are struck. This will elucidate the difference between prepared and non-prepared strings.



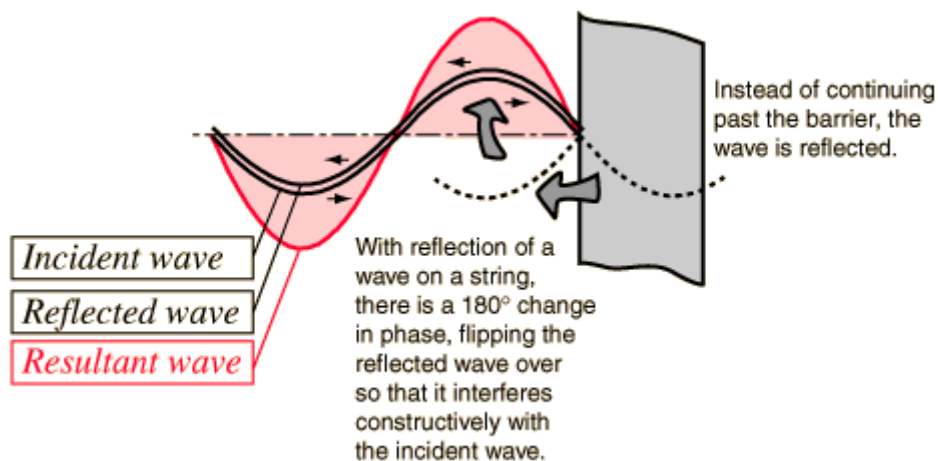
**Figure 28: Illustration demonstrating the main components of a single piano string**

The basic principle of a piano begins with a steel string (of varying diameter) which is held under tension between two fastening points called the capo d'astro bar and the hitch pin, which themselves are attached to a metal frame known as the plate. At the hitch pin end of the piano, the steel string runs across a wooden bridge which is attached to a wooden plate known as the soundboard. The string is set into vibration due to a collision between a felt hammer and the string. The hammer gains its motion through the action of the pianist depressing a key, which transfers actions via a system of levers known as the action. The vibrations from the strings are transmitted to the soundboard which then radiates the sound into the air.

The important part of the string for the purposes of preparation is between the 'capo d'astro bar' and the bridge. The region between the bridge and the hitch pin is dampened with cloth. The string is

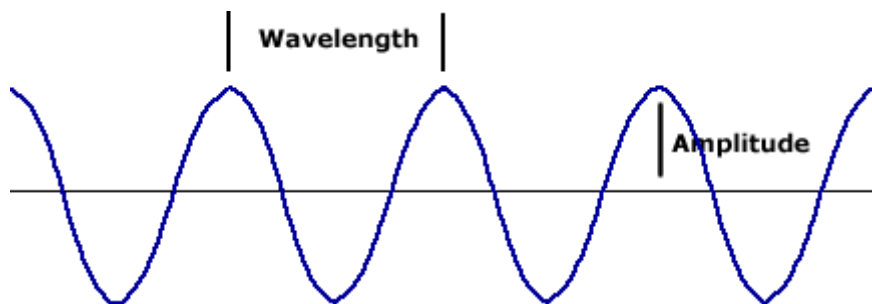
struck by the hammer which is deformed at the point of collision. The collision creates a wave which transmits vibrations down the string via the bridge and to the soundboard, producing sound.

When a string is struck it begins to vibrate. Once a string is vibrating it can have several modes of resonance which correspond to standing waves of different wavelengths and frequencies. These are the natural harmonics of the string. A standing wave mode arises from the combination of reflection and interference interfering with the incident wave (where the string was hit). An important part of the condition for this constructive interference for stretched strings is the fact that the waves change phase upon reflection from a fixed end. Under these conditions, the medium appears to vibrate in segments or regions and the fact that these vibrations are made up of travelling waves is not apparent - hence the term "standing wave".



**Figure 29: Illustration of the different wave movements of a string**

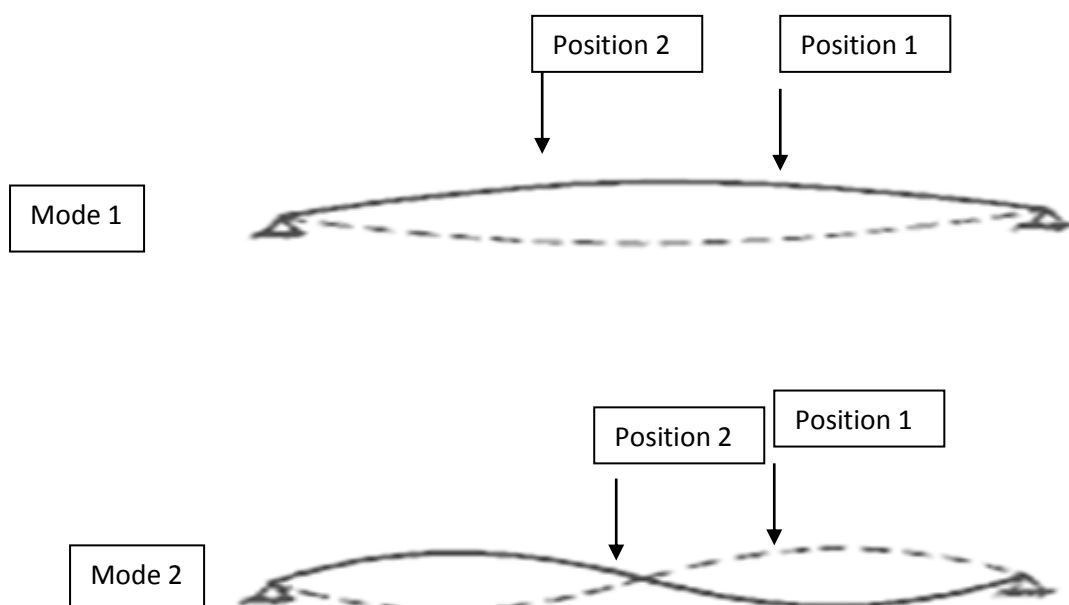
A wavelength can be defined as the distance from the crest of one wave to the top of the next wave.

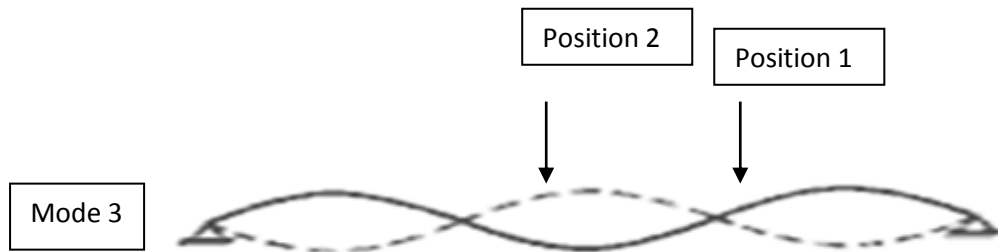


**Figure 30: Illustration of a wavelength and the amplitude of a sound wave**

The frequency of sound is the rate at which the waves pass a given point. When the hammer hits the string, it is said to excite the string and so it excites the string to vibrate in one or more modes, producing a complex sound wave made up of many harmonics. The length, mass and tension of the string determine the exact waveform. The strengths of the harmonics produced depend where the string is struck. The mode in which the string is excited is determined by the positioning of the hammer.

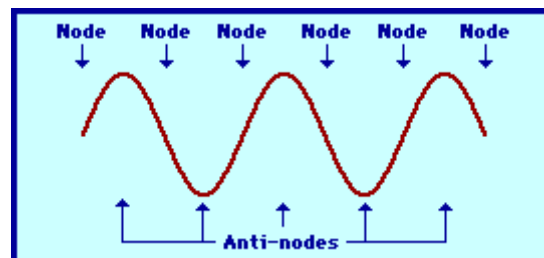
The example below shows various modes of excitation and the theoretical hammer positions that could excite them. In order to excite the string in 'mode one' at its maximum, it must be struck by the hammer, at position one, since this is the anti-node – where the most motion of the string is possible. (The antinode is the point of maximum disturbance midway between the nodes.) However, consider the effect of trying to excite mode two using the hammer in the same position. With the hammer in this position, mode two will not be excited at all – because the hammer hits the string directly on the node, the area where no motion is possible. However, consider using this hammer position to excite 'mode three' of the string – in this case the string will be excited to the maximum since position one falls on the anti-node of 'mode three'





**Figure 31: Illustration of a hammer positions and modes of excitation**

In order to excite the string in all of modes one-three, the hammer may be placed at position two. In this case, each mode will be excited to a different extent, depending on how close to a node or antinode the hammer hits. In 'mode one', it will be excited by about 70%, in 'mode two' to 100% and in 'mode three' about 80%.



**Figure 32: Illustration of nodes and anti-nodes**

We can see that in each of the different positions that the hammer could be, it will produce a unique 'recipe' of vibrations comprised of different levels of vibrations from each of many modes. This will result in a unique shape of vibrations in the string and a unique level of each of the partial frequencies.

Since the hammer is relatively close to the end of the string (keyboard end) in a real piano, it will not hit a node of any of the lower partials. For example, if it is 5cm from the end of a string 65cm long, it is 1/13 of the way along, so the 13<sup>th</sup> partial is the only one that will not be excited. For a string that is excited by striking (i.e. a piano string), the different modes of excitation decrease in amplitude, as they get higher. This happens in the relationships shown in figure 4.

Fundamental Frequency	Amplitude = 1
Second Partial	Amplitude = $\frac{1}{2}$
Third Partial	Amplitude = $\frac{1}{3}$

Nth Partial	Amplitude – 1/n
-------------	-----------------

**Figure 33: Relationship between modes of excitation and amplitude**

So the partials that are higher in frequency are quieter. However, due to the influence of the soundboard and piano casing and the acoustics of a performance space or venue, the volumes of the partials change wildly as they reach our ears.

Notes from A0 up to approximately G2 have 20-30 audible partials. Notes from G2 up to approximately C5, partials are reduced and higher partials are lost. At C5 only five to six partials can be heard. BY C8 only the second partial can be heard.

This effect is partially due to what is called inharmonicity, which means the partials become more and more out of tune as the frequencies deviate from the exact mathematical ratios. Increasing the softness of the felt on the hammers of the higher notes, which increases the contact time with the string during the hammer blow, can counteract this and this therefore dampens the higher partials. When the attack of the note is higher – more of the partials are heard, and at ‘lower’ volumes, less of the higher partials are heard.

To calculate the frequency of a piano string physicists have discovered the following equation:

$$f = \sqrt{\left(n \left(\frac{1}{lr}\right) \sqrt{\frac{t}{d}} \sqrt{\frac{1}{4\pi}}\right)^2 \times \left(n^2 \sqrt{\frac{y}{d}} \left(\frac{\pi}{\sqrt{2}}\right)\right)^2}$$

n=The number of the partial considered (where 1=the fundamental)

l=Length of the string

r=Radius of the string

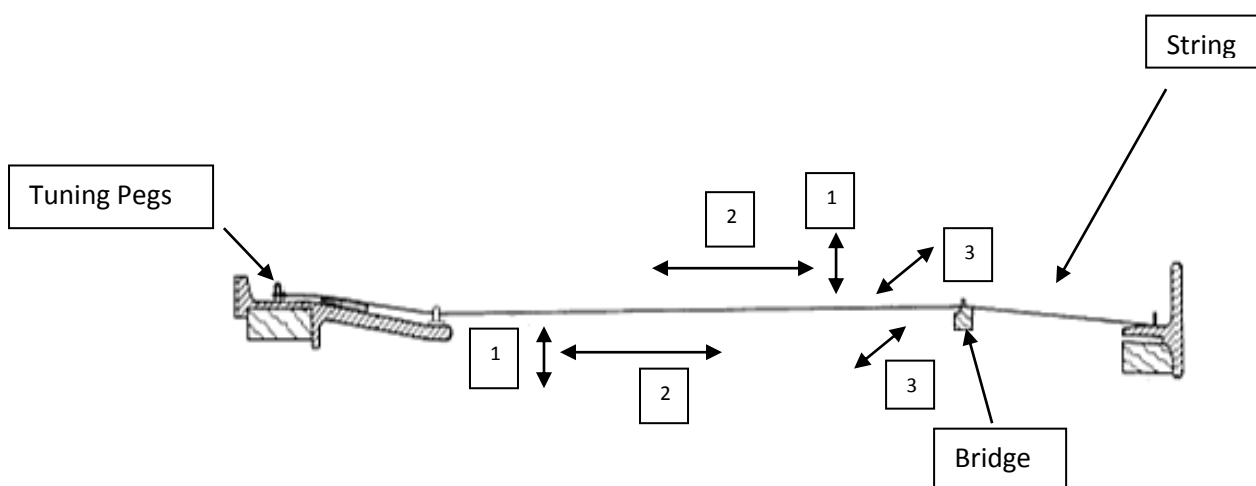
T=Tension of the string

d=Density of the string

$Y$  = Modulus of elasticity

As can be seen, the frequency depends on the length, tension, radius and density of the string, along with the modulus of elasticity and must be calculated for each string.

The first possibility is that the preparation could act on particular types of vibration. A piano string can vibrate in four ways: up and down, sideways, end to end and in a twisting motion.



**Figure 34: Illustration demonstrating movement of a vibrating string**

1 = Transverse (vertical)

2 = Transverse (horizontal)

3 = Longitudinal

4 = Torsional (twisting)

If the string is bound to another by means of a preparation, then this will have an effect on each type of vibration. Among these effects this may reduce the amplitude of the sound produced (i.e. volume). For this examination though, the most important effect is on the frequency, i.e. the pitch of the note produced.



To work out the change in frequency for each 'mode' (or 'partial'), the following equation can be applied:

$$\frac{\text{Maximum reduction in frequency}}{\text{Original frequency}} = \frac{\text{Added mass}}{\text{Original mass}}$$

The maximum reduction in frequency will occur if the preparation is placed at an anti-node of that particular mode – i.e. the place where the maximum motion will occur. This is likely to have a dampening effect. For a preparation placed at the node, there would be no effect on the frequency of that mode, as the node is not moving. For a preparation placed between a node and anti-node, some intermediate level of effect should occur.

Another occurrence that may affect the production of certain partials in a prepared piano, is the circumstance of masking, when a weak sound is obscured by a stronger sound. The weak sound is known as the maskee or signal. There is also the possibility of sympathetic vibrations of strings. This can happen when the preparations create different partials that are not in the fundamental tone.

Another technique that Cage used when preparing his piano was the use of the una corda pedal. This pedal when depressed lifts the hammer to the right. Therefore, if Cage was to prepare a piano that had triple strings per note, and only prepares the two strings to the left, leaving the third string unprepared, he could create two different effects. One sound would be a combination of all three strings, mixing the sounds of preparation and non-preparation and having a strong feel of the fundamental tone, or with the third string silenced and leaving just the sound of prepared strings. James Pritchett suggests that the effect caused by having altered and non-altered strings causes beating.<sup>309</sup> In his later scores for prepared piano, Cage marks the una corda pedal meticulously. The combination of all these factors results in the change of the sound of a note.

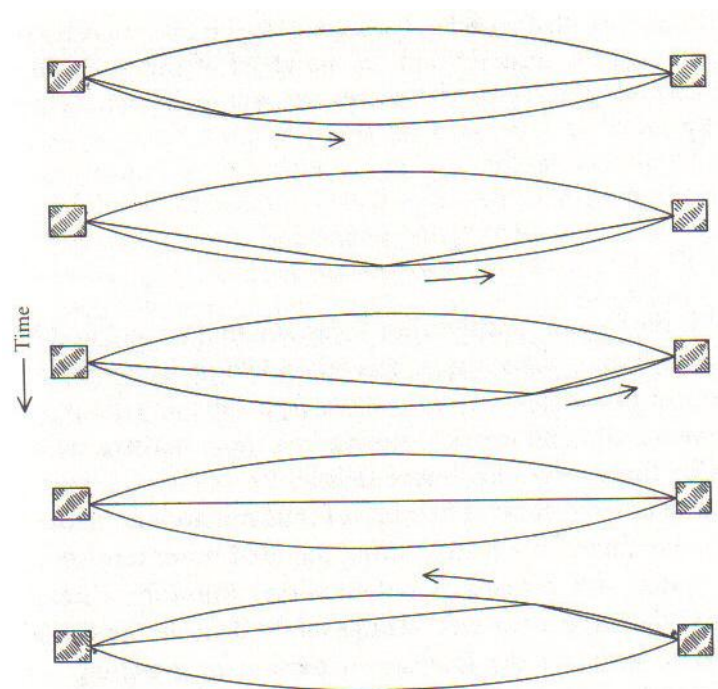
So, a vibration on a piano string creates a tone which produces a particular pitch. Therefore it can be said that pitch can be related to the total number of vibrations per second that a piano string produces,

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<sup>309</sup>J. Pritchett, *The Music of John Cage*, p. 23.

or the total number of times that the pulse (created by the collision of hammer and string) creates in a round trip. For example, if A4 is struck the total number of times that the pulse will travel up and down the string is 440 times per second.

Due to the great amount of tension on a piano string and owing to the mass of the string itself, when it is hit with the piano hammer at a certain point, the inertia created by the collision means that the string does not return immediately to its original position but bends in the opposite direction. Thus because of the tension and the mass, plus the added mass of the preparation (this is why the weight of preparations is so important) the piano string vibrates from side to side.



**Figure 35: Illustration demonstrating direction of waves travelling along a string**

Because the transverse waves travel the string twice once in both directions, the frequency can be given by the formula:

$$f = \frac{v}{2l}$$

Where L is the length of the string, it can also be given as:

$$f = \frac{\sqrt{t/m}}{2l}$$

This is because this velocity is the square root of the ratio of the tension T to the mass per unit length M.

What is important to note is that when these sound waves hit an obstacle on the string they make the wave reflect (at least to some extent) and create a kind of echo. This would normally happen when the sound wave reached the far extremity of the strings at the hitch pin and the aggraffe, but when a preparation is inserted it will not stop the entire wave because it is not immovable but it will deaden some of the echo or slow down the wave.

A reflected wave can take varying amount of time to sound its echo. This is dependent on the distance and the speed of the wave. The formula for calculating this is given as:

$$v = \sqrt{\frac{t}{m}}$$

T is the tension of the string measured in Newton's and M is the mass per unit length of the string measured in kilograms per meter. V is the velocity of the waves.

The bigger the string, for example towards the bass end of the keyboard, means that the movement of the string is slower. (Obversely faster in a string that is more stretched).

The bass strings in a piano are heavier and longer than the treble strings, it therefore takes a greater amount of time to produce its longitudinal wave. The increase in mass is produced by a procedure known as over winding. Due to the size of the bass strings, their amplitude is also great. To compete with the greater amplitude of the bass strings, mid-range strings on a piano are also over wound and have two strings per note. The higher range notes in the piano have three strings per note, but are not over wound.

Piano strings like all stringed instruments are tuned by adjusting the tension T of the strings. By increasing T the piano tuner also increases the frequency F. However by adding a preparation to the string the length of the string L is also altered as mentioned previously.

### 3.6: Sonographic Analyses

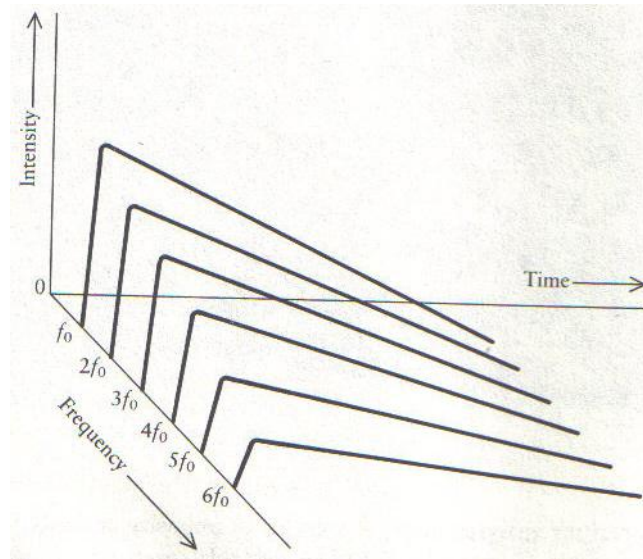
With a sonograph it is possible to analyse the differences that arise in terms of sounds produced by preparations in performances and by using software called 'audiosculpt' developed at IRCAM in Paris, and an open source audio editor called 'audacity', it has been possible to analyse recordings.

It must be made clear, however, that the sound of the collision of the hammer and string may have some impact on the sonogram, producing background noise.

Using the research carried out in chapter two, it can also be demonstrated how subtle variations in preparation positioning can greatly alter the effect produced. By analyses of recordings made, where variables such as distance along string and depth of wind down of preparation are finely altered, (but using the exact measurement gained from the research in chapter two) it will be possible to show the sound that Cage may have heard when preparing his piano, because of the exact weight and position of the preparation. Obviously the main problem encountered here is the type of piano used. Later in the chapter this variability will be discussed. To be able to record the preparations it has been essential to use a Digital Hard Disk Recorder – M Audio Micro Track II (XLR input) and an AKG 414 condenser microphone.

The basic function of sonograms is to approximate the differences in frequency and amplitude. Using narrow band filters it is possible to analyse the acute differences in frequency between different prepared pianos. Intensity is indicated by the darkness of the shading.

The sonograms show horizontal striations representing the individual harmonic partials of the prepared note being analysed. The intensity of partials change with time. This is demonstrated in the perspective drawing below, which is not mathematically accurate. However it does highlight that with the commencement of a sound, intensity rises to a peak and as the sound expires so does the intensity.



**Figure 36: Frequency/Time Intensity Graph**

### 3.6.1: Individual Screws analysed for different winding depth

In the research of chapter two, it has become apparent that there are three large areas of ambiguity when considering aspects of preparing the piano for performance; these are

1. What type of preparation should be specifically chosen (size of screw, bolt etc.)
2. What distance should the screw or bolt be wound down between the string (this shall be referred to as winding depth)
3. Is there a great difference if the preparation is adjusted slightly to gain a better sonic effect?

With the assistance of sonographs it is possible to analyse points two and three. From the research carried out on Cage's preparations for the *Sonatas and Interludes*, it became obvious that on some of the preparations Cage had favoured a particular winding depth, as there was more wear at particular rungs of the preparations. To be able to analyse whether winding depth creates a significant difference in the sonic effect, a screw measuring 1 ¼ inches in length was situated at six inches from the dampers, and the winding depth was calculated by counting the amount of rungs that the screw was to be wound down. Three variables were used in this analysis; counting down from the very top rung of the screw; three rungs, which meant that most of the screw was below the strings, six rungs, which meant the screw was wound down half way and ten rungs which meant that the predominant amount of the screw shaft was above the strings.

From the sonographic images below it can be seen that the lower partials produced from the note are very strong, with the strongest partials being produced around the fifth octave of the piano between C5 and G5. The largest notable difference is in the upper most partials produced. The screw that had a winding depth of ten rungs produced considerably more partials than the screws that had a winding depth of three and six rungs. The strongest upper partials produced in the ten rung depth sound in the eighth octave of the piano, producing notes C8 to G#8, almost an octave more than the other two winding depths. The reason for the higher partials is likely due to the fact that the screw is not as constrained and adds to the vibration of the piano string, as it is not restricted. However, the amount of difference it would make to the sonic effect is debatable. As it is so high, the partials are more likely to be faint and barely audible to the human ear. The lowest partials in the ten rung winding depth do not appear 'cleanly' on the sonographic image and give the impression that the lower partials produce a sonic effect that is dense and 'muddy', whereas the screws with the winding depths of three and six would produce a sonic effect that is brighter sounding. The screw that has a winding depth of three rungs produces very strong (darkness of the striations) and a greater quantity of mid-range partials C4 to G6. This gives the impression that the partials produced are more in keeping with the note had it not been prepared. It is interesting that the middle partials from all three winding depths have a fairly similar strength and pitch, meaning the sonic effect produced would be quite difficult to distinguish by a human ear.

### Screw 6": 3 Rungs

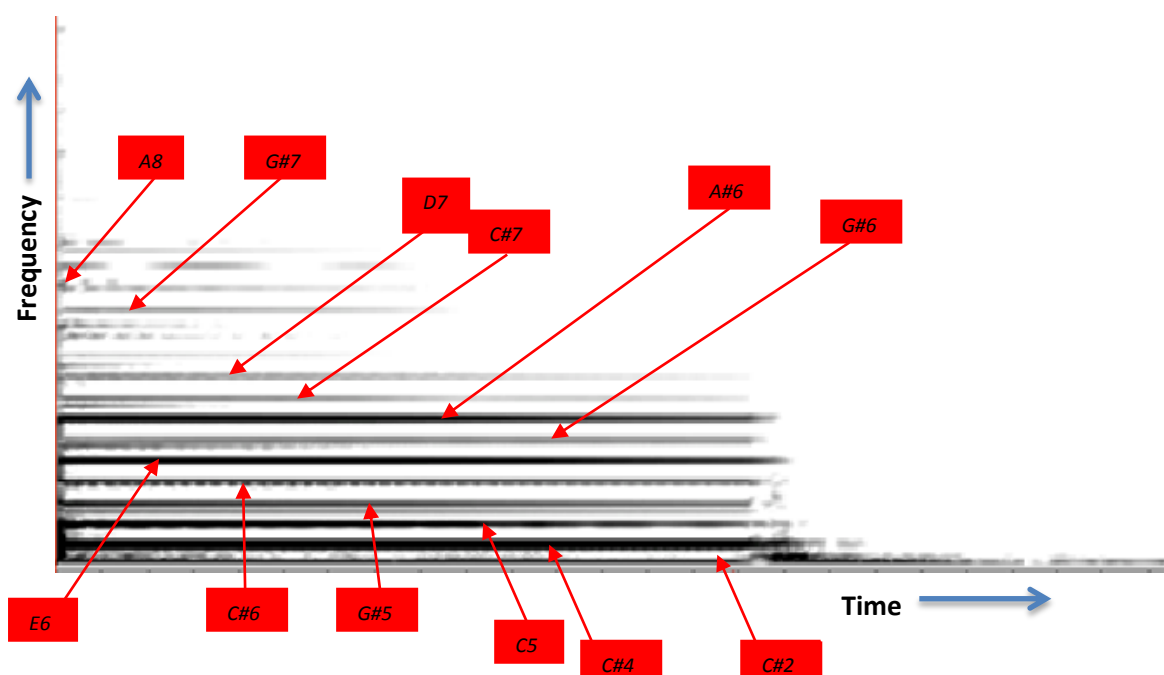




Figure 37: Pitch matrix for Screw 6": 3 rungs

### Screw 6": 6 Rungs

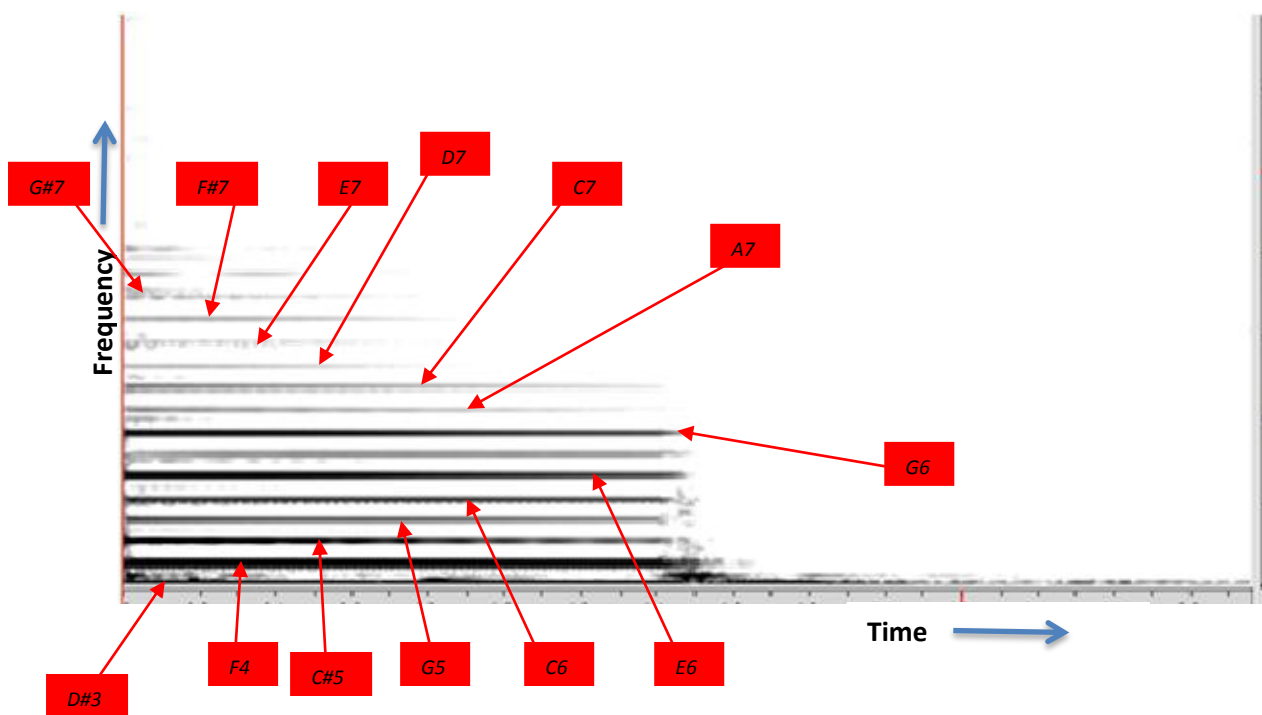




Figure 38: Pitch matrix for Screw 6'': 6 rungs

### Screw 6'':10 rungs

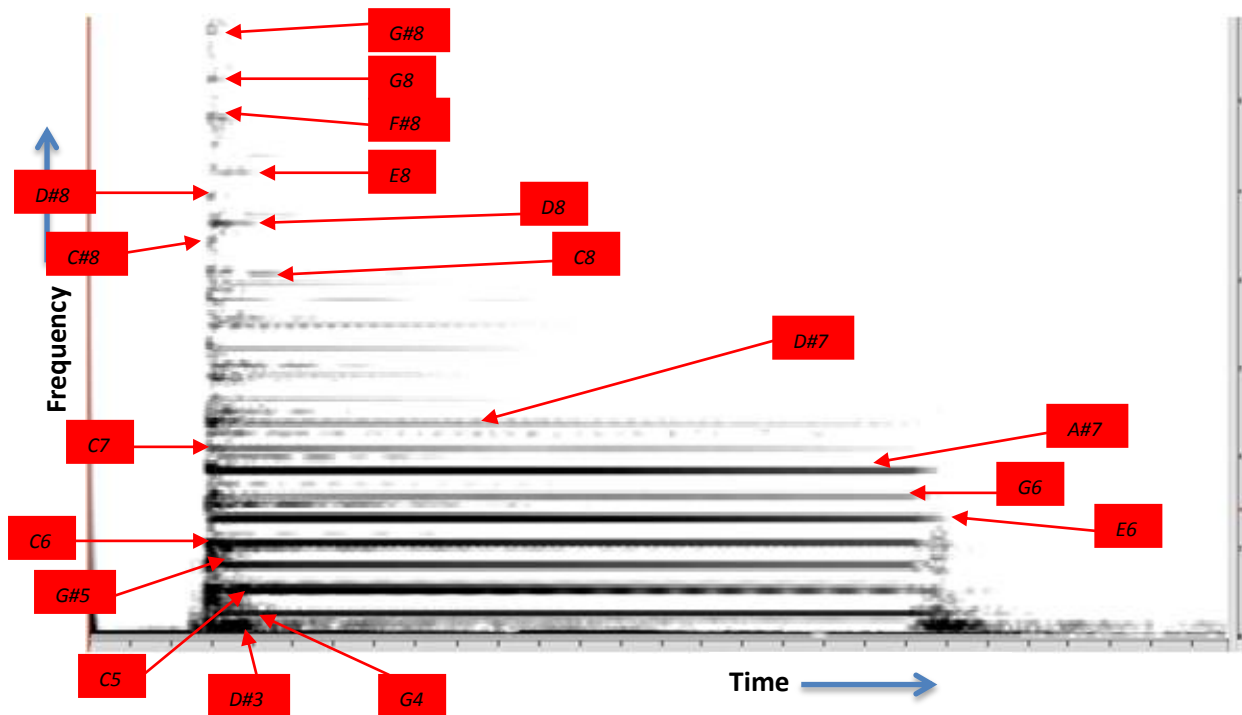






Figure 39: Pitch matrix for Screw 6'': 10 rungs

### 3.6.2: Individual Bolts analysed for distances from the damper

Point three alludes to the fact that many performers only take Cage's measurements as to where a preparation should be situated, as a guide and not as definitive. Cage would realise that the differences between types of pianos could not be catered for in his instructions and performers would have to choose the positioning by experimentation – in most performances of prepared piano music experimentation means adjusting the preparation slightly to create a more interesting sonic effect.

By submitting a preparation to sonographic analysis it is possible to test to what extent experimenting with a preparation can alter the sounds that are produced. Here is one example:

A bolt 1 ½ inches in length was inserted between the strings of the piano, it was wound to a winding depth of 15 rungs (the thread of this bolt was very fine). The bolt was then positioned at three different distances from the dampers; six inches, seven inches and eight inches.

The sonographic images of the bolt positioned at six and seven inches from the damper produce a result with quite similar effects as the bolt six inches from the damper produces stringer partials in the seventh octave of the piano, A#6 – C#6, with the bolt positioned six inches from the damper producing strong partials in the fifth octave of the piano B5 – F#5. The strongest partials produced by the bolts at six and even inches from the damper appear in the lowest octaves between G1 and D2 and, although the bolt at eighth inches does produce a low partial at G#1, compared to the other bolts, it is not strong (the striations are quite faint). The sonographic image of the bolt at eight inches from the damper demonstrates partials that are not strong, producing its strongest partials at F3 and D#4. The likelihood that there are less partials produced at this point is that the positing of the bolt is

probably closer to a node which creates a restriction in the strings excitation, demonstrating that the slightest movement towards or away from the dampers can have an effect on the sonic effect produced.

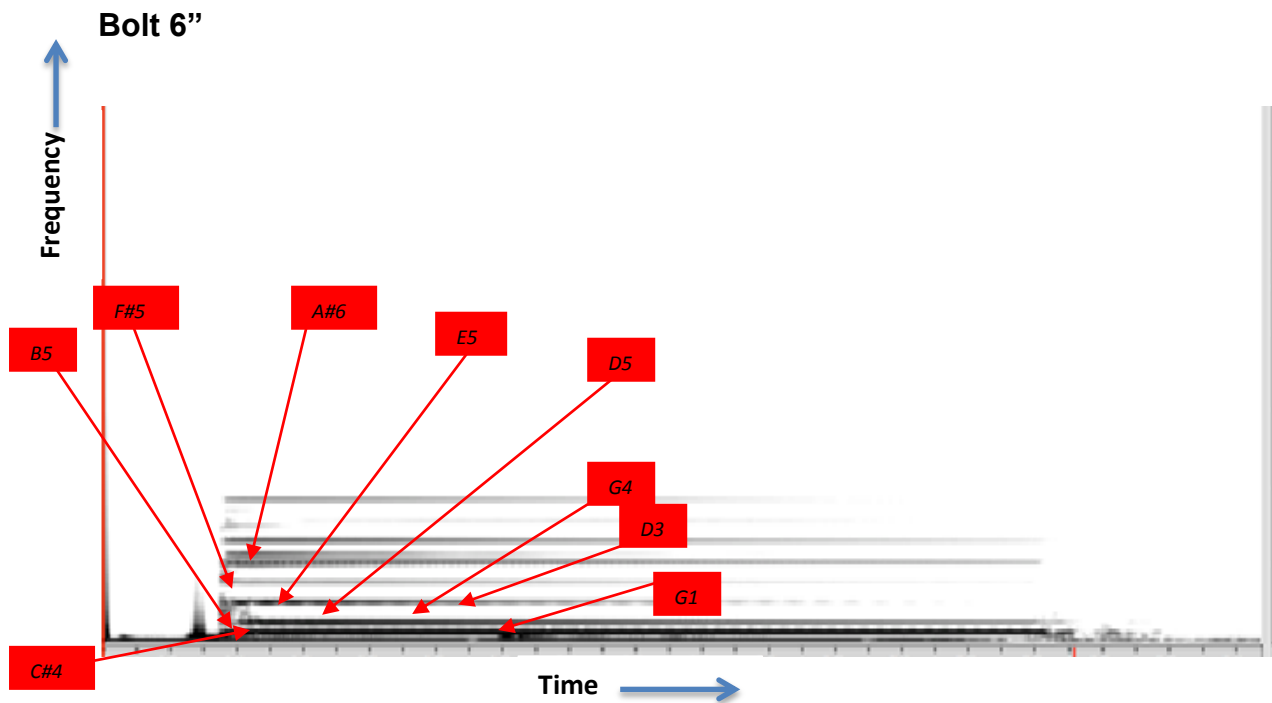


Figure 40: Pitch matrix for bolt 6"

## Bolt 7"

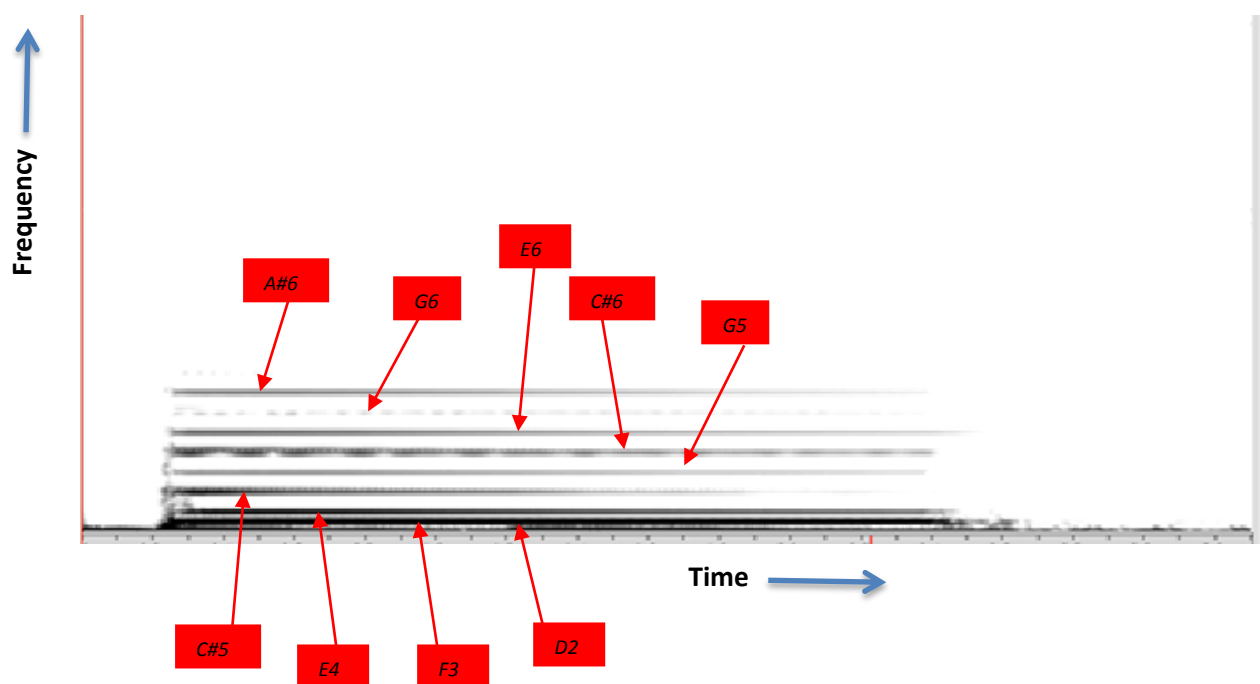


Figure 41: Pitch matrix for bolt 7"

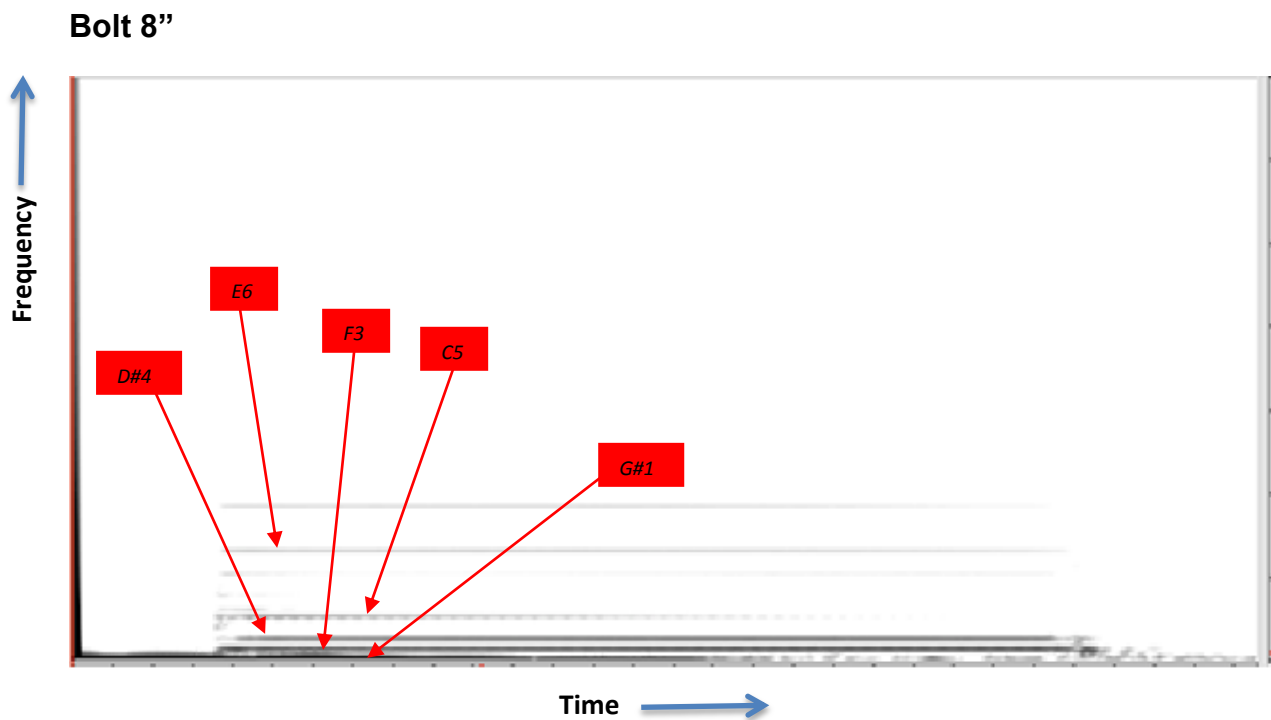


Figure 42: Pitch matrix for bolt 8"

### 3.6.3: Individual Notes Analysed from Seven Different performances

If each performer takes Cage's instructions as a starting point and then experiments with the preparations to create the best sonic effect, is there a big difference between performances and is one performance more accurate than another? Using sonographic analysis has made it possible to analyse different performances of *Sonata 1* from Cage's *Sonatas and Interludes* for prepared piano by different pianists and assess the differences in sounds produced during performance.

Two prepared notes have been isolated and chosen for the analysis. These are an Eb and D from bar 19 in *Sonata 1*. Both these notes are prepared, Eb with rubber and a furniture bolt with nuts and D with a furniture bolt. The reason for isolating these particular notes, is that they are notes that are not affected by any other note; they are not part of any chord or counterpoint, and so will give clear notes not distorted by any other.

It must be reiterated however, that the sound of the collision of the hammer and string may have some impact on the sonogram, producing background noise. It should also be mentioned that this analysis is not judging whether one performance is 'better' than another, but is analysing the difference in sonic effects produced by the positioning of the preparations.

The seven performances are:

1. Mario Ajemian Sonata 1: 25 Year Retrospective Concert, New York Town Hall, 1958
2. Yuji Takahashi Sonata 1: Fylkington Recording
3. Herbert Henck Sonata 1: ECM Records
4. Mario Bertoncini Sonata 1: DAAD
5. Yuji Takahashi Sonata 1: Denon
6. Robert Miller Sonata 1: New World Recording 1976

The choice of performances is quite interesting, however. The first recording performed by Mario Ajemian and taken from Cage's 25 year Retrospective Concert is intriguing as Cage would have been actively involved with this concert. It is very likely that he would have been advising performers of his pieces, and also likely he advised Ajemian with choices of preparations.

Recording two and five are both performed by Yuji Takahashi but the sound produced in performance is very different. This highlights the fact that many factors need to be taken into consideration when judging the sonic effect of the preparations – certainly the type of preparations and the piano being prepared, but also variables such as concert venue and the temperature of the performance space will affect the sound produced by the preparations.

Performance seven is performed by Robert Miller. This recording is interesting as Cage again was present at the recording and assisted the sound engineers. It is a strong possibility that Cage would have had some impact on the positioning and type of preparations used.

## Performer 1: Maro Ajemian 25 Year Retrospective Concert

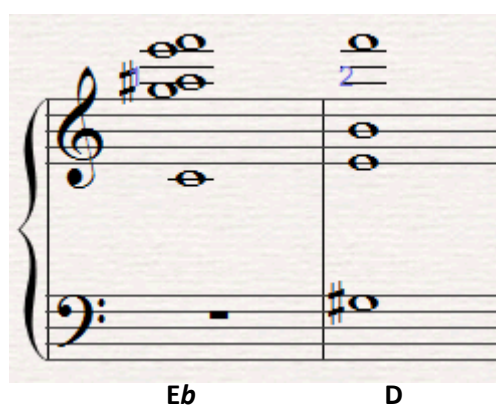
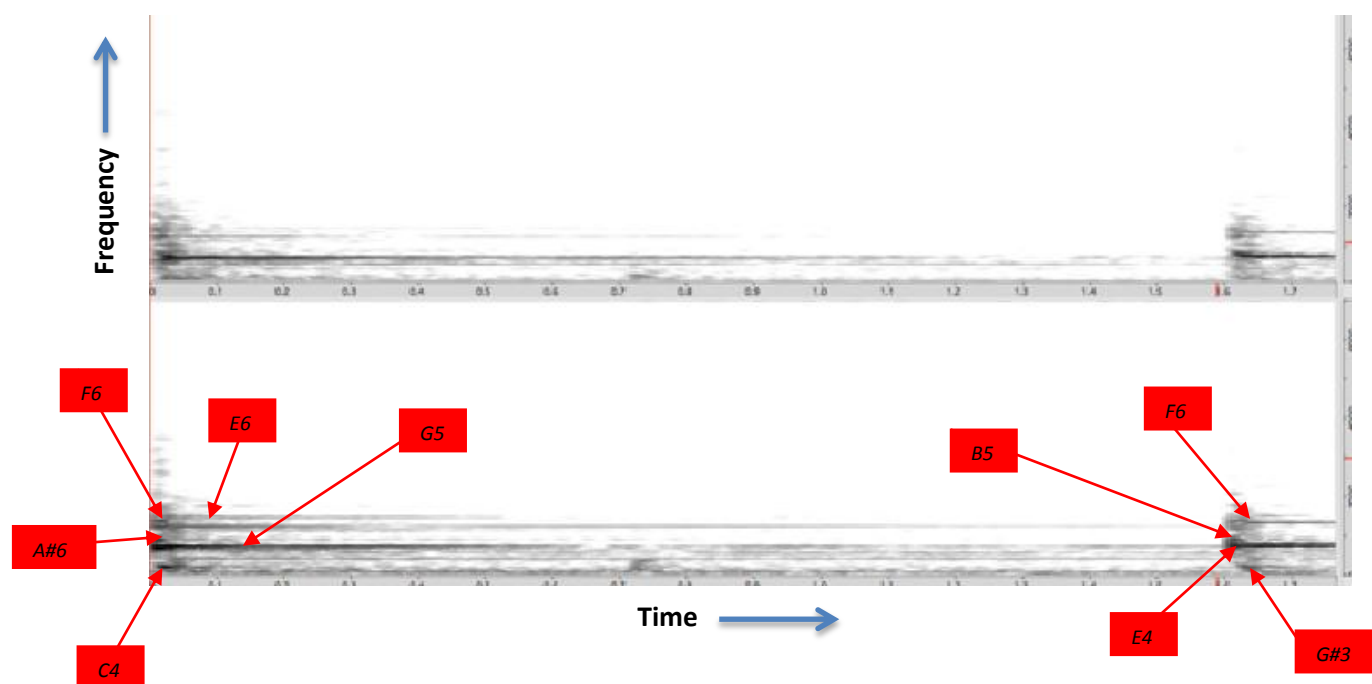


Figure 43: Pitch matrix for Maro Ajemian 25 Year Retrospective Concert recording

Performer 2: Yuji Takahashi, Fylkington Recording

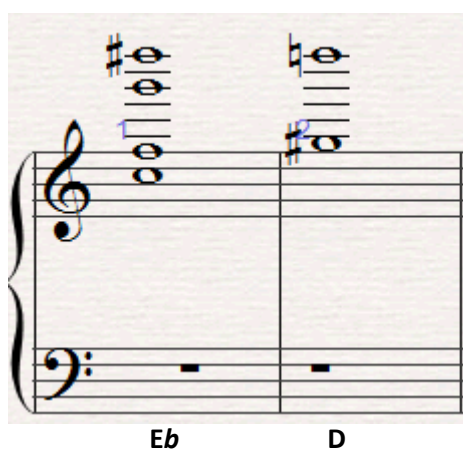
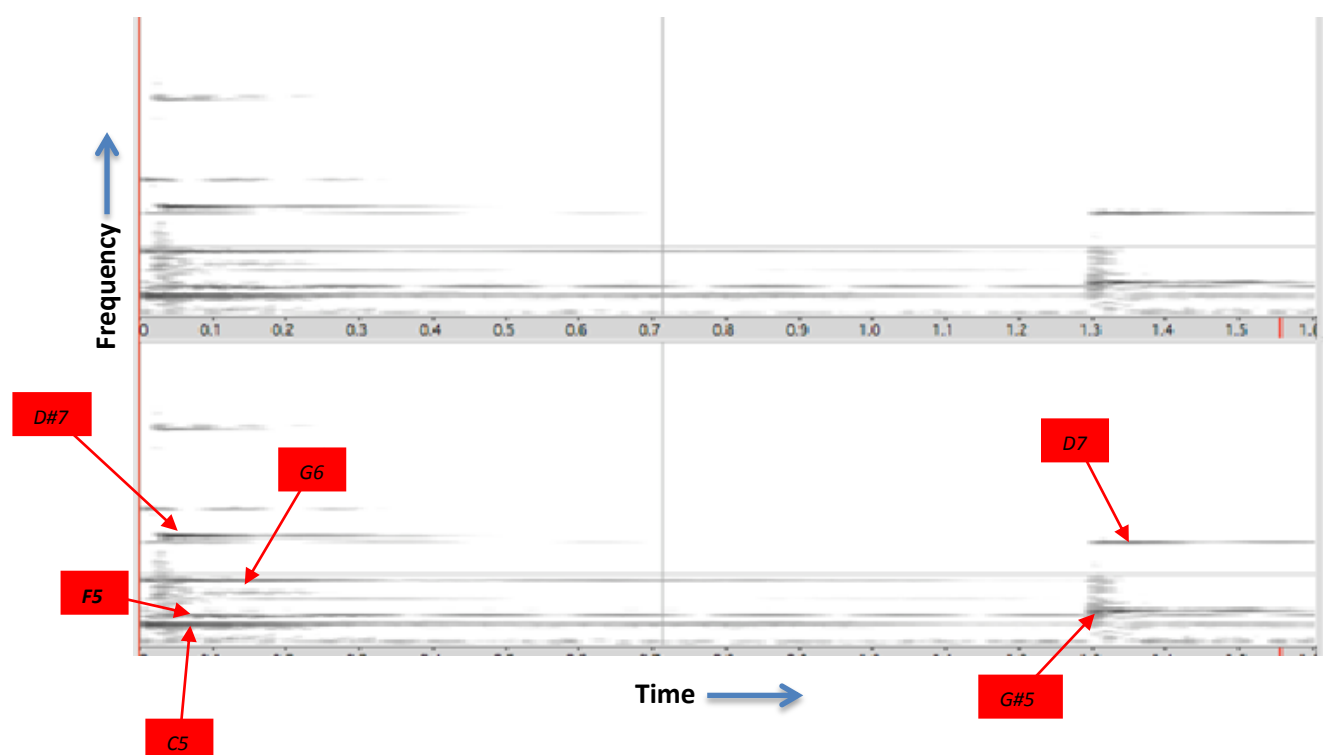


Figure 44: Pitch matrix for Yuji Takahashi,  
Fylkington Recording

### Performer 3: Herbert Henck, ECM Recording

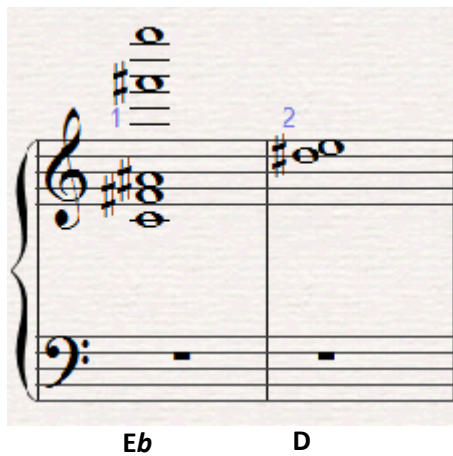
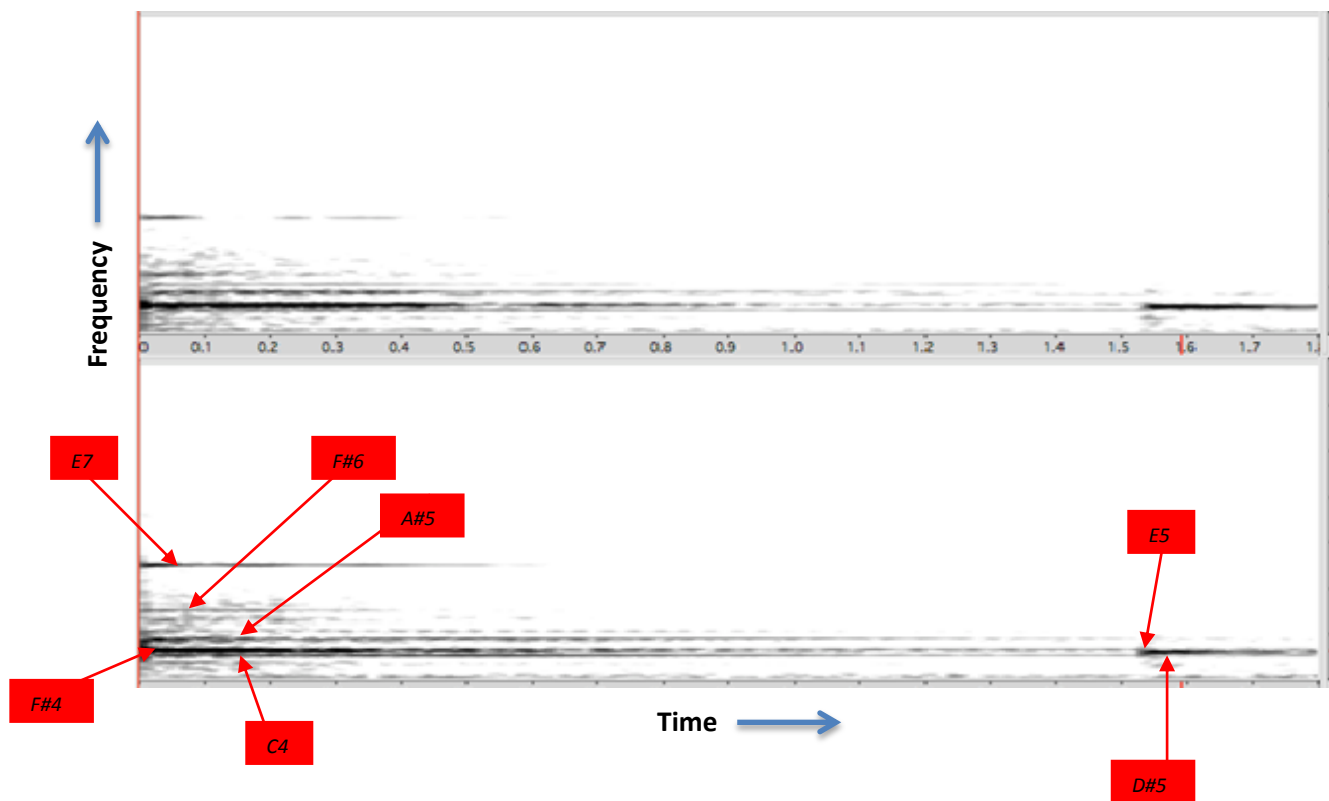


Figure 45: Pitch matrix for Herbert Henck, ECM recording



## Performer 4: John Tilbury, Explore Recording

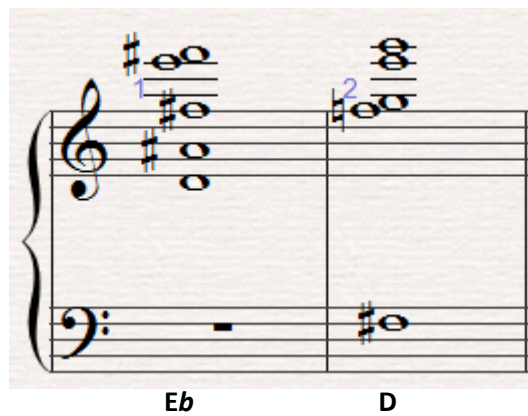
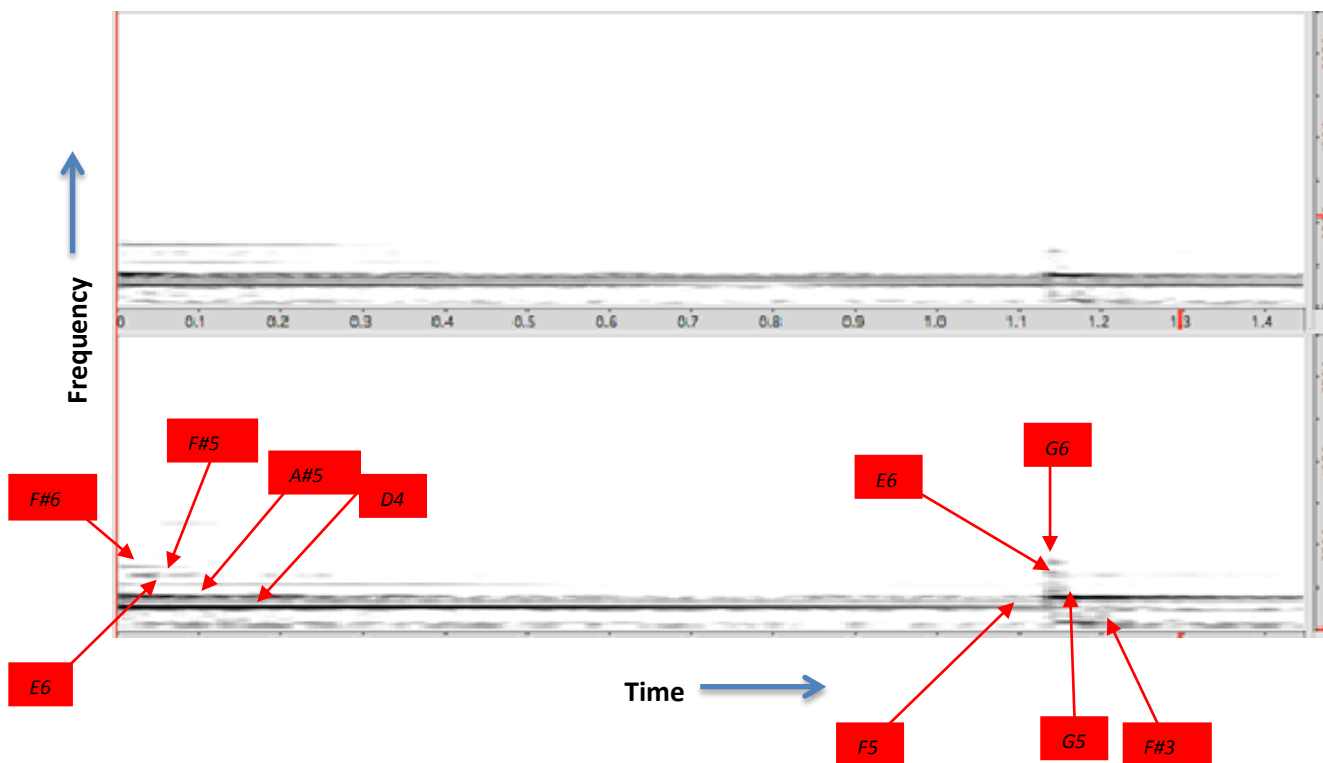


Figure 46: Pitch matrix for John Tilbury, Explore Recording

# Performer 5: Mario Bertoncini, DAAD Recording

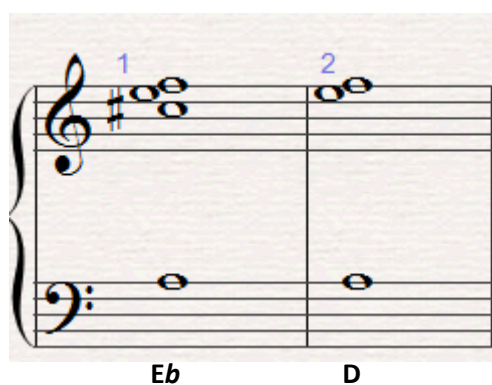
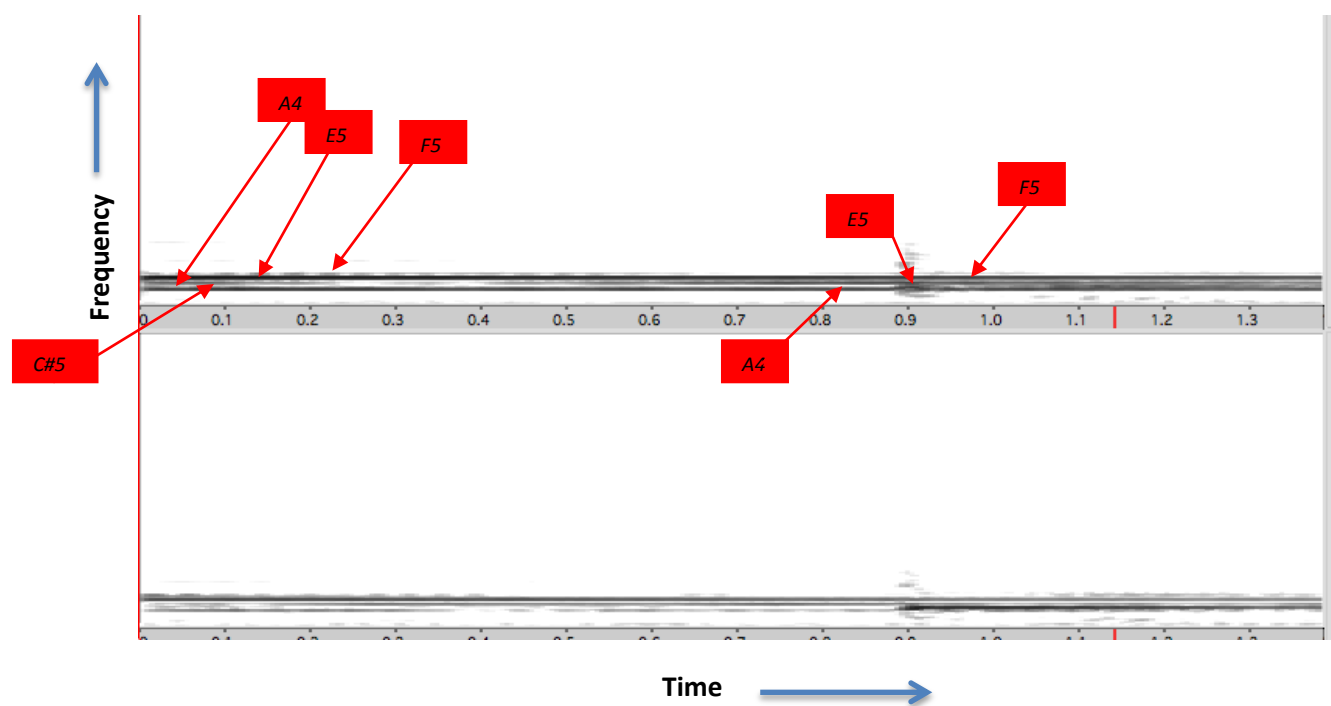


Figure 47: Pitch matrix for Mario Bertoncini, DAAD Recording

## Performer 6: Yuji Takahashi, Denon Recording

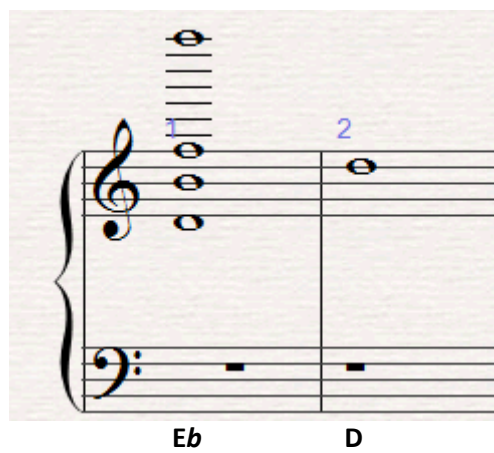
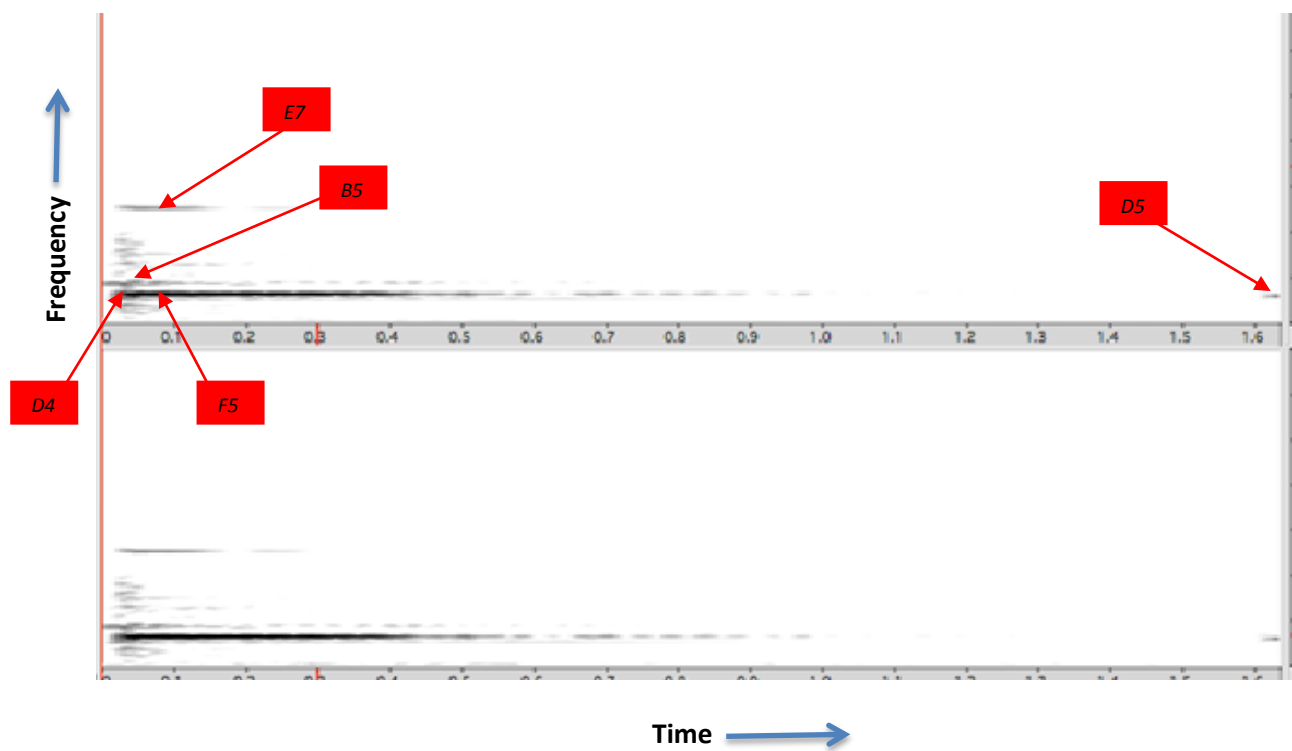


Figure 48: Pitch matrix for Yuji Takahashi, Denon Recording

## Performer 7: Robert Miller, New World Recording

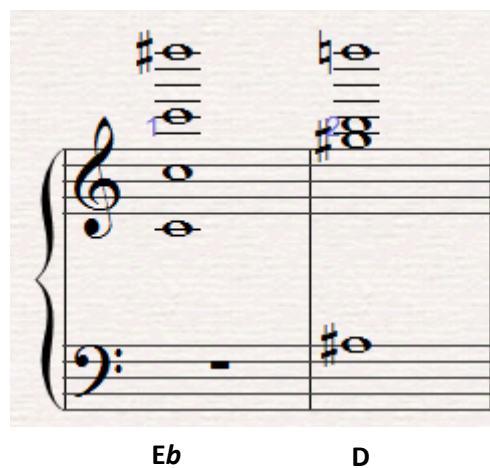
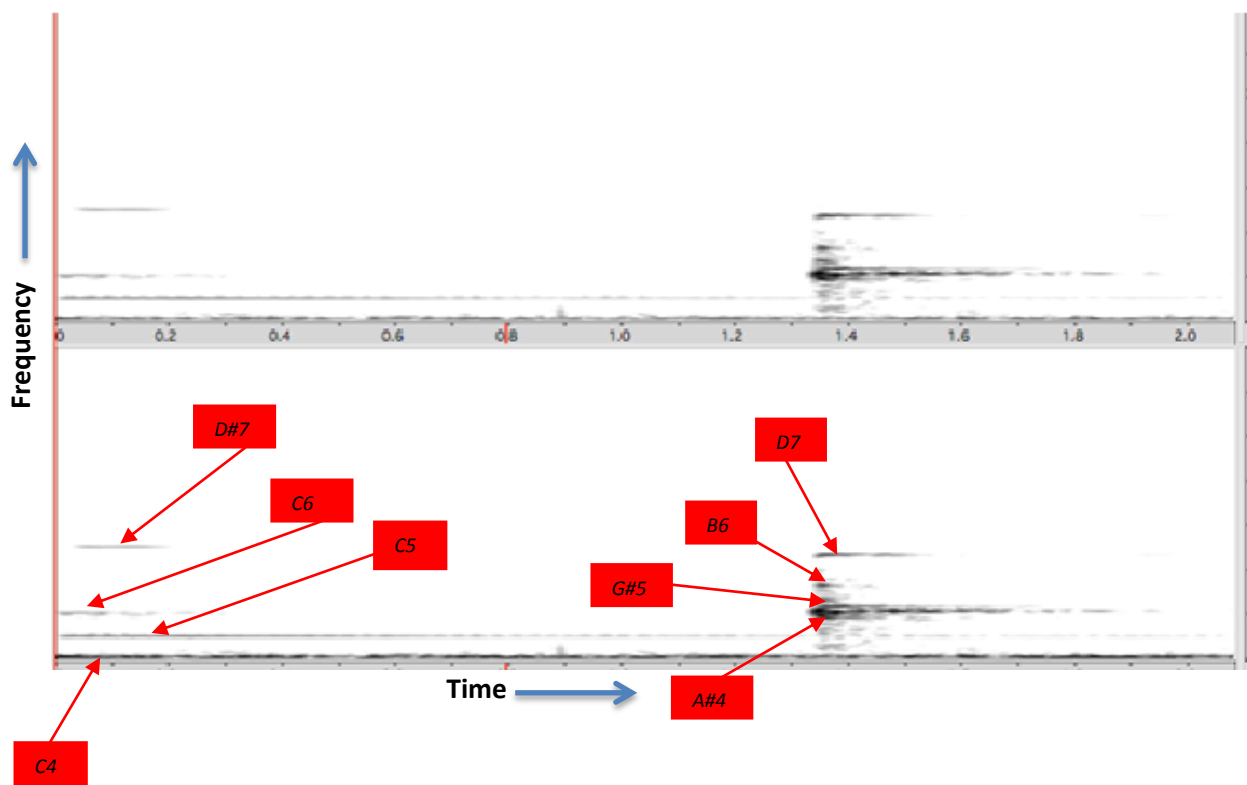


Figure 49: Pitch matrix for Robert Miller, New World Recording

The notes analysed in performance one produce similar partials, with the Eb the strongest striation is the G5 and with the prepared D it is E4. Both notes achieve partials ranging to an F6, but higher partials although faintly visible from the sonogram will be barely audible.

The partials in performance two are strongest mid-range with C5 the strongest partial for the prepared Eb and G#5 for the prepared D. The prepared D doesn't produce any other strong partials; however the D7-D#7 pitch is prominent in both prepared notes.

It appears there is little effect on the prepared D in performance three, as it doesn't produce any striking striations apart from D#5 and E5. The C4-F4 range is strong in the prepared Eb and the highest audible note is again in the seventh octave at E7.

What is apparent about performance four is that the D5 which is strong in the Eb prepared notes appears to 'bleed' into the effect produced by the prepared D. The mid-range partials are strongest in the prepared Eb, with D4-F#6 being particularly prominent. The highest audible partial for the prepared D, albeit faint, is G6.

There is no difference between the partials produced by the preparations in performance five, and the sonograph alludes to their being hardly a change of note; this is demonstrated by the solid striations that lead from the prepared Eb to the prepared D. The partials that are present in both notes are A4, E5 and F5.

Performance five produces strong partials on the prepared Eb at the range D4-F5. However, the prepared D appears to be hardly sounded at all by the performer. This could be an example of what Cage was suggesting when he mentions cadences, and that the best way to experiment with preparations is to make sure that they work with the cadences of the piece.<sup>310</sup> This concept will be examined in chapter four. The two particular notes are played at a cadential point in the piece where the Eb is 'stressed' with relief on the D. However, in performance seven, the sonogram suggests that the opposite happens. The prepared Eb produces few partials suggesting that it is played softly and the D produces a greater amount of darker striations, suggesting more force was used when depressing the key. However, as in performance two the D7-D#7 is prominent.

The sounds that are produced by the piano are said to be periodic consisting of related frequencies or partials of related frequencies. The frequencies of sounds are perceived as pitches to human ears. However, along with pitch, the human auditory system also perceives other qualities in the sounds, such being the quality of the sound produced, which may be described with reference to the

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<sup>310</sup> DVD *'Margaret Leng Tan: The Works for Piano 7'* (Mode Records, Mode 158: 2006)

'brightness' or 'dullness' of a sound. It can be said that a sound which is predominated by low frequency partials is 'duller' sounding than a sound which consists predominantly of successive higher sounding frequency partials, which are said to sound 'brighter' or 'buzzy'.

It can also be said that the prepared piano is not a linear system. The frequency that is put in is not the frequency that comes out. Unlike a sine wave which is linear and produces exactly the same in and out, the resultant output from a prepared piano is inferior to its input. If the amplitude of the attack is changed by hitting the key harder, the corresponding amplitude expressed does not equate to a corresponding increase. It is not the same in a prepared piano.

When the piano string is set into motion due to the collision between hammer and string the resultant vibration is found to consist of different patterns of vibrations called modes. The vibration of each mode is found to exponential in that it loses a fraction of its amplitude in successive periods of time. This is most prevalent to the prepared piano. Because the preparation acts as a mute on the string, it deadens the vibrations of the string to a varying extent, thus producing another decaying effect on the mode of vibration.

Under sufficient tension a piano string can vibrate in more than one frequency, the lowest frequency being the fundamental frequency, and that which is the dominant sound. As previously stated, the vibrations travel the distance of the string with a constant velocity and are reflected at the cessation of each string. An example of such can be found below where  $v$  is velocity and  $f$  is frequency and  $L$  is length. Because the wave travels the string twice due to the echo effect the length of the string is doubled  $2L$ , this can also be described as the wavelength,

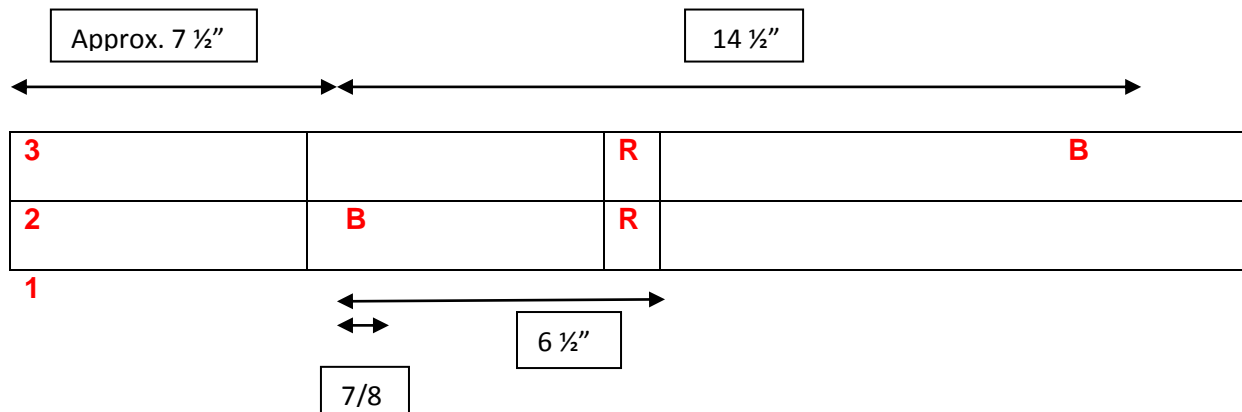
$$f_0 = \frac{v}{2L}$$

#### **3.6.4: Virtual Analysis of a prepared string**

To demonstrate how the above equations work, they can be applied to a particular string that has been prepared in John Cage's Magnum Opus the *Sonatas and Interludes*. It is important to note that the calculations used here are to demonstrate the effects of the preparations and are approximations to enable a clear expression of the effects.

Consider the string C4 (Middle C) in the *Sonatas and Interludes* this string has a length of 62.6cm or 25 inches. The preparations specified for this string is a bolt, between strings one and two, 14 ½ inches from the damper. Cage also places a bolt between strings two and three, 7/8 inches from the damper, and rubber, over and under between strings one, two and three, 6 ½ inches from the damper.

A representation of this may look as follows, where B is the bolt and R is the rubber.



**Figure 50: Virtual representation of a prepared piano string**

The individual effects of each preparation on each string may act like the following:

### String 1: Bolt, Rubber

A bolt influencing mode one or the fundamental. The anti-node is present at 12 ½ inches from the tuning pegs. The anti-node is always half way along the string.

The effect of the bolt can be worked out by applying the equations stated previously

$$\frac{\text{Maximum reduction in frequency}}{\text{Original frequency}} = \frac{\text{Added mass}}{\text{Original mass}}$$

The original volume of the string = 62.5 cm (length) x  $\pi$  x  $0.05\text{cm}^2$  (area of the cross section) =  $0.491\text{cm}^3$  (this is the original string volume)

Multiply the original string volume by the density of the string to give the total mass of the string. The density of the string =  $7.8 \text{ g/cm}^3$  (grams per cubic cm). Therefore the max weight of the string is 3.82g.

Original frequency (of middle C) = 261.63 Hz

$$\frac{\text{Maximum reduction in frequency}}{261.63} = \frac{2g}{3.83g} = 137 \text{ Hz reduction}$$

2 grams is the original mass of the preparation, and 3.83 grams is the mass of the string without a preparation. This tells us the difference between the old frequency and the new prepared frequency.

Since the bolt is 22 inches from the tuning pegs, and the anti-node is at 12.5 inches, the preparation would be expected to have about 20-30% of the total effect. This is equal to an approximation of 27-41 Hz. This would give a total frequency of 220-235 Hz. This can be equated to a pitch somewhere between the A and B below middle C, i.e. between one and three semitones difference.

The bolt is placed three inches from the end of the string (bridge end). In order to find out which modes will be affected, the ratio of the position of the bolt compared to the total length of the string is considered. This ratio is  $\frac{3}{25}$  which is not a whole number fraction of any of the lower partials; therefore it is not likely to impede any partials. However, it is close to the anti-node of the fourth partial, 3.125 inches from the bridge, in fact  $\frac{1}{8}$  inch away. This may have some dampening effect on the fourth partial as the size of the bolt is likely to exceed  $\frac{1}{8}$  inch in radius. This is why it is important to know such things as the size of the head of a bolt or nut, and the depth it can be inserted. Due to the taper on bolts and screws, the string spreads further apart, increasing the tension of the string and resulting in a higher pitch. The main effect of the rubber will be to decrease the resonance of the strings and dampen vibrations. The position of the rubber is at  $6 \frac{1}{2}$  inches from the dampers. This corresponds to approximately 14 inches from the tuning pegs. The rubber is placed close to half way along the string but not exactly, it is actually placed at 0.56 inches. This will have the effect of dampening all of the lower partials, including the fundamental. In this instance the position of the rubber was probably chosen exactly for this purpose, as it neither selects specific partials for dampening, nor avoids dampening others.



## String 2

In addition to the bolt considered above which prepares string one, an additional bolt is required for string 2 and is presented at 7/8 inch from the damper. This corresponds to 8.375 inches from the tuning pegs. This position is roughly 1/3 of the distance from the tuning pegs to the bridge. This bolt is therefore likely to dampen partials except those that are multiples of three. Therefore the third, sixth, ninth etc partials will be relatively increased in resonance compared to others. However, the additional effect of the other bolt will be to dampen other partials including those which are multiples of three. It is therefore likely that the final frequency is between 130-145 cycles per second (the effect has been scaled up due to the closer proximity to the antinode that increases the dampening effect. This gives a pitch around C3 (C below middle C) to the adjacent D.

## String 3

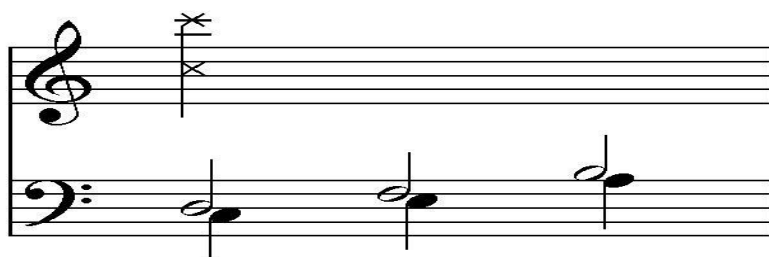
String 3 is a similar case to string 1 in that (in addition to the rubber), a single bolt is in direct contact with the string. This bolt is at 7/8 inches from the dampers. As mentioned in the consideration of string 2, this is approximately 1/3 of the distance of the whole string. This has the effect of dampening the partials except those that are a multiple of three. In contrast to string 2, the additional bolt is not present, so the relative increase in resonance may be more noticeable on string 3. The effect on frequency caused by the additional weight is

~137 cycles per second reduction (calculated as in string 1)

But the bolt is closer to the antinode, giving approximately 60-70% of its effect.

Therefore the final frequency is 166-179 cycles per second, and the final pitch will be between E3 (below middle C) and the F adjacent. Assuming a final frequency from string 3 of ~175 cycles per second, the enriched partials (the 3<sup>rd</sup>, 6<sup>th</sup>, 9<sup>th</sup> etc) are approximately:

- 525 cycles per second (Hz) about C above middle C (C5)
- 1050 cycles per second (Hz) about C 2 octaves above middle C (C7)
- 2100 cycles per second (Hz) about C 3 octaves above middle C (C8)



**Figure 51: Notated example of total effects on C4**

A filled in note and an open note next to each other denote that the actual pitch will be somewhere between these two pitches. X indicates a partial frequency (harmonic). All these notes will be partially dampened.

# Chapter Four – Analysis

## 4.1: Context

The predominant concern of this thesis is the production of sound through the preparation of pianos relating to the solo prepared piano music of John Cage. Chapter four will therefore use certain solo prepared piano pieces as case studies to highlight the major areas of analysis concerning the production of sound. By acquiring such an understanding of the solo prepared piano works through analysis it will be possible to gain (particularly for the performer) a greater appreciation of the results of preparing the piano for performance in terms of the sounds that are created, realise a better impression of the texture of the pieces and achieve a better perspective of the role of the pianist.

Traditional analysis of Western notated music is based on what is seen in the score. When dealing with music for prepared piano, the analyst does not have this luxury and therefore traditional modes of analysis become limited, but potentially useful. The link between traditional musical notation and the sound actually produced was de-constructed with the invention of the prepared piano. As Yasunao Tone describes, this causes a 'rupture between notes (the concept of pitches on sheet music) and actual auditory images (the pitches' representation), which is also a rupture between signifier (note) and signified (played pitch).<sup>311</sup> This idea of a rupture in the tonal system can also be highlighted with reference to linguistic terminology. Tone uses the example of Saussure to demonstrate this idea. In his publication 'course in general linguistics'<sup>312</sup>, Saussure intimates that language and writing are systems of signs, with the sole purpose of writing being to represent language.

The linguistic sign unites not a thing and a name, but a concept and a sound image. The latter is not the material sound – a purely physical thing – but the psychological imprint of the sound, the impression that it makes on our senses [...]<sup>313</sup>

If 'writing' is substituted for music (notation) (notes on a page) and 'language' is substituted for sounds (produced by playing the notes on the page) until the chain of events leads to music, then traditional

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<sup>311</sup> Y. Tone, John Cage and Recording, Leonard Music Journal, 13:2003: p. 13.

<sup>312</sup> The Cours de linguistique générale by Saussure completed by Bally and Séchehaye in 1922

<sup>313</sup> J-J, Nattiez, Music and Discourse: Towards a Semiology of Music, New Jersey, Princeton university Press, 1987, p. 3.

analysis concentrates upon the bond between keyboard and notes played on it and the sounds produced by the pianist thereafter.

The prepared piano, as Tone describes it, is a 'problem of signs.' There is no link between 'writing' and 'language' – one does not represent the other. Therefore to examine the link between sign, interpretation and object with relation to Cage's prepared piano music, it is feasible to follow the model set by American philosopher Charles Sanders (CS) Peirce, which states that there is an *object* (notation), which is *interpreted* (by the pianist who prepares the piano for performance and determines how to execute the event), therefore creating a third sign (the sound).

Taking Peirce's realisation one could look at notation as an 'arbitrary sign'. A sign becomes arbitrary when it is only convention that stops it denoting its traditional meaning. If a musician were to look at notation and see a particular pitch, described by a Westernised musical symbol, they would automatically know what the relationship was between symbol and sound, or if one were to align this with linguistic theory, it could be said that the signifier (the note on the page) through connotations produces the signified (the sound that is produced) – the relationship between notation as signifier and sound potentially produced, pre-supposes previous levels of signification; essentially there should be a link between seeing and hearing.

There is a basic communication premise at the centre of Peirce's model. There is always an intended idea or message which is channelled to a 'receiver' through a 'transmitter', after being received there is a 'response'. The transmitter can be described as anything or anyone that produces the music e.g. John Cage as composer or pianist. The message is the music (but as it sounds, not as it looks on the score) and the receiver is anyone that hears the music. What Peirce says via Tagg is that the intended message (the music) is 'what the transmitters want to get across – the right sounds at the right time in the right order creating the right 'feel'.<sup>314</sup> Transmitters (such as Cage) do not tend to articulate what type of feel they are intending. In fact the closest Cage has got to, is by describing the effect of the prepared piano in general in the score to *Amores*. This, therefore, results in the creation of two factions, which Tagg would describe as 'codally competent' or 'codally incompetent'. Codally competent listeners are from the same 'cultural' background. They would know Cage's music well

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<sup>314</sup> P. Tagg, Introductory Notes to the Semiotics of Music, Conference Paper, Liverpool/Brisbane, July 1999, p. 3.

and be fully aware of the effects intended when preparing a piano for a performance of Cage's music. However, can anyone be 'fully' aware of the effects intended? (To some extent even Cage himself would have been unaware; most of the sounds used in his pieces were created by experiment prior to committing the music to paper.), There is no criteria for judging whether a preparation is 'poor'; this may lead to codal incompetence that arises when transmitter and receiver have no shared understanding; the result would be poor preparation of the piano.

A third level of understanding could be discussed here; Tagg refers to this as Codal interference. Codal Interference occurs when transmitter and receiver share understanding but have a different expectation of the understanding. Would a specialist in Romantic piano music play Cage's prepared piano music in the same way as a specialist in contemporary piano music? Both performers (receivers) have the same understanding as the transmitter (Cage) and understand his notations, but the codal interference *could* affect the way the 'Romantic' receiver interprets the signs. Seeing the preparations notated and knowing that there is an amount of flexibility when preparing the piano would the Romantic specialist prepare the piano to a Romantic ideal rather than to what Cage had intended (the right sounds at the right time in the right order creating the right feel). Essentially this question seems more relevant to the actual interpretation of the music (i.e. post-preparation), rather than to the act of preparation itself, which would seem to depend upon no other tradition. However, taking into account Cage's consideration of cadences as mentioned in the previous chapter, then surely the way one prepares a piano inherently affects the way a performer performs. If there is a gestural feature in the music that is heightened by a preparation and is coming at a moment in the piece where one might associate a climax to be, (maybe with reference to a particular tradition in music) the way that climax is approached would differ stylistically.

Alternatively it could be asked, 'is it ok for a piece of music to be transposed?' Essentially this is the same question as asking if particular sounds are justifiable when placing preparations at points in the piano that are not the exact measurements stipulated by Cage. Philip Tagg believes that 'the communicative value of those tones will depend on their synchronic and diachronic context.'<sup>315</sup> Essentially, various factors will always affect the context in which the music is heard, e.g. instrumentation, pitch, timbre, dynamics, acoustics and importantly, when thinking about the prepared

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<sup>315</sup> P. Tagg p. 22.

piano music, what happens before and after the tones produced. Other factors need to be addressed as well, particularly with regard to the performance of the individual tone. The receiver is placing their own value judgments on Cage's prepared piano music by interpreting the guidelines set by the transmitter, and by doing so they are creating an intersubjective precedent. However, Cage's prepared piano sounds do depend on relatively traditional notions of continuity, unlike his later chance derived compositions which do not need to be heard in a synchronic or diatonic text. They have interest in their own individuality and therefore the realisation of such precedence is superfluous.

From a receiver's perspective, transposing a piece by a semitone would not be noticeable (unless that receiver had perfect pitch and a score to hand when listening to the music). The problem inherently lies with the transmitter as they need to transpose. However, with the prepared piano music the receiver is affected because the sonic event is greatly changed when the preparation is moved. One needs to therefore ask the question; how *should* Cage's prepared piano music be listened to?

Therefore, as the focus of this thesis is on the concentration of sounds of the solo prepared piano music, the analysis needs to be conducted from an aural perspective rather than a visual one, in much the same way as a performer would need to begin to analyse the sounds. That is not to say that the score is surplus to requirement. Indeed, the score is essential when analysing the other predominant interesting factor of the music from this period - the micro-macrocosmic structure. The sounds of the prepared piano must really be thought of as distinct from the score – what they sound like, how does the transmission of sound occur, how does sound relate to form and structure, rather than trying to speculate how these things occur by examining the score. With music by a composer such as Cage, who suggests that much of the content of compositions such as the *Sonatas & Interludes* were composed through considered improvisation<sup>316</sup> – by using aural facts (although the existence of an aurally exact representation is being questioned by this thesis) the analyst is drawing conclusions from a set of observations, which pertain to something other than the notated music.

The simplest and most functional way of analysing the prepared piano music is to utilise recordings of performances of the solo prepared piano music by different pianists and compare and contrast the differences. This will highlight the discrepancies between the look of the score and the sound produced. It will not give a definition of the perfect prepared piano performance (and this thesis does

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<sup>316</sup> J. Cage, *Composition as Process*, p. 19.

not attempt to do that) but will describe what is happening in the music. When asked if performances should be the same [an ideal performance] Cage said,

When it's clear that the person who is realizing the work is doing his work not only in the spirit of the composition, but in such a way as to free his choices, then I think it makes no differences what the results are, because we are not interested in results. Results are like deaths. What we're interested in is things going on, and changing, not in their being fixed. But when someone uses a piece like that, that they think is free, in order to do anything they want to do, when I say for instance. "Make a disciplined action," I'm not saying, "Do whatever you like," and that's precisely what some people now think I'm saying [...] the freedoms I've given have not been given to permit just anything that one wants to do, but have been invitations for people to free themselves from their likes and dislikes, and to discipline themselves.<sup>317</sup>

Although this quote relates in context to indeterminate music or indeterminate notations, one could argue that there is still relevance to the prepared piano music due to the indeterminate nature of the resultant sonic events once a piano has been prepared and, as Cage would later comment, that the prepared piano is a feather in the cap of indeterminacy!<sup>318</sup> The other way in which an aural analysis could be conducted is by utilising the research gained in chapter two and constructing an authentic prepared piano. This would however lead to too many variables and would not allow for comparison. Again this chapter is not about proving what is right and what is wrong, merely identifying the different effects that pianos prepared at different times, places and by different performers have. To understand the prepared piano music, access to recordings is vital. Those recordings the best way of conducting an analysis.

Cage had differing attitudes to recording throughout his life. When asked about the elusiveness of his music when people have tried to record it he answered: 'I like live music. I don't stop my music from being recorded because other people like it. But I've always been opposed to records.'<sup>319</sup> However, this eventually changed, 'I now not only don't object to my music being recorded but I even help people to record it. However, I never listen to the records.'<sup>320</sup> The reason why Cage did not listen to the recording may have nothing to do with the fact that they were recordings of his music, as the statement was coming from a person who didn't watch television or read newspapers. However the change in heart may also have been because of advantages that came with recordings; concerning

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<sup>317</sup> J. Cage, *Conversing with Cage*, p. 108.

<sup>318</sup> W. Duckworth, *Talking Music: Conversations with John Cage, Philip Glass, Laurie Anderson and Five Generations of American Experimental Composers*, Da Capo Press, 1999, p. 12.

<sup>319</sup> J. Cage, *Conversing with Cage*, p. 125.

<sup>320</sup> *Ibid.*, p. 138.

the dissemination of Cage's musical ideas. He said 'Even a bad performance may help to educate musicians and listeners to the possibilities of this new work and stretch their capabilities to be interested in their experiences.'<sup>321</sup>

Can a performance of a prepared piano piece be identified just by listening? Do the distinctions between sonic variations caused by ambiguity in preparing a piano lead to the pieces being less recognisable? In reality, the likelihood is that the pieces would be recognised; at the very least the pieces are distinct and identifiable regardless of the judgements made by the performer in preparing the piano. The sound reproduced by playing a record cannot be reduced to the identity of the sound that has been made up of the performance, which in turn is a realisation or translation of the score. This is why analysing the recordings of the prepared piano music is fundamental to understanding the sounds produced when performing the solo prepared piano music.

It has been discovered that there is a certain degree of artistic licence concerning the choices of preparations and the resultant sound with regard to different performances of the prepared piano music (whether justified or unjustified), and this is in large part due to the relationship between the prepared sound and the score. This infers that the whole Westernised notion of notation is brought into question – it is no longer a representation of the sounds *going* to be produced but instead merely a map of instructions for the performer. This raises quite an interesting point in that, despite the dislocation of notation and sound, the notation itself is still traditional and directly linked with the Western classical tradition. Do performers apply elements of rubato or other 'shaping' to their interpretations despite the resultant sound being in direct contradiction to the shapes of the notation? If one takes a preparation such as weather stripping, which retains a fair degree of the (original) pitch content, as the material merely acts as a dampening agent, traditional modes of articulation or phrasing would be permissible as the resultant sonic event is not too distant from the notation. However, if one was to make the same interpretation with another preparation which has a greater impact on the original pitch content, such as wood or rubber, a different form of articulation would be required. This has consequences for Cage's later compositions. Along with the unpredictability of notation, Cage had discovered a means for removing decision making from composing, paving the way for an objective style of composing and indeterminacy.

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<sup>321</sup> *Ibid.*, p. 109.



Pitch will be analysed by transcribing the prepared piano music from recordings by several different pianists. By transcribing what pitch is heard, it will then be possible to draw comparisons with chapter three, and analyse the differences between prepared sounds and unprepared sounds. It will also be possible to draw comparisons between recordings. This can then be related to the research carried out in chapter three, where Cage's music was analysed with the aid of sonographic analysis, and demonstrated what pitches should be when prepared exactly as Cage had described. This kind of pitch transcription will also show the effect that a preparation has on the nodes of a string.

Another advantage to transcribing the pitches is that it may trigger references to other styles of music that may not be noticed in certain pieces due to the effect of the preparations. For instance, particular rhythmic patterns may become apparent when not masked by the notation. This form of dictation should not affect the way that rhythm is notated, which should more or less remain the same as it does in the score. However, there will be occasions when rhythm will be affected. This will come about as a result of the affect the preparation has on the string. Cage may have asked for the string to be prepared with a preparation that has a considerable damping effect on the string, but Cage has called for a minim in the score. In this case the aural effect (the shortening of the note) will be notated. To be able to demonstrate this kind of transcription analysis, it is important the pieces that are chosen for the case study are relatively 'pitchy' pieces and are spread over an extensive range, rather than focused on one particular pitch, as many of the prepared piano pieces tend to be. This means that the pieces chosen will be able to demonstrate the wide range of aural effects created by preparing the piano. It will be interesting to note the pitch of prepared notes and non-prepared notes in the same piece also, along with resultant rhythmic patterns that emerge through the alternation of noise and pitch which is not immediately revealed by the notation alone.

Timbre can be analysed with regard to the classification of the type of sound produced within performances of the same pieces. This again will highlight the effect that different preparations have on the production of sound. This type of analysis requires a form of graphic representation to clearly distinguish between the varying timbres. This form of graphic analysis will highlight the relationship between the continuity of timbres between performances of the same solo prepared piano work by different pianists. Analysis of the timbre will also highlight the cadences of the pieces, coupled with an analysis of the form of the solo prepared piano work. It will illustrate where the climax of the

sections or movements are. Cage expressed in *Composition as Process* that the cadences in the *Sonatas and Interludes* would work if the piano was prepared correctly.<sup>322</sup> When Cage was asked by Margaret Leng Tan about preparing the piano he said 'in those days (1940s) I was writing music that still had a feeling of cadence to it so let that be your guide when you prepare the piano.'<sup>323</sup> This quotation suggests that the prepared effect although altered should still fall within the realms of a sense of tonality. Cage also, as demonstrated in the quote at the beginning of this chapter states: 'You will often be able to tell whether your preparation is good or not if the cadences work.'<sup>324</sup> Cage's use of the term cadence suggests so much more, however; rhythmic properties, gestural types, closure, as well as tonality. As mentioned in the previous chapter, Cage also states in the *Two Pastorales* that 'accelerandos and ritards are to be associated with the structure, rather than with the sounds that happen in it.'<sup>325</sup> Cage is essentially creating a sense of repose in his music, but rather than the strong use of a harmonic cadence, the prepared piano music utilises characteristics of rhythmic cadences where Cage is able to provide the listener with a sense of musical punctuation rather than a feeling of finality. Essentially as Cage would suggest he was creating his own form of musical theory, a kind of anarchic theory of music:

Most of my life I thought that I had to find an alternative to harmony, but the harmony I was thinking about was the one that had been taught at school. Now I see that everything outside of school is also harmonious [...] A changed definition of harmony; one that doesn't involve any rules or laws. You might call it an anarchic harmony. Just sounds being together.<sup>326</sup>

Even though the following quote by Cage is used in discussion for a much later work, *Apartment House 1776*, it clearly identifies Cage's feelings on the use of cadences in his music, and they serve a theoretical purpose, now the sounds can remain unfinished if needs be:

The cadences and everything disappeared; but the flavor remained. You can recognize it as eighteenth century music; but it's suddenly brilliant in a new way. It is because each sound vibrates from itself, not from a theory. . . . The cadences which

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<sup>322</sup> J. Cage, *Composition as Process*, p. 19.

<sup>323</sup> DVD 'Margaret Leng Tan: *The Works for Piano 7* (Mode Records, Mode 158: 2006), 34'20

<sup>324</sup> John Cage, text published in CD Booklet *Sonatas and Interludes* played by Mario Ajemian New York 1995 Composers recording inc., CD 700

<sup>325</sup> J. Cage, *Two Pastorales*, (New York/London: Edition Peters, N.D.)

<sup>326</sup> <http://www.sterneck.net/john-cage/anarchic-harmony/index.php> accessed 29/05/2011

were the function of the theory, to make syntax and all, all of that is gone, so that you get the most marvellous overlappings.<sup>327</sup>

Discovering new ways of structuring the sounds created by the prepared piano was integral to the music of this period. Cage facilitated many different forms of structuring in this period, but the most utilised was that which incorporated some form of rhythmic structuring. The solo prepared piano music will be analysed to demonstrate Cage's musical form and highlight the links based on numerical relationships of sections and groups of bars. This section will particularly trace this development from the early dance pieces right up to the climax of Cage's utilisation of his micro-macrocosmic structure which he relinquished in 1952 soon after the discovery of chance techniques.

Finally, gestures that are characteristic of the solo prepared piano music will be illustrated in order to reveal the importance of preparations on the solo prepared piano music. Comparisons will be made to similar pieces that utilise the same musical or rhythmical gestures, but the differences in preparation will be highlighted demonstrating that although the same gestures have been used the pieces are completely distinguishable.

## **4.2: Musical Gestures**

In all of Cage's prepared piano music there can be found common identifiable gestural patterns. Cage admitted that the pieces were composed at the piano and through what he called 'considered improvisation'.<sup>328</sup> Therefore the construction of the music, as will be shown, displays a content that is largely based on how the fingers naturally fall at the keyboard of the piano. It must not be forgotten that Cage was trained as a pianist in a traditional manner by his Aunt Phoebe, and the patterns of gestures in the solo prepared piano could quite easily be associated with the fingering patterns of much traditionally written classical music.

It must also be noted that, although Cage was a proficient pianist he was not a 'David Tudor'. Therefore as most of the solo prepared piano music was written for Cage to perform himself, it is only logical that he should make the process of performing easier. By not having large leaps about the keyboard Cage could perform without the worry of hitting wrong notes.

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<sup>327</sup> J. Pritchett, *The Music of John Cage*, p.3.

<sup>328</sup> J. Cage, *Composition as Process*, p. 19.

This compact and safe style of composition is clearly demonstrated by Cage in *Tossed as It Is Untroubled*. The first half of the piece is very concentrated and utilises predominantly a forward driving energy consisting of focused quaver runs that use a total of five notes over the space of a seventh, in which no leaps or unconventional actions are required by the pianist. The whole first half is prepared with the same preparation of weather stripping; which also means that any misplaced ordering of notes within the range that is prepared, may be concealed as the same prepared sound is produced. This kind of restriction occurs four times across the body of prepared piano works in *Bacchanale*, *Tossed as it is Untroubled*, *Our Spring Will Come* and *Music For Marcel Duchamp*.



**Figure 52: *Tossed As it is Untroubled* (bar 17-20) (Copyright © (1960) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved**

The importance of gestural patterns should not be underestimated, as it is this material that works with and complements the units of rhythmic structure.

The solo prepared piano music that was written to accompany dances is texturally very thin and many of the pieces are dominated by a single line that is 'traditionally' accompanied in the left hand by a simple musical device. Therefore the focus of the solo dance accompaniments becomes the melody, or to be more precise, the delineation of musical layers. The dance works also tend to be very regular in pulse and repetitive. *Spontaneous Earth* written for a dance by Merce Cunningham in 1944 demonstrates the idea of organised sounds with an accompaniment. *Spontaneous Earth* also demonstrates the Cage's use of a regular pulse in which the notes (prepared with screw with weather stripping cover causing a sonic effect that dampens the sonorous effect of the screw) are repetitive.



**Figure 53: *Spontaneous Earth* demonstrating the melodic line with accompaniment (bars 1-9)**  
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The likelihood of such regularity is a result of the medium for which the music was composed; to accompany dancers. The music is often used as ‘fillers’ to enable music and choreography to have equal phrase lengths. The term ‘filler’ is used because it is a transient moment when music and dance are not temporally at the same point in the performance, Cage has designed the two bars in such a way as they can be repeated an unlimited amount of times without changing the structuring of the music or choreography.

The final bars of *Mysterious Adventure* demonstrate the relationship between the dancer and the pianist. It consists of vamp bars with the statement ‘repeat any number of times’. The notes are predominantly prepared with rubber which gives a sonorous gong like sound. Eb3 is prepared with rubber and a big bolt, C4 is prepared with rubber, Bb4 is rubber, the Ab4 is heavily prepared with rubber, bolt, rubber wrapped wood with bolt, Db4 is prepared with rubber, screw, medium bolt and Eb4 is rubber and wood.



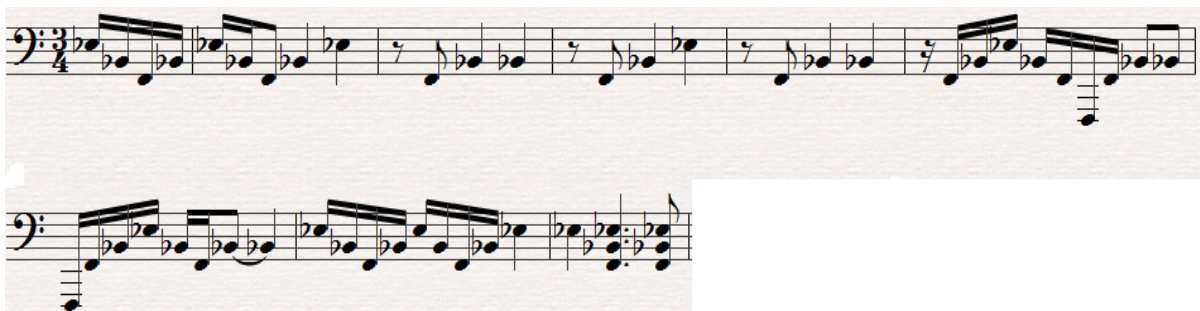
**Figure 54: *Mysterious Adventure* demonstrating vamp bars (movement five, bars 56-60)**  
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The pieces, for analysis purposes, can be divided into two distinct categories; those composed to accompany, e.g. dance, film, and those composed as solo concert works.

## Sparse Textures

The largest distinction between the two categories of composition is the depth of musical texture within the pieces. It can be easily seen from the scores which accompany the dance works that they are texturally very sparse and consist of focussed and often hyperactive activity consisting of quaver and semi-quaver runs. (The texture is focussed because it concentrates predominantly around an area of four to five pitches and around a particular octave range of the keyboard, high, middle or low).

*The Unavailable Memory Of*, composed in 1944 for a dance by Merce Cunningham is an excellent example of a thin but concentrated texture. The texture is sparse and concentrates on pitches F-Eb and Bb, which are dampened by weather stripping and rubber, but still retain some of the original pitch.



**Figure 55: *The Unavailable Memory Of* demonstrating thin texture (bars 1-9) (Copyright © (1977) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved**

*Tossed As It Is Untroubled* is another good example of a dance piece that has a very limited texture. *Tossed As It Is Untroubled* is very similar to *The Unavailable Memory Of* as both are composed of a single line with few different preparations. *Tossed As It Is Untroubled* is again very sparse but its range focuses on the tenor range of the keyboard, unlike *The Unavailable Memory Of* which concentrates on the bass range of the keyboard.



**Figure 56: *Tossed As It is Untroubled* demonstrating thin texture (bars 54-56)**

*Primitive* composed for the dance by Wilson Williams in 1942 also demonstrates the sparse nature of the solo prepared piano dance accompaniments, where the span of the opening of the piece meanders around the alto range of the keyboard spanning a range of a fourth. The pitches are prepared with bolts and screws. The effects of these preparations create a sort of metallic rattle sound. Cage's prepared piano music contains many examples of sparse textures, but they always seem to form an introduction to a 'busier' section of the music. This would seem logical, as the more musical material is likely to mean more preparations – and lots of preparations together can at times become incoherent. Therefore *In the Name of the Holocaust* and *Primitive* the use of modal passages (centred around D)<sup>329</sup> with chromatic and percussive effects are more obvious due to the sparse texture of the music.



**Figure 57: *Primitive* demonstrating sparse texture of dance accompaniment (bars 1-5)**  
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<sup>329</sup> D. W. Bernstein, *Music I: to the Late 1940s*, p. 79.



*Music for Marcel Duchamp* composed in 1947 is another good example of a piece with thin musical texture and concentrated area of pitch. This piece concentrates on an area in the middle range of the keyboard, prepared almost exclusively with weather stripping (with a small bolt and rubber used on two pitches). *Music for Marcel Duchamp* consists largely of quaver runs, interjected with small sections of sustained notes which, due to the continuous use of the sustain pedal, carry for their full duration.

However, in *Music for Marcel Duchamp*, Cage explores the incorporation of silence in music as a gesture itself, rather than as a means of punctuating the hyperactive runs. What must be observed, however, there are no true silences in *Music for Marcel Duchamp* as the sustain pedal is permanently depressed throughout the piece; therefore, the previous statement of sounds penetrates the silent bars. The most obvious demonstration of this technique is demonstrated at the end of the piece, in which Cage incorporates the silence into a four bar pattern that is repeated seven times, consisting of a bar of silence (with depressed pedal), two bars of quaver runs, a semibreve followed by a crotchet worth of silence.



**Figure 58: *Music for Marcel Duchamp* demonstrating sparse texture with silences (bars 109-121) (Copyright © (1961) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved**

The sparse texture in the dance pieces is largely a result of the limited amount of pitches and prepared sounds that Cage utilises in their construction. In the *Unavailable Memory* of Cage uses five tones in the whole piece, prepared with wood, screw with weather stripping, weather stripping and rubber, all of which dampen pitches while still allowing a large degree of the original pitch to remain.





**Figure 59: Pitch Matrix: *Unavailable Memory Of***

*Music for Marcel Duchamp* uses only eight pitches, all are prepared.



**Figure 60: Pitch Matrix: *Music for Marcel Duchamp***

*Bacchanale* uses ten pitches, all of which are prepared with weather stripping, small bolt and screw with nuts – the screw with nut provides a stark contrast to the dull sound of the weather stripping.



**Figure 61: Pitch Matrix: *Bacchanale***

Many of the pitches and prepared tones are often stated at the outset of the piece, this is particularly obvious in *Bacchanale* where the piece largely consists of ostinato-like patterns constructed from the initial statement in the opening bar of the piece.



**Figure 62: *Bacchanale* demonstrating exposition of notes (bars 1-4) (Copyright © (1960) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved)**

*The Unavailable Memory Of* is also an example of a piece that is based on the statement of a chord. In *The Unavailable Memory Of* the chord is segmented into an arpeggio stated at the outset of the piece, and the following music is assembled around repetitions of the four pitches involved in the arpeggiated chord. In addition to the four notes used in the chord, there is an additional bass note (F2), which is prepared with wood, giving a totally different effect to the other prepared notes.



**Figure 63: *The Unavailable Memory Of* demonstrating arpeggiation of a chord (bars 1-9)**

The sparse textures of the dance-based solo prepared pieces are not confined to the volume of notes used in the composition of the works, but also there is often very little sonic diversity. As has been examined in previous chapters, Cage did not use a huge range of different preparations; this is particularly apparent in the dance accompaniments. Thus when a new sonic element is introduced into the piece, it breaks up the monotony of the limited range of sounds and adds a different character and musical layer to the piece.

*Root of an Unfocus* is a primary example of this sort of sparse sonic variability. The piece relies heavily on three essentials. The first sound is produced by two notes D3 and F4 which are prepared with bolts and weather stripping; this combination produces a type of thud. The second sonic element is produced by four notes prepared with screws and are situated in the soprano range of the keyboard. When these notes are depressed they are most often used in a cluster and produce a stark, piercing sound, retaining some of the original pitch. The most notable third sound is produced by two long bolts which are touching the sound board. The sound produced comes as a jolt to the listener, it is a stark contrast to the mellower sound of the other two prepared sonic elements.



**Figure 64: *Root of an Unfocus* demonstrating 'clacking' (bars 60-70) (Copyright © (1960) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved.**

Along with the limited amount of sonic diversity and narrow quantity of notes used in the composition of the solo prepared piano music, it also lacks a wide range of dynamic. A prepared piano has a very limited dynamic range similar to a harpsichord due to the effect of the preparations. Very often the solo prepared piano music has low dynamic markings, and introduces a dynamic contrast with the use of an attack or accent rather than a crescendo. However, *Primitive* is a good example of the use of dynamics in the prepared piano. One of the earliest solo prepared piano pieces composed in 1942 it has a larger array of prepared notes with thirteen prepared with screws and bolts. *Primitive* can be divided into short sections from the increasing dynamic volume, beginning with *pianissimo* and increasing to *fortissimo* at the end of the piece.

*A Room* composed in 1943 is the only prepared piano piece notated in the alto clef and has *ppp* as its dynamic measure throughout the whole piece. As is common in the solo prepared piano music the una corda pedal is used and in *A Room* is depressed throughout the whole piece. This ensures that only two strings are heard resonating at the same time instead of three, thus limiting the extra pitches a third string might have added to the overall sonic palette.

Cage's use of open sparse textures, coupled with the small registral difference between parts adds to and creates tension in the solo prepared piano music without the need for 'shock' tactics like big forzandos, heavily accented notes or rhythmic complexities. It allows the beauty and integrity of the music created by the preparations to speak for themselves.

### **Increased Energy**

As mentioned previously, by keeping the notes under the range of the fingertips Cage was able to limit the chance of mistakes occurring in his own performances. However, by composing in this way, Cage also produces another gesture which is common throughout most of the dance works. Many of the solo prepared piano music consist of what shall be called increased energy. This description can be applied when the piece contains notes. They are of no greater value than the duration of a quaver, are linked together to form prolonged runs of notes and focused on a particular range of the keyboard, usually of no greater range than a seventh. Sometimes the same patterns of notes are repeated in a frenetic style. In the faster sections of these pieces the notes are always prepared with the same object, which permits the same type of sound to always be produced.

The first piece for dance accompaniment, *Bacchanale* is a prime example of this increased energy that runs through most of the dance works. It is also heightened by the changes of tempo and the increasing rate at the end by moving to triplet semi-quavers. As *Bacchanale* demonstrates the dominant notation consists of quavers.

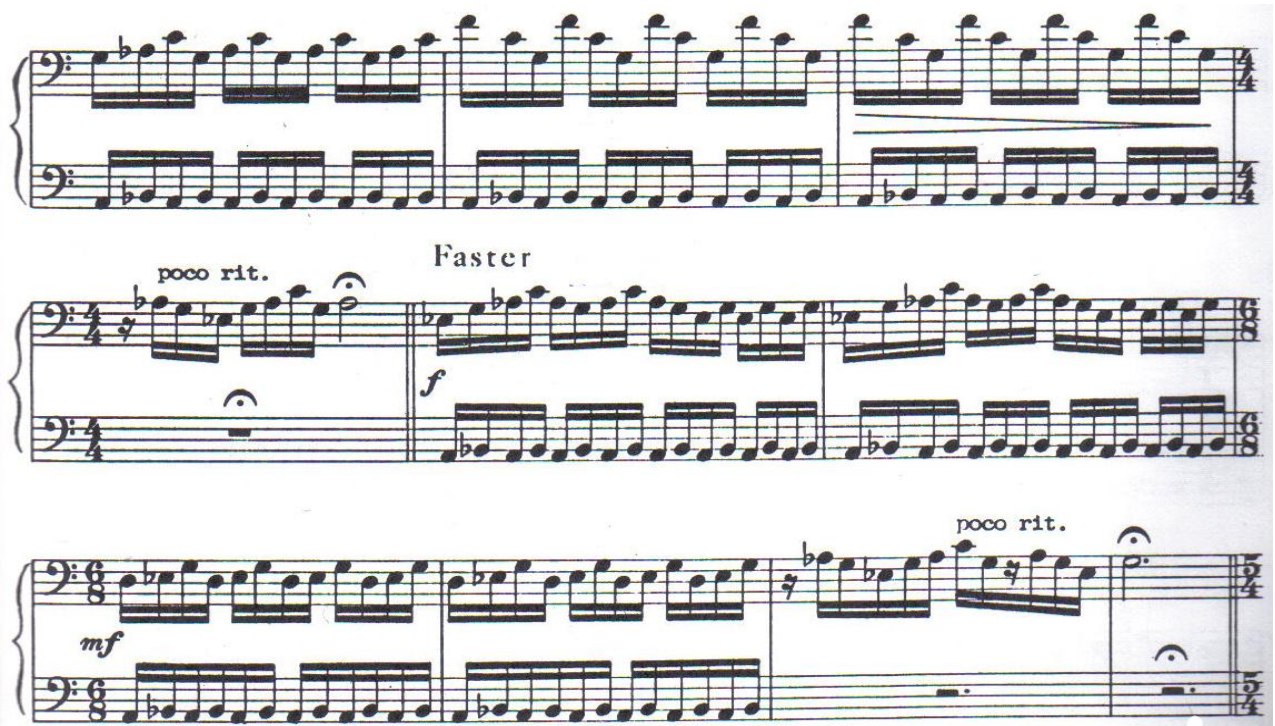


Figure 65: *Bacchanale* demonstrating increased energy (bars 6-15)

## Ostinato Gestures

The use of repeated gestures and ostinati are utilised extensively in the pieces written for dance accompaniments throughout the decade that Cage wrote for the solo prepared piano. Cage did use repeated gestures and ostinati in the concert works for solo prepared piano, but the resulting musical statements were utilised to a lesser degree throughout these pieces and when used they appeared more sophisticated.

In *Bacchanale*, Cage uses the ostinato extensively. By utilising the repetition of phrases, Cage is able to alternate between melodic gestures that enforce the dancer's movement and the ostinato gestures that enable the dancer to become prominent in the duo. *Bacchanale* consists of many different ostinato bass and melodic fragments. For this analysis the term ostinato means a short repeated rhythmic pattern. The musical gesture that achieves longevity in the piece is the ostinati based on the notes A – Bb prepared with weather stripping and accompanied by different melodic fragments of varying lengths.

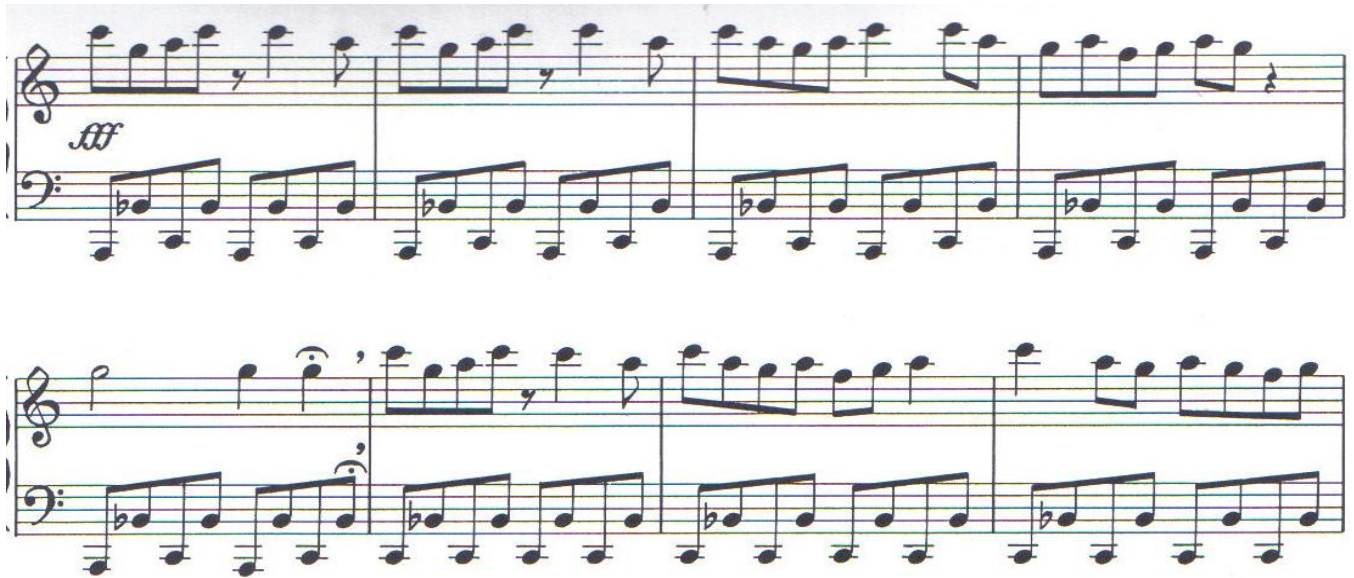




**Figure 66: *Bacchanale* demonstrating ostinato figure based on A-Bb (bars 9-15)**

Not only does Cage employ the ostinato gesture to notes that are situated closely to each other, he also frequently uses ostinato gestures where there is a larger gap between notated pitches, a form of displacement. When Cage uses the leaps he often does it on notes that have different preparations, which creates a disruption in the monotony of the similar pitch and identical preparation ostinato. This gives a strong suggestion that the preparations are more significant than the pitch and that the larger interval leap creates a greater sonic impact than one when two close intervals are prepared.

In *Bacchanale*, Cage frequently uses an ostinato pattern using A3 prepared with weather stripping and Bb4 prepared with weather stripping but also a screw with nuts. The difference between the preparations would become very noticeable as the nuts being free to rattle would produce an effect quite distinct from that of the weather stripping, so what looks on the page like a minor ninth is simply the alternation of two quite distinct sounds. This technique can also be seen in the more heavily prepared *And the Earth Shall Bear Again*, this time with A1 prepared with a piece of plastic and a Bb3 prepared with a bolt, both producing very different sounds. *Totem Ancestor* also demonstrates this technique clearly with an ostinato change in register between an A3 prepared with double weather stripping and Bb4 prepared with a bolt.



**Figure 67: *And the Earth Shall Bear Again* demonstrating ostinato displacement (bars 68-75) (Copyright © (1960) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved.**

**Figure 68: *Totem Ancestor* demonstrating ostinato displacement (bars 39-48) (Copyright © (2004) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved.**

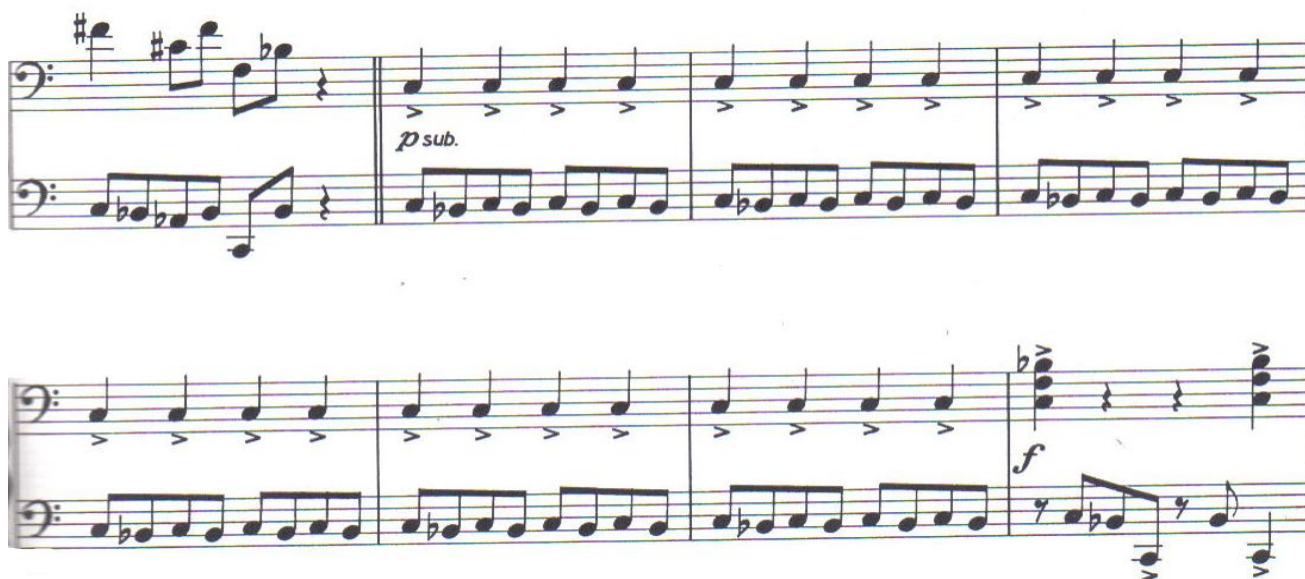
In the fourth movement of *The Perilous Night*, a concert work Cage uses a semi quaver ostinato pattern in the right hand prepared with bamboo and bolt and rubber and combines this with varying patterns of long notes in the left hand accompaniment. However, due to the dampening effect of the screw and weather stripping, the duration is cut to at most a crotchet length.



**Figure 69: *The Perilous Night* demonstrating ostinato patterns (movement 4, bars 1-8)**  
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Cage also uses other forms of repetition which appear as extensions of the ostinato idea. One such recurring pattern is in *And the Earth shall Bear Again*, where Cage substitutes the ostinato for a prolonged trill (similar to the fast tempo material in the *Bacchanale*) that accompanies the melodic fragments in the right hand. The trill is prepared with two different kinds of bolt; a long bolt and a bolt. This example is defined as a trill unlike that in example 7b because of the interval distance between the two notes. The distance in 7e is a third which makes the resultant effect more like a 'traditional' trill in pianistic terms, unlike the 'alberti bass' formed ostinato experienced in 7b. In 7e only the E $\flat$  is prepared, with bamboo and bolt, the G $\flat$  is left unprepared, this creates quite a distinct sound between the two pitches. In 7b the A and B $\flat$  are both prepared with weather stripping, however the sounds are actually entirely different because of the addition of a screw and nuts on the B $\flat$ .





**Figure 70: *And the Earth Shall Bear Again* demonstrating trill as an extension of ostinato patterns (bars 10-16)**

### **Gestures created by preparations**

Other gestures in the solo prepared piano music may be termed as abstract gestures. That is, there is nothing visual in the score to determine that they are gestures as such. However, the use of preparations creates such a moment in the piece that the sonic effect may be determined as a gesture.

The prepared piano pieces of the 1940s offer the most interesting analysis in terms of abstract gestures, as these works predominately have preparations that affect the bass registers of the piano. The most heavily utilised preparation for the bass registers is a material that is quite substantial such as rubber. This creates a thud which is quite stark when it is heard. The treble registers in the prepared piano music of the 1940s are prepared with materials that allow a certain amount of the original pitch to remain and much of this is due to screws and bolts that these notes are prepared with.

*And the Earth Shall Bear Again* is such an example of a gestural occurrence in the abstract. The piece is composed to accompany a dance by Valerie Bettis and is prepared predominantly with metal preparations. However, in the middle stages (bars 68 to 77) of the piece Cage introduces a transposed pentatonic section that incorporates a prepared note ostinato gesture in the left hand to an unprepared tune in the right hand. The result of introducing unprepared notes to a piece that consists of totally prepared tones up to that point creates a particularly striking sonic effect.



**Figure 71: *And the Earth Shall Bear Again* demonstrating unprepared notes against prepared notes (bars 68-77)**

*Our Spring Will Come* also uses a section which uses a combination of prepared notes and non-prepared notes, but this time Cage does not use an unrelated tune but simply uses a held unprepared middle A4.



**Figure 72: *Our Spring Will Come* demonstrating unprepared notes against prepared notes (bars 31-42) (Copyright © (1977) by Henmar Press Inc. Used by permission of C. F. Peters Corp. All Rights Reserved.**

*Tossed as it is untroubled* also uses this kind of gesture. However, instead of using non prepared notes with prepared notes as the previous two examples, Cage introduces a new preparation that greatly contrasts with the sonic element produced by the preparation used in the piece up to that point. Specifically, in *Tossed as it is Untroubled*, Cage brings in a heavily prepared high section, utilising one large and some small screws, which produces a sharp contrast to the duller tones produced by the weather stripping that prepares its counterpoint.



**Figure 73: *Tossed as it is Untroubled* demonstrating introduction of a screw (bars 92-98)**

### 4.3: Harmony: Role and Function

In the Eighteenth and Nineteenth century the function of harmony in music was always regarded as the most crucial aspect of the musical content. The predominant functional role that harmony has played in music for centuries is that of creating a structure in which the composer has a set of hierarchies that can be adhered to and therefore plan the music accordingly, particularly regarding tonal structures. The other dominant role that harmony plays is that it is an agent of colour and mood. It allows an audience to appreciate different moods created by different harmonic progressions and to observe the tension in the music created with the use of chromatics.

## John Cage and harmony

Cage often recounted his conflict with harmony and his lack of feeling for what was an integral part of composition for many centuries. While studying with Schoenberg, Cage would be lambasted as to the pre-requisite importance of the skill of harmony to a composer. Schoenberg believed that skill in harmony was the pre-requisite of a composer, because, as he understood it, it functioned not merely as colouristic chord building, but as the central structural resource of a musical work.<sup>330</sup> Cage's relationship with harmony is commonly held as one in which the composer tried to distance himself from the constraints of the rigid structuring application. He said, 'harmony is a forced abstract vertical relation which blots out the spontaneous nature of the sounds forced into it. It is artificial and unrealistic.'<sup>331</sup> However, by distancing himself, it was easier for him to maximise his theory of sound and composition, and increase his commitment with the sounds that made up his compositions. So was Cage's lack of feeling for harmony a deliberate act to ignore the harmonic function of music and highlight the use of sound and noise and a dominant factor? As Rob Haskins points out, Morton Feldman in fact set Cage up as a composer who had full control of the harmonic nature of music by stating that Cage 'had impeccable ears'.<sup>332</sup>, although the fact that Cage had 'impeccable ears' does not necessarily suggest that he had full control of the harmonic nature of the music. Cage had excellent ears when considering his own music, but there isn't any evidence to suggest that he was a mature harmonic listener in terms of functional harmonic movement. Traditional tonal harmony fulfils a structural function; its system is based on the triad and the dyad, and focuses around a centricity as a harmonic guide rope. Cage rejected harmony on the basis of the effect it had on the nature of audience's ears. As he said, harmony has become a 'tool of Western Commercialism'.<sup>333</sup> Although Cage believed he did not have an ear for harmony, he did not reject harmony per se if it arose through composition.

Cage's fascination with the East may have had an influence on his dislike of harmony. As he said he wanted to introduce elements of the East into the West not worship the elements through his music. Oriental music tends to have events instead of harmony and as he states 'the East does not practice

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<sup>330</sup> D. Revell, p. 53

<sup>331</sup> D. Revell, p. 120.

<sup>332</sup> Quoted in Rob Haskins Notes on Cage Harmony and Analysis originally in P. Gena and J. Brent, *A John Cage Reader: In Celebration of his 70<sup>th</sup> Birthday*, New York, C.F. Peters Corp., 1982, pp. 54-55.

<sup>333</sup> J. Cage, *The East in the West*, pp. 24-25.

harmony.<sup>334</sup> He goes on to say that 'large musical conditions which are characteristically Oriental are: 'that the music be non-thematic, non-harmonic, non-motival; that it have (a) an integral stepwise use of scale, (b) structural rhythm, (c) an integral use of percussive sound and (d) pitch distances less than a semi-tone.'<sup>335</sup>

*Music for Marcel Duchamp* is a good example of such a piece of prepared piano music that demonstrates Cage's incorporation of Eastern practices without any form of adulation. In *Music for Marcel Duchamp* Cage is able to demonstrate the non-harmonic nature of Asian music and along with the structural rhythm used to organise the sounds, Cage also incorporates the percussiveness that is prevalent in much Asian music. In particular Cage introduces a prepared D(3) which is prepared with weather stripping. This prepared tone introduces a sound akin to something like the Tibetan Tingsha which when used by Tibetan Buddhist practitioners for prayer and rituals, produces harmonic overtones. Cage's juxtaposition of the single improvised line and methodically placed bars of silence create sound events which, like Asian music, are used very much instead of harmony. This influence of the East has been previously examined in chapter one.

The combination of the devices used instead of harmony creates in *Music for Marcel Duchamp* a piece that is static and meditative in its performance. The music is colourless in emotion and the combination of silence and short phrases, with the occasional appearance of harmony resulting from the sustained melody notes.

Although later in life Cage discovered that harmoniousness was not the same as harmony, he noted works by younger composers such as James Tenney, stating 'if this is harmony [...] I take everything back I've said – I'm all for it [...] I'm finding everything is harmonious and, furthermore, that noises harmonize with musical tones.'<sup>336</sup> Although Cage seems to have discovered this commonality between harmony and sound suddenly, in (1937), he did infer such a relationship:

The music is not concerned with harmoniousness as generally understood, where the quality harmony results from a blending of several elements. Here we are concerned with the coexistence of dissimilar, and the central points where fusion occurs are many: the ears of the listeners wherever they are. This

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<sup>334</sup> *Ibid.*, p. 22.

<sup>335</sup> *Ibid.*, p. 24.

<sup>336</sup> D. Revell, p. 280.

harmony, to paraphrase Bergson's statement about disorder, is simply a harmony to which many are unaccustomed.<sup>337</sup>

## The prepared piano and harmony

However, when preparations are introduced into the equation, the result is the loss of any sort of tonality or harmony. There appears no relation between the note to note procedures, any kind of harmony that does appear is coincidental. Harmony is produced however by the 'reaction' of string and preparation. This however, does not feature as part of the pre-compositional plan. Evidently the act of composing a piece of music alters. For Cage the conception of a piece of prepared piano music begins with the choice of prepared sounds, rather than devising a structure relating to harmony. John Cage believed that anything could become material for the composer. Cage begins his compositions with a choice of physical materials (preparations) which in turn lead to the creation of unique sounds or noises which take on the role of harmony. The tones created are for themselves and of themselves; they have relation only as a result of the type of material they are prepared from, that is, it is only the character of the sound that can be related to any other sound. The nature of such a composition means that the noises cannot be inserted into a harmonic structure as a result of their melodic character but must be ordered according to the type of sound produced. There is no evidence to suggest that Cage selected the preparations at all to any harmonic instinct. There appears to be nothing governing his choice of preparation, it would appear that he simply follows his taste, and that there is no structural ideas relating to the preparation. Cage is re-thinking new definitions and relationships within the structuring of music. Cage would go on to say 'Seeking an interpenetration and non-obstruction of sounds ... a composer at this moment ... renounces harmony and its effect of fusing sounds into a fixed relationship.'<sup>338</sup>

As has been described at length, the result of adding a preparation to the piano will result in a loss of tone quality and therefore making the use of harmony altered. Prepared notes become autonomous to pitch and harmonic relations, the only degree of residual harmony remaining comes from the strength of the harmonics produced by the resultant preparation and other pitch sounds, such as the 'flattened' effect of weather stripping on notes, or when only two strings are prepared leaving a third to sound unprepared.

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<sup>337</sup> J. Cage, *Experimental Music*, p. 12.

<sup>338</sup> J. Cage, *Happy New Ears in A Year from Monday*, Middletown: Connecticut, Wesleyan university Press, 1969, p. 31.

The prepared piano music enhances the audible variety of musical materials; they include noises – (clacks, whistles, jangling) as well as tones (prepared strings played with unprepared strings, the use of the una corda pedal), along with the integration of silence, and thus the need for the audience to listen to the music without pre-conceived expectations. As a result of the non-applicable nature of harmony to noise ‘The present method of writing music...will be inadequate for the composer, who will be faced with the entire field of sound’<sup>339</sup>

When playing the prepared piano a whole range of sounds can be heard from depressing a single key resulting in intervals, single tones, mixed frequencies making a harmonious sound to a mixture of frequency constructing a myriad of tones. Cage would describe this kind of aggregate of pitches as a gamut. Therefore any type of discussion of harmony and the prepared piano must incorporate some explanation on the harmony of a gamut of sound. The prepared piano produces such a tone that contains any number of harmonic partials, creating a problem for a theory of harmony in relation to the composition of prepared piano music.

The result of not using harmony as a structuring tool is that another all-encompassing structural device must be sought. Cage needed the use of a sound device that could incorporate the determinants of a sound: frequency, amplitude, timbre, duration and morphology. As has been discussed previously, Cage solved this situation by inventing a structuring system based on temporal units. However, with harmony, sections of the structure could be defined or highlighted with strict tonal devices such as modulation or cadence. Cage decided to articulate the parts of his structure by using contrasting devices such as changes in amplitude, tempo, and particularly pertinent is a change in timbre with the introduction of a new preparation.

So can there be any kind of tonal relationship between the solo prepared piano music which, from looking at the score may produce a commonality between parts of the work or movements of the work? Throughout the Sonatas and Interludes there appears to be a tendency towards utilising a ‘tonal centricity’. Frequently, Cage focuses on B. For instance in Sonata XII Cage leaves the Bs and F#s unprepared with three and six occurrences respectively. Each time these pitches appear they are made more dominant by being placed amongst prepared notes.

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<sup>339</sup> J. Cage, *Future of Music: Credo*, p. 4.

This kind of compositional method of having a tonal home centre is further commented by Cage:

I think the whole harmonic structure in Western music is based on having a home [...] <sup>340</sup>wandering away from it and then coming back to it. A key, a mode, or a kind of repetitive music as we experience it now, gives a sense of place. I think that's gone and what we're dealing with is an absence of that. <sup>341</sup>

Music is characterized by its pitch, its loudness, its timbre, and its duration. Silence, which is at the opposite and, therefore, the necessary partner of sound, is characterized by its duration. One will be drawn to the conclusion that of the four characteristics of the material of the music, duration, that is, time length, is the most fundamental. Silence cannot be heard in terms of pitch or harmony. It is heard in terms of time length. <sup>342</sup>

In writing for these sounds, as in writing for percussion instruments alone, the composer is dealing with material that does not fit into the orthodox scales and harmonies. It is therefore necessary to find some other means of organising those sounds for symphonic instruments. Each sound must be considered as essentially different from and independent of every other sound <sup>343</sup> and the performer's role in the selection of prepared sound becomes paramount.

#### 4.4: Structural Analysis

The goal for Cage as an organiser of sound was the liberation of sound. Therefore the co-existence of sound and silence in music was a necessity. He stated in his lecture 'forerunners of Modern Music' that 'the material of music is sound and silence. Integrating these is composing' <sup>344</sup>. Key to the teaching of Schoenberg was the rule that music should be structured by dividing the composition into parts. The most efficient way according to Schoenberg was to use harmony as the defining material for the structural units. This however, negated the co-existence of sound and silence.

The negation of silence in harmonically structured music created moral problems for Cage. Cage stripped music to its fundamental elements which includes duration, frequency, amplitude and timbre. Duration is the only element that incorporates both sound and silence <sup>345</sup>. Cage would confirm his

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<sup>340</sup> *Ibid.*

<sup>341</sup> D. Revell, p. 278.

<sup>342</sup> Defense of Satie p81.

<sup>343</sup> J. Cage, *For More New Sounds*, p. 66.

<sup>344</sup> J. Cage, *Forerunners of Modern Music* in *Silence* English Ed., London, Marion Boyars, 1969, p. 62.

<sup>345</sup> J. Cage, *Composition as Process*, p. 18.



theory by stating 'Harmonic structure is a recent occidental phenomenon, for the past century in a process of disintegration.'<sup>346</sup>

Before the onset of their musical indifferences Boulez wrote of Cage's realisation that Schoenberg's method of musical organisation would not fit his own compositional ethos.

When Cage rid of the twelve tone series, a strongly rhythmic structure became necessary to him as a support for the musical argument. John Cage came to the conclusion that in order to build this construction, a purely formal, impersonal idea was required: that of numerical relations. [...] In this way as a priori numerical structure arises which the composer describes as prismatic and which I should prefer to call a crystallized structure.<sup>347</sup>

By creating a structure based on arithmetical proportions - where structure is created by division of the whole into related parts on a macro and micro level, Cage was able to allow the sounds to be 'free' and form a free flowing continuity, while at the same time establishing a set of compositional principles. Cage wasn't quite ready to let completely go of control!

The structure that developed from the division of the whole into parts became the result of a principle that Cage based on the square root. In this principle the large sections of the piece - the macro- have the same relationship in the whole piece as the small section - the micro- has within a single unit.

Cage could pre-conceive his micro and macro structures as empty frames that could be filled by the 'noises [*that*] delight me.' Cage would go onto say:

And when I saw that time was the proper basis of music, since it included both sound and silence, I saw that pitch and harmony and counterpoint and all those things had been the basis of European music were improperly so and had made it into the boring things that for the most part it symphonically became. I agree with the African prince who went to a concert in London and afterwards was asked what he thought. He had heard a programme of music that began before Bach and went on up to modern times, and he said "why did they play the same thing over and over again?"<sup>348</sup>

The configurations that are conceived by producing micro and macro structures are placed by Cage fundamentally in a state of silence that is filled with rhythm. The micro and macro structures created a template which enabled the replacement of harmonic structuring, and allowed a skeleton that could

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<sup>346</sup> J-J. Nattiez, *The Boulez-Cage Correspondence*, p. 40.

<sup>347</sup> *Ibid.*, p. 31.

<sup>348</sup> J. Cage, *Conversing with Cage*, p. 64.

incorporate silence, and the involvement of rhythmic complexities of pitched and un-pitched noises.

Cage would expand on this idea by stating:

There's none of this boom, boom, boom, business in my music, [...] a measure is taken as a strict measure of time - not 1, 2, 3,4 - which I fill various sounds. It's not the rhythmic structure that I was concerned with, it was the phraseology and the relation of the parts<sup>349</sup>

The first example of Cage employing a form of rhythmic structure came in 1939 with *First Construction (in Metal)*. In its simplest form the structuring of the piece is entirely based on the figure 16 and the construction of the title refers to the construction of the structure, i.e. square root form. On the fundamental level, the piece is controlled by the number 16. 16 controls the number of sounds used by each of the percussion sextet and it also controls the amount of rhythmic motifs utilised throughout the piece.

The use of a structuring formula like that used in *First Construction (in Metal)* enabled Cage to create music that brought together paradoxical elements (sounds - pitched and unpitched and silence) into a position of considered freedom (music).<sup>350</sup>

Structure for Cage meant the division of a whole into parts. He believed this was a matter of mind composing (opposed to heart composing, which he classed as method, material and form). By method, Cage meant the note to note procedure of composition. Materials are the sounds and silences that are produced from composing. Form is what Cage called the 'morphology of continuity'<sup>351</sup>; by this Cage meant the observation of the development of the material.

It is the integration of sound and silence (opposites) that makes the analysis of structure in Cage's music so intriguing as two direct opposites; mind and heart, or structure and form combine to create a free flowing continuity (music). With the invention of an overarching scheme like the macro-micro

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<sup>349</sup> D. Revill, *The Roaring Silence*, p. 61.

<sup>350</sup> For a thorough analysis of *First Construction (in Metal)* see D. Nicholls, *American Experimental Music 1890-1940*, Cambridge University Press, 1990

<sup>351</sup> J. Cage, *Composition as Process*, p. 18

structure the possibilities for structuring compositions became endless. Nowhere was this impact felt than in the relationship between music and dance. Merce Cunningham would elaborate:

What was involved was a macro-microscopic rhythmic structure in which the large parts were related to the small parts in divisions of time. This is a way of working between the music and the dance that allowed them to be separate, coming together only at the structural points. The use of time structure allowed us to work separately, Cage not having to be with the dance except at structural points, and I was free to make the phrases and movements within the phrases vary their speeds and accents without reference to a musical beat, again only using the structural points as identification between us<sup>352</sup>

Cage's indebtedness to the macro-microcosmic structure (as he would label it) is obvious due to its usage in his music for over a decade between the late 1930s, 1940s and early 1950s. It would enable Cage to structure his compositions to suit all mediums, whether for dance, film or concert platform. However, during this decade the structure did not remain bathetic, but would evolve throughout the early 1940s with the early dance works like *Bacchanale*, which makes clear the structure by enabling different configurations of the structure to be transparent. In the late 1940s Cage's 'morphology of continuity' does not make lucent the structure, but instead creates an organic unity. The organic unities of the latter prepared piano pieces that utilise a form of macro-microcosmic structure, have a contingent relationship between the whole piece and its substituent parts. Therefore, the pieces of the late 1930s and early 1940s have an inorganic approach to structuring, where the relationships between whole and substituent parts are not reliant on a contingent relationship but have insular structures instead. The idea of organic and inorganic entities within a piece of music demonstrates Cage's ideas on the co-existence of paradoxical elements in music mentioned earlier. Law elements (elements that ought to be together in music) remain as a constant, and elements of music that cannot (and should not?) be agreed upon benefit each other to create an overarching unity within the composition.

Cage would confirm this idea of law and freedom or as he also called it 'Grace and Clarity' in an essay of the same name published in 1944. In it he says that:

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<sup>352</sup> M, Cunningham, A Collaborative Process Between Music and Dance in in P. Gena and J. Brent, *A John Cage Reader: In Celebration of his 70<sup>th</sup> Birthday*, New York, C.F. Peters Corp., 1982, pp. 107-108..

With clarity of rhythmic structure, *grace* forms a duality. Together they have a relation like that of body and soul. Clarity is cold, mathematical, inhuman, but basic and earthy. Grace is warm, incalculable, human, opposed to clarity, and like the air. Grace is not here used to mean prettiness; it is used to mean the play with and against the clarity of the rhythmic structure. The two are always present together in the best works of time arts, endlessly, and life-givingly, opposed to each other.<sup>353</sup>

In chapter one it was stated that the invention of the prepared piano emerged from the inspiration and influence that Cage gained from several mediums. Likewise, the utilisation of a micro-macrocosmic structure was not autonomous either. The examination of the influences that directly or indirectly impacted upon the utilisation of a rhythmic type of structuring is essential as it makes clear the context with which Cage considered a framework of the sounds that were produced by the invention of the prepared piano. This section will consider Arnold Schoenberg, Erik Satie and Eastern and Oriental music as influences toward the creation of a form of macro-micro rhythmic structure.

Arnold Schoenberg was one of the most influential figures in Twentieth Century music and also to Cage in his early career as a composer. However, if Henry Cowell was the thesis for Cage's development, mapping a strategy for Cage to follow, Schoenberg was the antithesis, mapping a strategy that Cage deemed old fashioned and limited, which he vowed to steer clear of.

Cage had first encountered the music of Schoenberg in 1930 and it was this encounter that led Cage to begin composing in a similar fashion to Schoenberg utilising a twenty-five note tone row. At the age of 22, Cage embarked on his studies with Schoenberg at the suggestion of Henry Cowell, who at this time, believed Schoenberg to be the greatest of all living composers. Cage was among a group of three private students who studied with Schoenberg in the fall of 1934. Among the three private students along with Cage were Bernice Abrahms Geiringer and George Trembley.

The Nineteenth Century notion of tonality as an organising principle began to wane; other composers sought new methods to construct their music that was not reliant on tonality. Schoenberg's serialist principles along with Stravinsky's neo-classicism became fashionable. It was at this time that many young composers felt an urge to take sides in this polemic. Cage chose to side with Schoenberg and was drawn to his organizing method; serialism.

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<sup>353</sup> J. Cage, *Grace and Clarity* in *Silence*, English Ed., London, Marion Boyars, 1968, pp. 91-92.

It was the renouncement of standard Western tonality in Schoenberg's method of serial composition that interested the young Cage. Schoenberg's serial composition entailed composing with pre-arranged twelve tones of the octave formed into a tone row. The composer then 'builds' the composition by constructing melodies by layering the rows horizontally, or constructing chords by stacking the rows vertically. However the sounds are constricted to the order in which the original row was conceived, all of which must be used before any of the other tones can be repeated. Some of Cage's very early pieces from this serialist period remain, the most famous being the *Six Short Inventions*. However, Cage did not directly copy Schoenberg's method, he 'constructed motivic segments based on the row's intervallic structure and formed connections between these motives by referring to the final note of each segment and its position within the row.'<sup>354</sup>

Key to Schoenberg's teaching was the rule that music should be structured by dividing the composition into parts. Schoenberg instructed that music should be divided using harmony as the defining material. Although Cage believed that music should be structured by dividing the composition into parts, he did not, however, agree that harmony and pitch (the traditional way of organising music) was the best way to obtain the divisions. As Cage would say:

The strict division of parts, the structure, was a function of the duration aspect of sound, since, of all the aspects of sound including frequency, amplitude, and timbre, duration alone, was also a characteristic of silence.<sup>355</sup>

For Cage the goal was liberation of sound. Therefore the coexistence of sound and silence in music was a necessity. Structure for Cage meant the division of a whole into parts; method meant the note to note procedure of composition and materials are the sounds and silences that are produced from composing and form is the 'morphology of continuity'. By this Cage, meant the observation of the development of the material. He stated in his lecture *'Forerunners of Modern Music'* that 'the material of music is sound and silence. Integrating these is composing.'<sup>356</sup> It is this definition of integrating opposites that makes analysis of structures in Cage's music so intriguing as two direct opposites; mind and heart, or structure and form combine, to create a free flowing continuity (music).

However, the young Cage gradually renounced his admiration for the 'master's' presence and techniques. He said of being called a Schoenberg pupil 'that designation is so cheap now that I am

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<sup>354</sup> D. W. Bernstein, *Music I: to the late 1940s*, p. 66.

<sup>355</sup> J. Cage, *Composition as Process*, p. 18.

<sup>356</sup> J. Cage, *Forerunners of Modern Music*, p. 62.

not interested in it; it is being bandied about by all those whose ears are vacant passageways for his words.<sup>357</sup> He began to realise the necessity of harmony in this form of serial organisation. It provided a model, but no structural means and as Cage would often recount, he had no feeling for harmony 'After two years it became clear to both of us that I had no feeling for harmony.'<sup>358</sup> It is interesting to note that Cage relinquished his studies with Schoenberg apparently after attending Schoenberg's first harmony class at UCLA, as he had 'little interest in writing the modulating chord sentences that Schoenberg required.'<sup>359</sup> For Schoenberg harmony was not just colouristic; it was structural. It was the means one used to distinguish one part of a composition from another. Therefore he said I'd never be able to write music. "Why not?" "You'll come to a wall and never be able to get through."<sup>360</sup> Virgil Thomson would praise Cage's use of rhythmic structuring ahead of the Schoenbergian style by saying:

by this getting rid, at the beginning, of the constrictive element in a-tonal writing - which is the necessity of taking consistent care to avoid making classical harmony with a standardised palette of instrumental sounds and pitches that exists primarily for the purpose of producing such harmony, Mr Cage has been free to develop the rhythmic element of composition, which is the weakest element in the Schoenbergian style, to a point of sophistication unmatched in the technique of any living composer. [...] His works represents [...] not only the most advanced methods now in use anywhere, but original musical expression of the very highest poetic quality.<sup>361</sup>

For Cage, harmony was a constraint to his composing, the prepared piano music was the first instigation in which Cage felt the necessity to create his own forms of structure for his composition. The genesis for this revelation has been explored in chapter one, where Cage felt that working with dancers first demanded some form of structuring that wasn't harmonic.

However, Cage deemed himself on the true course to composing Modernist music. After all Schoenberg had gone as far as freeing music from tonality why could he not go as far to free music from the twelve tones of his system. 'If every note is equal to every other then any controllable sound is equal to any other or to any tone.'<sup>362</sup>

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<sup>357</sup> M. Hicks, John Cage's Studies with Schoenberg, *American Music*, 8:2 (1990), p. 128.

<sup>358</sup> D. Revill, *The Roaring Silence*, p. 53.

<sup>359</sup> M. Hicks, John Cage's Studies with Schoenberg, p.130.

<sup>360</sup> D. W. Bernstein, *Music I: to the Late 1940s*, p. 83.

<sup>361</sup> C. Tomkins, p. 96.

<sup>362</sup> M. Hicks, John Cage's Studies with Schoenberg, p.131.

In 1948 Cage organised a festival in honour of Erik Satie at Black Mountain College. As part of the festival Cage delivered his now infamous lecture entitled 'Defense of Satie'. This lecture became integral to Cage's formation on ideas of rhythmic structuring and he used it to give his ideas the enigmatic weight of a composer like Satie. It also demonstrates Satie's influence in Cage's use of rhythmic structure.

The *Defense of Satie* lecture provided an argument and used Satie as an example of its usefulness. Cage states that Satie planned the structure of his music from movement to movement using the transition from key to key as the defining factor. He describes Satie's procedure as being defined in terms of time lengths. As Cage analysed much of Satie's music while on a study trip to Paris and was influential in bringing Satie's music to a modern audience in the 1940s, it is unsurprising that his music has a commonality. As Michael Nyman remarks 'melody - modality, stasis, flatness of movement (an inevitable consequence of rhythmic pre-planning) and unpretentiousness.'<sup>363</sup>

Cage would elaborate further, he says: 'Music is a continuity of sound. In order that it may be distinguishable from non being, it must have a structure; that is, it must have parts that are clearly separate but that interact in such a way as to make a whole.'<sup>364</sup> He insists that music needs form and structure to become whole.

During the same trip to Paris, Cage became convinced that he could detect in Satie's *Socrate* a form of rhythmic structuring akin to his; a structure he believed Satie had utilised in order to ease his hatred of traditional attitudes, enabling Satie to break with the harmonic structure of Beethoven. (Some years later, Cage saw Satie's notebooks in Paris and found, sprinkled in the margins, clusters of numbers that seemed to correspond to the numbers Cage used to work out his own rhythmic structure). He mentioned it to Darius Milhaud who had known Satie well. 'Oh, no, those numbers referred to shopping lists.'<sup>365</sup> However, Michael Nyman suggests that similar number structuring appear in Satie's sketch books for the ballet *Mercure* and for *Cinema*. He also comments on the similarity between the 'non developmental style of both composers and the infinite repetition that does

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<sup>363</sup> M. Nyman, Cage and Satie, *The Musical Times*, 114:1570 (1973), p. 1228.

<sup>364</sup> J. Cage, *Defense of Satie*, p. 78.

<sup>365</sup> C. Tomkins, p. 102.

not establish any strong tonal feeling.<sup>366</sup> Even the first American performance of *Vexations* that Cage organised, had a rhythmic structuring to it 'it began at 5.40 one morning and goes till 12.40 the next morning. Each player had to play for twenty minutes and prepare for twenty minutes prior to the performance in silent contemplation. To fill the allotted 18 hours and forty minutes they had to play fifteen repetitions over twenty minutes, each repetition being timed to last one minute twenty seconds.'<sup>367</sup>

Two further investigations into influences on Cage's use of a rhythmic form of structuring can be linked quite easily together. Both have been discussed at length in this thesis, as has Cage's indebtedness with regard inspiration for the creation of the prepared piano itself, Henry Cowell and music of the East. It was Cowell, as Cage's instructor at the new School for Social Research, who introduced Cage to Oriental rhythmic systems, and Cage's micro-macrocosmic structure bears a resemblance to the rhythmic systems used in traditional Indian music, called Tala. It is likely Cage would have compounded his basis knowledge of this form of rhythmic structuring during his tutorials with Indian musician Gita Saradhai. Tala is the term used in Indian classical music to describe the rhythmic pattern used throughout the whole composition. Some talas are very complex and therefore performed rarely. A simple tala, and one commonly used in Indian composition is called the Teental, which consists of four bars of four beats each.

Paul Griffiths goes as far to suggest that Cage's practice of numbering in his rhythmic structures is a direct homage to the composer Colin McPhee, whose practice of 'notating ostinatos, as repeating number sequences [...] with the numbers now interpreted not as pitches but as length of time,'<sup>368</sup> not to mention the uncanny resemblance to the prepared piano sound and the Gamelan orchestra.

In the article *East in the West* Cage would allude to some techniques similar to Oriental music in his percussion music, 'in general, then, there may be pointed out certain large musical conditions which are characteristically Oriental.'<sup>369</sup>

As suggested in chapter one, a direct link can be seen between several of Cowell's pieces, most notably *Sound Form No. 1*, the *United Quartet*, and *Pulse*. These pieces utilise what Cowell would

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<sup>366</sup> M. Nyman, *Cage and Satie*, p. 1229.

<sup>367</sup> Ibid.

<sup>368</sup> P. Griffiths, p. 12.

<sup>369</sup> J. Cage, *East in the West*, p. 24.



title his unification principle, and bears a strong resemblance to Cage's micro-macrocosmic structure. It is also fair to say that Cage was very familiar with at least one of the above mentioned pieces, *Pulse*, as it was he who conducted the premiere performance in 1939.<sup>370</sup>

As the subject of this section of the study is to analyse the prepared piano music with regards to the techniques that Cage used in structuring the music it is essential to choose pieces from the prepared piano oeuvre that demonstrate the workings of the structuring techniques in operation, and therefore demonstrate their workings within the morphology of continuity. Criteria for choosing a work for the structural analysis include the 'particular type of compositional technique the work exhibits as well as the stylistic characteristics it represents.' If biographical information about the piece under analysis is required the reference to chapter two is recommended. The works that are focused on in this section are *Bacchanale*, *Totem Ancestor*, *And the Earth Shall Bear Again*, *Primitive*, *In the Name of the Holocaust*, *Our Spring Will Come*, *Triple Paced*, *Daughters of the Lonesome Isle*, *The Works of Calder*, *Spontaneous Earth*, *Two Pastorales*, *Mysterious Adventure*, *The Perilous Night*, *Music for Marcel Duchamp* and the *Sonatas and Interludes*.

### **Examples: *The Sonatas and Interludes***

Cage's rhythmic structures provided him with a rule enabling the creation of a definitive musical form. It enabled Cage to link sections of his compositions with a single overarching formula that governed his music with a single number series.

In his treatise *For More New Sounds*, Cage very clearly suggests that a temporal form of structure is the only way that music should be constructed. Cage considered all sounds and silences to be music. All aspects of sound contain one or some part of frequency, amplitude, timbre and duration, yet it is only the temporal aspect that can facilitate silence as well, and so for Cage this method was the only logical means for structuring compositions.

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<sup>370</sup> For a thorough analysis of *Pulse* see D. Nicholls, *American Experimental Music 1890-1940*, Cambridge University Press, 1990, p. 74.

Cage's structuring essentially expressed that the large scale moieties of the piece (the macro structure) mirrored the smaller moieties (micro structure) through arithmetical application of proportion.

The use of a structure based on rhythmic values enabled Cage to incorporate all sounds and silences into his composition, in just the same way as conventional sounds could be incorporated. The rhythmic structure was conceived before the material, it stood separate, and this meant that no part of the material influenced the creation of the structure.

Much of Cage's early prepared piano music was written to accompany dances and at this point Cage had not begun to formalise. He development of any kind of rhythmic structure. As he describes:

'In writing for the modern dance, I generally did so after the dance was completed. This means that I wrote the music to the counts given me by the dancer. These counts were nearly always, from a musician's point of view, totally lacking in organization: three measures of 4/4 followed by one measure of five, 22 beats in a new tempo, a pause and two measures of 7/8. I believe this disorder led me to the inception of structural rhythm.'<sup>371</sup>

### **Elementary Structuring: *The Sonatas & Interludes***

Cage utilises other forms of low level structuring in his prepared piano music, many of which he uses throughout the whole oeuvre. The first obvious type of elementary structuring is a demarcation of individual sections into subsections; these are always highlighted by double bar lines or rehearsal letters.

The work that demonstrates most clearly this type of elementary structuring is the *Sonatas & Interludes*, in which Cage divides the movements to create this form of configuration. This elementary structuring results in the formation of sixteen sonatas and four interludes that are collected into four groups of four. It could be further surmised that the *Sonatas & Interludes* have been divided in half; in the first half the interludes each follow a group of four Sonatas and in the second section the interludes precede each group of four. The arrangement of the *Sonatas & Interludes*, as shown below, gives an appearance of mirror symmetry. It is a palindromic sequence and acts as the elementary structuring in the *Sonatas & Interludes*.

*SSSS – I – SSSS – I – I – SSSS – I – SSSS*

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<sup>371</sup> J. Cage, *A Composer's Confessions*, p. 33.

Within each of the sections in the movements it should be noted that Cage has further divided the section. Cage called the larger sections, those between the repeats in the movement, the macro-structure. The further subdivided sections within these larger sections Cage called the micro-structure.

Sonata/Interlude		Total Number of Bars	A	B	C
Sonata	I	52	24	28	-
Sonata	II	74	28	46	-
Sonata	III	64	16	48	-
Sonata	IV	100	60	40	-
<b>Interlude</b>	<b>1</b>	<b>100</b>	-	-	-
Sonata	V	80	36	44	-
Sonata	VI	36	17	19	-
Sonata	VII	38	26	12	-
Sonata	VIII	50	28	22	-
<b>Interlude</b>	<b>2</b>	<b>64</b>	-	-	-
<b>Interlude</b>	<b>3</b>	<b>48</b>	-	-	-
Sonata	IX	66	8	34	24
Sonata	X	36	12	12	12
Sonata	XI	130	40	30	60
Sonata	XII	76	30	46	-
<b>Interlude</b>	<b>4</b>				
Sonata	XIII	100	30	70	-
Sonata (Gemini)	XIV	100	40	60	-
Sonata (Gemini)	XV	100	40	60	-
Sonata	XVI	100	70	30	-

Thirteen of the sonatas are in binary form, while the remaining three are in ternary. The form of the *Sonatas & Interludes* is made obvious from looking at the score; each section has a clear ending with a repeat, but the placement of the sections making up the gross form is different for each sonata.

Interlude 1 and 2 are through-composed, in that they have no repeats. Interludes 3 and 4 are in four parts, with each of their four macro sections being repeated.

The ternary movements come in Sonatas IX, X and XI. Each time, two sections are repeated out of the three, but the choice of which two are repeated differs each time. However, all of the sections are repeated once in each of the three ternary form movements.

The form of the piece makes the transition and the repetition from each binary section inevitable. For example, Sonata V opens with the first half of the macro section, which containing a dotted crotchet on an Eb, and an ostinato passage contains the same notes continuously in the left hand.

Piece	Form
Sonata I	Binary A://B://
Sonata II	Binary A://B://
Sonata III	Binary A://B://
Sonata IV	Binary A://B://
<b>Interlude 1</b>	<b>Through Composed</b>
Sonata V	Binary A://B://
Sonata VI	Binary A://B://
Sonata VII	Binary A://B://
Sonata VIII	Binary A://B://
<b>Interlude 2</b>	<b>Through Composed</b>
<b>Interlude 3</b>	<b>Four Part A://B://C://D://</b>
Sonata IX	Ternary A://B://C://
Sonata X	Ternary A://B://C://
Sonata XI	Ternary A://B://C://
Sonata XII	Binary A://B://
<b>Interlude 4</b>	<b>Four Part A://B://C://D://</b>
Sonata XIII	Binary A://B://
Sonata XIV (Gemini)	Binary A://B://
Sonata XV (Gemini)	Binary A://B://
Sonata XVI	Binary A://B://

There are two very clear forms of rhythmic structure that Cage employs. The most basic is one that was used in his earlier prepared piano music. This type of rhythmic structure is wholly dependent on the medium for which the music was written; that is incidental music for films, or more often than not, the early dance accompaniments. The large scale units and small scale units do not have to be of equal units and are merely surface level structures, into which Cage would insert the material for the composition. This type of rhythmic structure could be labelled surface level rhythmic structure.<sup>372</sup>

*Bacchanale* was not composed within a compositional structure akin to the micro-macrocosmic structure. Instead the structure was derived from the counts of the dance given by Fort, hence being a surface level rhythmic structure. On the most elementary level *Bacchanale* is structured in a simple ternary form pattern fast, slow, fast (A, B, A(i)) with the second slow section differing in content from the first fast section. It would appear that Fort based her 'movement on the pulse of a quarter note, leaving notation, meter, and tempo to Cage's discretion.'<sup>373</sup> The choreographed structure that Fort must have presented to Cage is based around a fulcrum of 10 beats with the alternation of 20 and 30 beats. The final phrase is 30 beats with a possible coda type ending with 13 beats extra totalling 43 beats.

<sup>372</sup> Paul Van Emmerik describes these as additive and divisive Rhythmic Structure; I would add another that is a hybrid of both additive and divisive.

<sup>373</sup> T. Levitz, p. 137.

$$30 + 20 + 30 + 20 + 30 + 10 + 30 + 10 + 30 + 30 + 43$$

Other pieces that can be deemed to have surface level rhythmic structure are *Totem Ancestor*, *And the Earth Shall Bear Again*, *Primitive*, *In the Name of the Holocaust*, *Our Spring Will Come*, *Triple Paced*, *Daughters of the Lonesome Isle* and *Music for the Works of Calder*.

However, from the middle of the 1940s, Cage began to incorporate variations of the micro-macrocosmic structure into his compositions for dances. This second form of rhythmic structuring could be termed apportion rhythmic structuring.<sup>374</sup>

A basic apportioned rhythmic structure can be seen in *Spontaneous Earth* which consists of 9 sections of 9 measures, and is subdivided as 3, 2, 2, 2.

The previous examples of apportioned rhythmic structuring have given examples of a structure divided by Cage utilising whole numbers. However, in the Sonatas and Interludes Cage apportions his structuring using fractionised numbering. The structural proportions are devised from the rhythmic structure that makes up the macro sections in each movement. Cage almost always makes the distinction between elements of the macrostructure with a double bar line in the sonatas. The elements of macrostructure are built up from smaller microstructural elements, often made up of fractions of bars. It is important to realise why rhythmic values are used to work out structural proportions, meaning bar length instead of a temporal sequence of proportions which have fixed time lengths i.e. seconds. This is because the tempo markings do not give the total value of notes that add up to whole numbers (of seconds). For example in Sonata I:

$$\text{Crotchet} = 76 \therefore \text{Quaver} = 152$$

$$\text{Quaver} = 60 \div 152 = 0.3947 = \frac{30}{76} = \frac{15}{38}$$

$$\text{Quaver} = \frac{15}{38} \text{ of a second or } 0.3947$$

Thus the first proportion of time that divides the macro structure (which is 1 ¼ bars in the system just demonstrated, using bar lengths) would be 3.947 seconds.

$$\frac{15}{38} \times 10 \text{ (10 = the number of quavers)} = 3.947 \text{ seconds}$$

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<sup>374</sup> This type of rhythmic structuring Emmerik labels divisive rhythmic structuring

The first two sections of microstructure would be 6.3158 seconds

$$15/38 \times 16 \text{ (16 = the number of quavers)} = 6.3158 \text{ seconds or } 1\frac{1}{4} + \frac{3}{4} \text{ of a bar}$$

*∴ The total macrostructure of section A of Sonata I would 44.211 seconds long:*

$$50 + 14 + 12 + 12 + 9 + 9 = 112 \text{ quavers}$$

This evidently makes no sense musically, and it is clear that Cage built up structural proportions in units of beats and bars rather than seconds.

In the elucidation of the structure, the two scales of structure are the microcosmic and macrocosmic structures. The two are related by multiplication in the following way. In Sonata XIV, microcosmic structure is given by 2, 2, 3, 3. This is determined using the square root method. First the macrocosmic sections of the music are distinguished, and the total beats of the piece are summed. In this case, the macrostructure is //:10 bars// 10 bars//:10 bars// 10 bars// 10 bars://. The total of all bars in the piece is 100 bars. The square root of 100 is 10. This represents one full cycle of microstructure (10 bars). To determine the individual elements of microstructure, each macrostructural element is divided by the cycle of microstructure (10 bars). Thus the two repeated elements of macrostructure, of 20 bars repeated then of 30 bars repeated, are each divided by 10 bars. This gives a microstructure of 2 repeated, then 3 repeated. Thus the microstructure is determined to be 2, 2, 3, 3.

In a reverse of this process, to form the macrostructure from the microstructure, the first element of macrostructure is formed by multiplying the entire microstructure by its first member, in this case 2. So the resulting macro-element is formed from two repeats of the element 2, 2, 3, 3; forming 2, 2, 3, 3; 2, 2, 3, 3. It is important to note that this not only gives the correct total of bars corresponding to that section in the piece, but that these 20 bars contain an inherent structure formed of elements of microstructure.

Although the macrostructural elements are observed rigorously in the music, the microstructure is subject to a more lenient treatment and, in some areas cannot be distinguished at all. For this reason, the square root method is needed to definitively determine the microstructure; it cannot be determined directly from the score.

The second element of macrostructure would be identical to the first and, in fact in the *Sonatas & Interludes*, a repeated element of macrostructure is a literal repeat of the first section. In this case, the third and fourth elements of macrostructure are also identical and are formed by three repeats of the microstructure; i.e. 2, 2, 3, 3; 2, 2, 3, 3; 2, 2, 3, 3. In most cases the units of both the macro and microstructure are bar equivalents of  $\frac{4}{4}$  time. So in this case, the resulting form would be binary, with a first repeated section of 20 bars and a second repeated section of 30 bars.

As previously mentioned, the macrostructure is always observed strictly in the *Sonatas & Interludes*. In contrast, the microstructural elements are less obvious. They provide an underlying structure to the pieces and in many cases, repeated elements of microstructure give rise to repeated rhythmic or melodic motifs. Cage uses a kind of rubato of structure with these micro-elements; in some cases relaxing the structure and in some cases disregarding it altogether. This is a clear example of what Cage regarded as 'form vs. structure' (remembering that Cage took structure to mean what would generally be called form. To him, form meant content and was the musical essence of the piece). Sometimes the two forces work together in harmony, and in some cases one overcomes the other, e.g. in the case of form (content) overcoming structure in these areas where microstructure is disregarded. The calculations of interdependence between micro and macrostructure are simple when each element of microstructure is a whole number, as it is in some of the sonatas. However, in other cases, the microstructure is made up of fractions. In this case, when forming the macrostructure, instead of repeating the elements of microstructure, they are divided. The following illustration is from Sonata V.

$$\text{Sonata V microstructure} = (2, 2, 2\frac{1}{2}, 2\frac{1}{2})$$

First element of macrostructure is given by two repeats of the microstructure, i.e.  $2, 2, 2\frac{1}{2}, 2\frac{1}{2}, 2, 2, 2\frac{1}{2}, 2\frac{1}{2}$ . This gives a total of 18 bars. The second element of microstructure is identical to the first. The third element of macrostructure is given by two and a half repeats of the microstructure; i.e. two full repeats, plus one where each element of microstructure is divided in half.

$$\sum = 2, 2, 2\frac{1}{2}, 2\frac{1}{2}, 2, 2, 2\frac{1}{2}, 2\frac{1}{2}, 1, 1, 1\frac{1}{4}, 1\frac{1}{4} = 22\frac{1}{2} \text{ bars}$$

The fourth element of macrostructure is identical to the third.

If structural proportions are given by =A, B, C, D etc.

Macrostructure is given by:

$$A \times (A + B + C + D) = \text{Total length of first unit of macrostructure}$$

$$B \times (A + B + C + D) = \text{Total length of first unit of macrostructure}$$

$$C \times (A + B + C + D) = \text{Total length of first unit of macrostructure}$$

$$D \times (A + B + C + D) = \text{Total length of first unit of macrostructure}$$

Summing up these units of macrostructure gives the total length of the piece. The individual units of microstructure are therefore multiplied up, each multiplied against all of the four elements and summed together into the total length of the first unit of macrostructure. Each of the Sonatas & Interludes can be formed from this multiplication of microstructural units. The units of the microstructure also have a meaning individually, as in many of the Sonatas & Interludes. The length of the sum of the units of microstructure making up each macrostructural unit is immediately followed by a pedal marking. In the following sections, the details of the micro and macrostructures of each movement are detailed, along with the process of multiplication used to produce a macrostructure. The indication 'required' refers to the actual amount of bars in each macrostructural unit of the piece. The sum of each microstructural pattern gives the 'square root ( $\sqrt{\phantom{x}}$ )' for that particular structure and this is equal to the square root of the total number of bars in each movement.

In some of the movements, the time signatures are simple and mostly in  $\frac{4}{4}$  time. However, in some cases particularly those with microstructures in fractions, in order to fulfil the cycle of macrostructure, subdivisions of bars are required. Cage enables this by using different time signatures. For example, in Sonata I,  $1\frac{3}{4}$  bars of  $\frac{4}{4}$  are required to fulfil macrostructural requirements of  $8\frac{3}{4}$  bars of  $\frac{4}{4}$ . Cage arranges this by using a single bar of  $\frac{7}{4}$ ; this equates to the same number of crotchet beats.

## Sonata I

$$\text{Structural Proportions} = 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}$$



$$1\frac{1}{4} \times (1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}) = \frac{35}{4} = 8\frac{3}{4}$$

$$\frac{3}{4} \times (1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}) = \frac{21}{4} = 5\frac{1}{4}$$

$$1\frac{1}{4} \times (1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}) = \frac{35}{4} = 8\frac{3}{4}$$

$$\frac{3}{4} \times (1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}) = \frac{21}{4} = 5\frac{1}{4}$$

$$1\frac{1}{2} \times (1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}) = 10\frac{1}{2}$$

$$Total = 49 \text{ (} 7 = \sqrt{\text{of } 1) \text{)}$$

### Structure of Compositional Makeup

#### Sonata I

Required:  $8\frac{3}{4}$  bars

*7 bars of  $\frac{2}{2}$  or 7 bars of 4 crotchet worth of beats*

*1 bar of  $\frac{7}{4}$  of 4 crotchet worth of beats*

*1 bar of  $\frac{3}{4}$  of 4 crotchet worth of beats*

*Total =  $8\frac{3}{4}$  bars = first major section.*

Required:  $5\frac{1}{4}$  bars

*2 bars of  $\frac{6}{4}$  or 2 bars of 6 crotchet worth of beats*

*2 bars of  $\frac{9}{8}$  or 2  $\frac{1}{4}$  of 4 crotchet worth of beats*

*Total =  $5\frac{1}{4}$  bars = second major section.*

Required:  $10\frac{1}{2}$  bars

*7 bars of  $\frac{2}{2}$  or 2 bars of 4 crotchet worth of beats*

*7 bars of  $\frac{2}{4}$  or  $3\frac{1}{2}$  of 4 crotchet worth of beats*

*Total =  $10\frac{1}{2}$  bars = third major section.*

The last section of Sonata I is an example of a form of diminution.

*Microstructure =  $1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{4}, \frac{3}{4}, 1\frac{1}{2}, 1\frac{1}{2}$*

In the last section, the  $1\frac{1}{2}$  units of microstructure are formed by one full cycle of microstructure, then a half cycle in which the time signature changes from  $\frac{2}{2}$  to  $\frac{2}{4}$ , essentially a diminution, leaving the microstructure intact, but half the size.

## **Sonata II**

Required:  $11\frac{5}{8}$  bars

*10 bars of  $\frac{4}{4}$  or 10 bars of 4 crotchet worth of beats*

*3 bars of  $\frac{3}{8}$  or  $1\frac{1}{8}$  of 4 crotchet worth of beats*

*1 bar of  $\frac{2}{4}$  or 1 bar of 2 crotchet worth of beats*

*Total =  $11\frac{5}{8}$  bars = first major section.*

Required:  $18\frac{13}{32}$  bars

*14 bars of  $\frac{4}{4}$  or 14 bars of 4 crotchet worth of beats*

*7 bars of  $\frac{3}{8}$  or  $2\frac{5}{4}$  of 4 crotchet worth of beats*

*2 bars of  $\frac{7}{8}$  or  $1\frac{3}{4}$  of 4 crotchet worth of beats*

*Total =  $18\frac{12}{32}$  bars = second major section. (This equates to 1 demi – semi quaver out!)*

## **Interlude 3**

*Structural Proportions =  $1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}$*

$$1\frac{1}{4} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 8\frac{3}{4}$$

$$1\frac{1}{4} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 8\frac{3}{4}$$

$$1 \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 7$$

$$1 \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 7$$

$$\frac{3}{4} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 5\frac{1}{8}$$

$$\frac{3}{4} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 5\frac{1}{8}$$

$$\frac{1}{2} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 3\frac{1}{2}$$

$$\frac{1}{2} \times (1\frac{1}{4}, 1\frac{1}{4}, 1, 1, \frac{3}{4}, \frac{3}{4}, \frac{1}{2}, \frac{1}{2}) = 3\frac{1}{2}$$

$$Total = 49 = (7 = \sqrt{\text{of Interlude } 3})$$

Required:  $8\frac{3}{4}$  bars

*7 bars of  $\frac{4}{4}$*

*1 bars of  $\frac{7}{4}$  or 1  $\frac{3}{4}$  bars of 4 crotchet worth of beats*

*Total =  $8\frac{3}{4}$  bars = first major section*

Required: 7 bars

*7 bars of  $\frac{4}{4}$*

*Total = 7 bars = second major section*

Required:  $5\frac{1}{4}$  bars

*4 bars of  $\frac{4}{4}$*

*1 bars of  $\frac{5}{4}$  or 1  $\frac{1}{4}$  bars of 4 crotchet worth of beats*

$$\text{Total} = 5 \frac{1}{4} \text{ bars} = \text{third major section}$$

Required:  $8 \frac{3}{4}$  bars

$$3 \text{ bars of } \frac{4}{4}$$

$$1 \text{ bars of } \frac{2}{4} \text{ or } 2 \text{ bars of } 4 \text{ crotchet worth of beats}$$

$$\text{Total} = 3 \frac{1}{2} \text{ bars} = \text{fourth major section}$$

Cage fools the analyst by inserting different time signatures into the pattern of the macrostructure. However, he makes it work by relating the new time signature to the original time signature, so the overall number of beats usually fits the predicted structural proportions.

For example in sonata I, the first half of the macrostructure requires  $8 \frac{3}{4}$  bars to be completed with the structural proportions  $1 \frac{1}{4}, \frac{3}{4}, 1 \frac{1}{4}, \frac{3}{4}, 1 \frac{1}{2}, 1 \frac{1}{2}$ , and so completing the first half of the macrostructure's cycle. The original time signature is  $\frac{2}{2}$ , which relates to 4 crotchet beats per bar, therefore a  $\frac{7}{4}$  bar would turn into  $1 \frac{3}{4}$  worth of a four crotchet beats per bar length, thus completing the macro cycle. This is also evident in the last 7 bars of Sonata I, which are in half time,  $\frac{2}{4}$ .

Sonatas IV, VII, X, XIV and XV all use whole numbers in the calculation of the microstructure, all others use fractions.

In Sonata II the prediction and the actual result are  $\frac{13}{32}$  and  $\frac{12}{32}$  respectively, one demi-semi quaver out. This may have been a deliberate act by Cage to sabotage his own structural formulae; or it could also be a genuine mistake on his part.

The basic premise of this chapter has been the ontology of prepared piano music. Exactly where does the music lie; in the score, sound or performance? What is the relationship between notational sign and sound? This has been discussed through the analysis of the prepared piano music. The prepared piano music is ideal for analysing how particular notational forms have certain implications and how these might affect our understanding of and be disrupted by what we hear and as was mentioned from the outset of this thesis: what one sees in the score is not what is heard in

performance. From the analysis it has been shown that the notational directions are suggested directions and not orders as essentially every notational sign is ambiguous. Signs in the musical score are inherently imprecise – they are merely clues, as Richard Dawkins in the *Selfish Gene* points out, genes are not a blue print but a recipe for creation.

# Chapter Five

## 5.1: Context

The premise of this chapter is to examine the issues performers face when working with preparations and their sonic outcomes.

The foundation for this relationship can be grounded by the cyclical question: Does the way a performer plays the prepared piano, affect the way the piano is prepared, or conversely, does the way the piano is prepared affect the way a performer plays?

Initially it is important to note that this chapter does not intend to act as an investigation into performance practice per se; however, it will examine to some extent, the degree to which the resultant sonic qualities of a given prepared piano performance relates to the preparation of a piano for performance and will draw upon answers from interviews that have been conducted with pianists familiar with playing the prepared piano. This chapter will elucidate the implications of this thesis for performers. The problems that have arisen through this thesis will be highlighted and possible solutions will be suggested through the application of theories suggested in this thesis and through the recommendations of professional pianists who perform the prepared piano music.

It must first be decided if a performer's choice of sound is the result of a stimulus (a meaning conveyed by the noise made by the preparation), the preferred choice of sound (negotiating from Cage's measurements) or stemming from the individual pianist and their individual tastes.

The noise produced by the preparation (or more importantly, the preferred noise) may be meaningful to a performer because it has related connotations. As Meyer says, it may evoke 'associations and connotations relative to the world of ideas, sentiments and physical objects.'<sup>375</sup> However, as performers of prepared piano music are (or likely to be) experienced listeners then the sounds produced by the preparations may have musical connotations of a different meaning; they may represent deeper imbedded training that they may have received. This may mean that the pianist selects a progression of sounds or tones produced by the preparations leading to or developing from

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<sup>375</sup> L. Meyer, *Emotion and Meaning in Music*, University of Chicago Press, 1961, p. 6.

another group or progression. The 'taste' of the pianist is a result of past experiences occurrences that remain in the memory of the pianist and influences them in future performances

It is interesting to note the way preparation sounds are described, such as 'tom tom' etc. This can be referred to as 'cultural noise'<sup>376</sup> where the habit responses take over and fill in the gaps with those of which the individual possesses. Prepared piano music possesses a rare quality, in that its cultural noise is different to the style of Westernised music. Therefore there is a greater amount of choice as to which gaps must be filled by the pianists past habits.

## 5.2: Considerations for the Pianist

### Preparations specifics

The first place a performer will start when beginning with Cage's prepared piano music is the table of preparations. As mentioned in chapter two, Cage's descriptions of preparations are very ambiguous and leave a great detail of choice (unintentionally at this point in Cage's career) up to the performer. Performers need to decide on the type and size of preparation needed as this will greatly affect the type of sound produced. If the pianist is given free choice as to the size and material of preparation as is the case in early pieces such as *In the Name of the Holocaust* and *Primitive*, (where Cage does not specify any sizes for the screws or bolts) or *Bacchanale* (where Cage recommends a small bolt but gives no further definition) likewise in *And the Earth Shall Bear Again* (where Cage specifies a large piece of bamboo or two thicknesses of woollen material, but he never specifies the thickness), then an informed choice is needed to make sure that the sounds produced fit correctly into the larger plan of the music. The pianists should consider the size, shape and material of the preparation along with variables such as winding depth. The material from which the preparation is made will greatly affect the quality of the harmonics produced.

Along with the type and thickness of the material, the pianist must also remember that a preparation should be large enough that it will actually have an effect on the string but also small enough so as not to touch and therefore alter any other string. This is particularly pertinent for preparations such as the penny and rubber. If a piece requires a penny such as in *A Valentine Out of Season* where Cage requires the preparation of D4 and Eb4, the pianist must remember that Cage is referring to a US

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<sup>376</sup> L. Meyer, p. 16.

penny or a cent, which is considerably smaller than pennies from other countries – such as England. An equivalent coin to utilise if in the UK is the five pence.

A performer must therefore make a reasoned choice as to the correct type of preparation. Herbert Henck believes that

Cage's descriptions are much too vague to try to be "authentic". There is no point to find out what "weather stripping" *really* meant in the forties when he composed these pieces. You cannot find this kind of material anyway. And if you could find it, it might have suffered in the meantime drastically by old age and sound much different now.

As has been discussed in chapter three, the measurements that Cage provides are for the Model O Steinway, unless stipulated as in *The Perilous Night*. How should a pianist decide where to position the preparation along the string? Should the pianist adjust to fit the type of piano being performed on? Should they be using identical measurements and leaving the resulting sound as it is and not adjusting it? Richard Bunker

always starts with the measurement given by Cage, and then adjust IF NEEDED, slightly back or forward, to achieve the most pleasing resonance. When I performed "Perilous Night" for Cage early in my career, he was delighted with this principle and its result. He DID care about the sound of the preparations above all. That, after all, the (sic) is the whole point of the prepared piano!!

The previous statement made by Bunker is interesting for two reasons. It is fascinating to note that Bunker suggests that the slight adjustment of the preparation is all that is needed to achieve the 'correct sound'. However, the second point of note is the phrase 'pleasing resonance'. What does Bunker mean by pleasing? He must mean pleasing to his ears. The term pleasing would seem quite an irrelevant comment as it has been found previously that the 'nicest' sounds are not always the most appropriate for the musical gestures and cadences of the piece – there is no evidence to suggest that Cage sought a pleasing sound either.

It is interesting to discover how performers go about choosing the particular preparations and where to place them. Philip Thomas believes that choice of preparation is personal to each performer,

I would wish to make sure I've got the right kind of material as stated in the notes for preparation and that I'm measuring the positioning of said material following the guidelines Cage gives. However, of course, I have no idea exactly what kind of screw or bolt he used (though occasionally there are further guidelines to this effect which are helpful) and when it comes to weather stripping I have to find something which I think feels right (I use a fibrous material I found about 9 years ago, but which alas I can't find now so it'll run out soon). As for positioning it on the string, I take account of Cage's



measurements, adapt them accordingly for the size piano I'm using, so that materials are placed *proportionately* along the string in relation to each other and the measurements in the score. But then I use my ear to make smaller adjustments and to decide how far down to screw a screw or to insert a bolt. What guides my ear? - my taste, bearing in mind that I don't think all sounds should be the most beautiful I can find! (I recall Cage in interview somewhere saying he liked the balance between nice sounds and noisy sounds). SO I try to get a *good* sound - either a good sonorous sound, or a good rattle, or a good clunk, or whatever. I don't think listening to recordings particularly helps - each one is so different, and whilst listening to early recordings (such as the 25-year retrospective, for which Cage was obviously present) is interesting, there are factors such as the recording quality which come into play and the pianist doing certain things depending upon the piano and their taste, etc.

It is essential however, that the performer remembers certain fundamentals regarding the positioning of preparations on strings, as have been commented on in chapter three. The pianist should initially begin with the measurements given by Cage in the instructions to the prepared piano piece. This measurement will give the pianist an area for which to begin the exploration for the desired sound. For example, in the Sonatas and Interludes Cage states that the measurement for the note G4 prepared with plastic should be  $2\frac{7}{8}$  of an inch from the damper. Remember to be accurate from where to measure; this should be the edge of the damper. Also measure to the same point for each preparation, which should be the first edge of the preparation that the pianist comes to. The best way to accomplish this is by using a tailor's tape measure which is generally much more flexible. If Cage states that the positioning of mutes is to be found by experimentation as in pieces such as *In the Name of the Holocaust* – where Cage requests the preparations to be positioned in 'such a way that they give a metallic rattle sound', then it is essential that several important points are considered, if a preparation is positioned at a nodal point of the string, the preparation will create very distinct harmonics. When the pianist prepares a string, the resulting sonic outcome will result in harmonics. The pianist must be aware however, as noted in chapter three, that at certain points of the string there are regions called nodes which are the position along the string where there is no amplitude whatsoever. By preparing the string with a preparation that touches the node, the note produced will be a corresponding harmonic to that fundamental note. The node located at the midpoint of a string divides that string equally into two parts. If a preparation was located at this point along the string it would create a frequency that is an octave above the fundamental frequency, because the string is vibrating at twice the speed of the fundamental. For instance, if middle C string is measured at approximately 64.0cm then the midpoint node located at 32.0cm would produce a frequency of C5 (middle C being C4). The pianist should recognise the connotations of this measurement and realise that because

Cage requested this specific distance from the damper, it is likely that he would have heard a sound that produced approximately an octave above. Therefore, the pianist can make the alterations to suit the desired piano and to create the correct sonic result. However, one must assume that Cage composed all of his prepared piano pieces on a Steinway Model O. Therefore it is essential for the pianist to realise that the movement of a preparation along a string – even by a fraction of an amount may mean that a nodal point is hit. This will therefore drastically alter the sound that is produced and is particularly pertinent to performing on different size and model pianos. Similarly if a preparation was positioned at  $\frac{1}{3}$  of the length of the string, then the string is divided equally into three equal parts, each vibrating at three times the fundamental frequency – this would also equate to  $1\frac{1}{2}$  times the octave. It is possible to work out the value of other harmonics, for example 'because the ratio between notes having the ratio 3:2 is a fifth, this harmonic must be the fifth note in the scale above the octave of the fundamental.'<sup>377</sup> Therefore stopping the string, such as adding a preparation and raising the fundamental by a given amount will raise the harmonic series by the same amount.

Herbert Henck believes:

In the case of Cage's prepared piano pieces, I put the preparations at points where they sound best – because you might know that Cage tried out his preparations on a very tiny model of a grand piano, and afterwards all the pianists who wanted to play these pieces came and asked him "Where should I place my preparations? This table of proportions in the instructions of the score doesn't match at all with the measurements of the instrument I'm using. What should I do?" And Cage's answer finally was: Put it where it sounds best, or where you like it best. This was a kind of including the chance into the preparation too, because the resulting sounds became in a way unpredictable for the composer who formerly wanted them to be very precise. But this kind of coincidence enriched the music afterwards and solved Cage's problem as well that of his performers in a very practical way. The preparation stopped to be static and became dynamic, flexible, and almost every performance was more or less surprising.

However, Henck goes on to say:

On the other hand it seems kind of crazy to me that just John Cage should have asked for a standard in sound, because it was against all his philosophy to have repetitions of more or less the same.

Yuji Takahashi:

The prepared piano changes the piano into an ensemble of modified tone colours so I follow first the informed choice of materials and their positions at the strings to bring forth the effects which are not

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<sup>377</sup> Marshall Cavendish Corp., *How it works: Science and Technology*, p. 2284.

arbitrary or indeterminate for instance metal add the resonance but rubber and felt mute the overtones but the indicated materials were contemporary when he wrote the piece in 1940-50s then you have to replace with similar available materials also the positioning differs according to the instrument you use and the state of strings you need to adjust minutely along on the string to find the best position to bring out the nicest sound, delicate and not harsh avoiding thud caused by touching the inner construction or frame of the piano singing tone.<sup>378</sup>

The pianist must also take into consideration the dimensions of the piano. It has been commented in this thesis numerous times, that all pianos are different and the difference can range from the insignificant, such as the material of the sustaining pedal, to critical – such as how thick the string is and the tension that the string puts on the piano. The average tension on a steel piano string is approximately 180lbs on the tenor and treble registers, with a 15-20% increase on the bass strings. The average modern piano has in the region of 230 strings, which consequently has a tension in the region of fifteen to twenty tons. This taken into consideration, a grand piano could feasibly have a string tension of anywhere up to thirty tons. It is logical to presume that the thickness of piano strings alter with regard to the pitch they are designed to produce. As the thickness alters, so too does the mass of the string with bass strings being thicker and heavier than the treble register strings. Typically the range for the thicknesses of string is from  $\frac{1}{30}$ " (.85mm) for the highest treble strings to  $\frac{1}{3}$ " (8.5mm) for the lowest bass,<sup>379</sup> and larger pianos and longer piano strings. It is important to note this because it will have an effect on the amount of vibrational energy produced by the string. By adding the preparation between the strings there is a combined effect between the two. Sound is produced by the vibrating string moving the surrounding air. As the string is quite thin, it does not have a great deal of vibrational energy to move the string to any large degree – this means that the sound produced is quite weak, with a low volume. The piano maker resolves this issue by mounting the string on a large frame and body. Adding the preparation adds a small amount of weight to the string inhibiting it even further; the string must use the vibrational energy it has to simply move itself with the increased weight (thus giving the dynamic range of a harpsichord). In theory the added weight should make the pitch lower due to the increase in mass. However, the added mass will also elongate the string, meaning the pitch should rise. The weight and dimension of the string will affect the percentage increase.

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<sup>378</sup> Yuji Takahashi, email interview with the author

<sup>379</sup> Five lectures on the acoustics of the piano ed. Anders Askenfelt www.ed

The pianist must also consider the winding depth of the preparation. This has been discussed with reference to sonographic analyses in chapter three. It was discussed that the sound can be altered further by the differing amount of the screw or bolts shaft that is above or below the string.

If the winding depth is greater, i.e. there are more rungs below the string than above and the body of the preparation is closer to the sounding board, then the sonic result produces more partials than preparations that have a winding depth of fewer rungs below the string. The research from chapter three discovered that if more of the preparation is above the string then there is a greater production of strong upper partials in the sound. The reason for the higher partials is likely due to the fact that the screw is not as constrained and adds to the vibration of the piano string as it is not restricted. The lower partials in the preparations with a winding depth mentioned previously, produce a muddy and dense sound. If this is the type of sonic result a pianist requires then it would be wise to wind the screw to an approximate depth of ten rungs. The opposite can be said of producing a brighter tone. Simply by having a lesser winding depth, for example somewhere between three and six rungs; a brighter sound can be produced. When the winding depth of the preparation is small, for instance three rungs, a larger amount of mid-range partials are produced, thus altering the sonic effect to a small amount and retaining a larger amount of the original fundamental tone.

The pianist must make the decision as to how much of a sonic change needs to be created. The pianist must first look at the music and decide whether, Cage has composed the section of music with a particular effect in mind (chapter four). Typically this will consist of some form of cadence. This will be discussed with particular reference to *The Perilous Night* in chapter six.

The pianist must be careful however, not to wind the preparation so far that it is in contact with the sounding board (unless specified by Cage). This will absorb some of the vibrational energy that is being transferred through the preparation and alter the sound produced again.

The quality of a sound or timbre is largely the result of the differing strengths of the harmonics produced. Every sound produced by the prepared piano has a particular recipe of 'resonant frequencies that combine to make the total sound'<sup>380</sup> Therefore, if a pianist requires a richer tone, then they must situate the preparation so as to produce stronger harmonics. Stronger harmonics are

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<sup>380</sup> L. D. Kirkpatrick and G. E. Francis, *Physics a World View* (Sixth ed.), Thomas Learning inc. 2006, p. 317.

produced when the preparation is situated at the nodal points of the strings, (positions were highlighted earlier in this chapter) and (if the preparations allows) when the winding depth of the preparation is greater. The timbre of the sound will also be affected by the dynamic at which the pianist performs. There will be some resistance caused by the preparation and the dynamic range is that of a harpsichord; so different sounds may be created due to fluctuations in the dynamic. A pianist should practice with several dynamic levels to ensure that the tone created by all of them is adequate for the performance.

The advice given to the pianist in this chapter so far has revolved around making considered decisions as to the type and positioning of the preparation. However, even though these decisions are considered, they are still made by the performer, who is making a judgment as to what Cage actually wanted in his music. This brings forth the discussion of authenticity. Can we create an authentic performance of a piece of prepared piano music by John Cage? How do composers actually feel about allowing performers to make decisions regarding their music? Christian Wolff believes the choices made by performers in Cage's music are similar to choices made by performers in his music:

I specified the preparations as clearly as I could, sometimes with distances spelled out (inches from dampers, etc.), though aware that this was approximate, dependent on the piano available. Sometimes I did specify resulting pitch, which was exact and could usually be realized on whatever piano was being used. It's rather like working with percussion - as Cage would have very well known. You can't control exactly what kind of drum, in what condition, with what idiosyncratic resonance characteristics, etc. you may get when asking for "medium tom-tom".<sup>381</sup>

The notion of authenticity is one of the most talked about subjects by musicians. The idea of creating an authentic performance in modern music may seem eccentric to some people, (even though John Cage's prepared piano music is over 60 years old). Allied to the idea of age is that there are still many people alive who knew the composer personally or professionally, and so the expectation is that any performance will always be informed, or if not, mistakes will be noted and rectified. However as has been demonstrated in this thesis, it is not just stylistic differences that occur in performances of prepared piano music, where performances vary due to pianist decisions relating to dynamics, tempo etc. It is the sound produced that varies greatly. The closest example to historical realisations is

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<sup>381</sup> Christian Wolff, email interview with Philip Thomas

when musicians play the pieces on period instruments, resulting in new sounds and acquiring what many would call 'historical accuracy', achieving what the composer actually heard, (and wanted?).

Richard Bunker, the pianist who Cage congratulated on his preparation of *Perilous Night* knows better than most Cage's feeling on authenticity:

Authenticity was an important issue to Cage at this point in his development, which is why he notated so carefully the measurements for the location of the preparations. But here's the rub: unless we know (which we don't) exactly what make and model piano he was using for each piece, there is no way to be unerringly authentic. As you know, each piano has its own "scale" of design of the harp. Obviously, string length variations increase from treble to bass. But I always BEGIN preparing a piano with Cage's instructions and measurements.

Christian Wolff, a composer who worked closely with Cage, and has also composed for prepared piano believes that

things change over time, and John Cage was quite aware of that, and from what I recall, took it in his stride. You could say: make your best effort to realize a piece (prepared piano) as you think it was intended, realizing that you might not altogether manage it, but making as musical a performance as you can, finally, on your (the performer's) terms and to the extent that (to use Cage's favorite terms), intelligence and conscience allow.<sup>382</sup>

This statement seems to put the choices firmly in the hands of the pianist. The problem largely lies with the ambiguity of Cage's specifications. However, from what we learn of Cage's philosophy from the 1950s onwards and his experiments in indeterminacy, are performers given permission to ignore Cage's instructions because of their ambiguity? Or must the wishes of the composer bear some impact on the choices made by the performer. Given Cage's aesthetic development post-1951, do we understand Cage's work from the 1940s as almost written by a different composer, or do we regard them retrospectively, and make choices according to his subsequent performance aesthetic. Richard Bunker believes

I don't think we are past caring about Cage's instructions any more than we should care about whether Bach's keyboard works are performed on piano or harpsichord or clavichord. One CAN play Bach's works on piano, but one must know and appreciate fully that this was not what Bach heard or intended. Cage's subsequent compositional development to aleatoric techniques might have grown out of his appreciation of the difficulty in duplicating the results of preparation measurements from one piano to another (and, certainly more importantly out of his study of the I Ching and Buddhism), but to retrospectively then imagine that his prepared piano measurements and specifications of materials no

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<sup>382</sup> Christian Wolff, email interview with Philip Thomas

longer matter seems to me a false logic. Yes, it matters, perhaps even more than Bach 'transcriptions' for pianoforte, because we still have plenty of real pianos around that can be "well prepared"<sup>383</sup>

Henck adds:

To solve all these problems and produce a "authentic" version seems to me impossible. Something like the "weather stripping" might make it clearer. Even if you are able to get hold of this old-fashioned material you must consider that its qualities might have changed in the meantime by old age. But even in the forties there might have been several companies to produce this kind of material, and it seems not very much alike that all these new products had the same quality to sound in the same way between the strings of a piano. Even wood or metal can be quite different, because there is not only "wood" but several types of wood, and they all might sound a little bit different.

### 5.3: Big Fish Audio

The John Cage Trust has taken a step closer to enabling a more universal sound for the prepared piano by creating a virtual prepared piano with the aid of the music company Big Fish Audio. Mikel Rouse the session producer for the music technology company Big Fish Audio, along with the John Cage Trust embarked on the task to sample prepared piano sounds for use with the *Sonatas & Interludes*, using the original preparations, as have been described in chapter two, and again using Cage's instructions found in the published score to the *Sonatas & Interludes* the group prepared the piano and recorded and programmed the sound produced to create three dynamic levels in five articulations which in total comprised 1,320 different samples. Big Fish Audio make a sweeping statement of seeking and utilising the 'near-perfect' piano for their recording which they located at LRP Studios in New York. They don't, however, state what makes the piano ideal for preparing.

Over several days, Big Fish Audio sampled each of the 88 notes of the piano, prepared and unprepared at the dynamic ranges piano, mezzoforte and fortissimo, and using 'staccato, long notes with natural decay, long notes with sustain pedal [for sound-board interaction], long notes with soft pedal, and long notes with soft pedal staccato [...] the longest samples lasted well over a minute.'<sup>384</sup>

Big Fish audio believe that they have created an authentic prepared piano in the form of a virtual instrument.<sup>385</sup> Big Fish Audio state that the reasoning for the creation of a CD-ROM full of recorded samples was two-fold:

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<sup>383</sup> Richard Bunger, email interview with the author

<sup>384</sup> Big Fish Audio CD-ROM Booklet, p. 4.

<sup>385</sup> [www.bigfishaudio.com/4DCGI/detail.html?325](http://www.bigfishaudio.com/4DCGI/detail.html?325)

[...] to extend the life of Cage's works for the instrument, and to make the instrument itself, the prepared piano, more readily available to performers and composers working exclusively with electronic equipment.<sup>386</sup>

Big Fish Audio believe in addition that 'the present format also permits lively experimentation with Cage's remarkable sounds, abstracted from his own compositions, encouraging new concepts, compositions, encouraging new concepts, compositions, and realizations.'<sup>387</sup>

There are many questions that could be asked about the *need for* and the legitimacy of such a large sample library. Fundamental to the prepared piano is the interactive quality of tones that occur when prepared and unprepared notes are played simultaneously. Even the overlapping of prepared sounds create many sympathetic resonances, interference beating and many unintentional compound noises created by the close contact of preparations to the real instrument (strings, hammer and soundboard) - all variables that could not be foreseen when recording samples. Can the same richness and uniqueness of sound be portrayed through the sampled library? This debate, however, is not as simple as comparing, at its most basic level, a piano ('real sound') versus synthesised sound – synthesiser ('virtual sound').

Many composers and performers who utilise technology would, however, argue that the specific sonic interactions mentioned previously could be created when combining digital sounds, suggesting that the interactive chance element is also obtainable in live electronic performance. If one were to consider recording per se as the collecting of samples, then in terms of Cage's compositional mission (sounds themselves), there is little difference between using the Big Fish Audio samples and making and listening to a recording of a live performance of Cage's prepared piano music.

Listening to a recording of the performance of the Sonatas & Interludes by John Dickson, that is available on Big Fish Audio website<sup>388</sup>, initially one might not observe any difference between this and other recordings. However, it does feel like it is too 'perfect' in sound. This may be the result of an ingrained bias on the part of the author, having touched the actual preparations, held and analysed the materials and seen many pianists spend hours preparing and un-preparing a piano for performance. The sonic results do not feel like they are being created by 'blood, sweat and tears' of a

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<sup>386</sup> Big Fish Audio CD-ROM Booklet, p. 3.

<sup>387</sup> Big Fish Audio CD-ROM Booklet, p. 3.

<sup>388</sup> <http://www.bigfishaudio.com/detail.html?325>



pianists searching for the correct sound, nor does the performance feel 'earthy' – a primitive feel that is created when using preparations.

That is not to say that the sounds produced are not of a good quality and after all, we do not know what treatment the sounds have been subjected to in the recording studio. It is pertinent to consider Cage's later beliefs and ask whether the 'containment' of such sounds would sit comfortably within his philosophy, and whether the act of preparing the piano is part of the indeterminate compositional process.

Is it right to project Cage's later philosophy onto his earlier music. Cage's philosophy changed greatly in the 1950s from considered composition to indeterminacy, probably largely as a result of the failure to control the sounds of the prepared piano.

Christian Wolff says:

I don't think he projected the chance-aesthetic back on works of the pre-chance time, except in the general way that he accepted the changing conditions of performance that passing time brought about.<sup>389</sup>

So what should happen if a performer encounters a problem? Should they abandon the performance, or should they project Cage's later philosophy onto his earlier works? When Herbert Henck encounters problems he normally finds:

a solution, but we have to be very specific now what kind of problem it is. But there is always a solution. Even to leave something out would be a possibility – at least in Cage's philosophy. You might regard these "impossibilities" as notated "irrationalities" where you are free (or with other words forced) to make your own decision. If something is not possible you might leave it out as a solution. It's not a crime and nobody will punish you.<sup>390</sup>

However, Philip Thomas takes the prepared piano pieces as early Cage and treats them accordingly, in the context of Cage's philosophy at the time they were written:

I wouldn't want to just do whatever simply because it's Cage. And I don't think that the choice of preparations affects what we know about Cage's response to other people's responses to the *Perilous Night*. I heard a recording of the *Sonatas and Interludes* last night and actually it struck me then how historical they feel - like 'great classics', and so different from post-chance Cage. So I would approach them in a similar manner to how I might approach a performance of Beethoven, Webern, etc. - informed, intelligent, but intuitive also.<sup>391</sup>

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<sup>389</sup> Christian Wolff, email interview with Philip Thomas

<sup>390</sup> Herbert Henck, email interview with the author

<sup>391</sup> Philip Thomas, email interview with the author

Takahashi believes:

I must say indeterminacy does not mean arbitrary or laissez-faire attitude you have to plan or even decide on the spot to obtain the beautiful yet unexpected discoveries [...] it really matters<sup>392</sup>

So, does preparing a piano effect the way a performer plays, or does the way a performer plays effect the way the piano is prepared?

For Takahashi:

the preparation of the piano are similar as mutes whether adding or subtracting the overtones each key needs different touch on them to get the good result you tend to play a little stronger since the preparation weakens the intensity of the sound but the touch should not mean to be even but rather colourful<sup>393</sup>

Thomas concentrates more on the sounds that are produced when performing:

Certain sounds will resonate more than others and project more than others and so one does where possible try to allow the 'weaker' sounds to project a little more where appropriate (for example in a run of notes). This is not always the case but is something I bear in mind, particularly when sounds are more isolated. So, just a little more attack. But pianists are used to that anyway - I played a concert recently of un-prepared music and the piano was very variable in its touch and sonority so we are fairly used to adjusting most of the time.<sup>394</sup>

The joy of preparing a piano for preparation lies in the pleasure of continual discovery, the discovery of new and interesting sound combinations and gamuts. The key to a successful performance is experimentation. However, the experimentation should be one that is considered and takes a holistic approach to the performance as a whole rather than the sound as an individual entity. As mentioned in chapter one, the objects chosen for preparation should be chosen so they do not stand out from the music. The pianist should always begin with Cage's measurements given in his table of preparations and from there they can decide on the correct course of action for that particular piano and that particular performance – but always be consistent, particularly regarding the point of the damper and the point of the preparation. However, when the pianist is happy with the results of their experimentation it is recommended that they make a detailed catalogue of the positioning and type of preparation used – they should endeavour to save the preparation for future performances.

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<sup>392</sup> Yuji Takahashi, email interview with the author

<sup>393</sup> Ibid.

<sup>394</sup> Philip Thomas, email interview with the author

Chapter six will now apply the knowledge gained by combining the analyses of music and preparation and create a case study to demonstrate a considered preparation of *The Perilous Night*.

## Chapter Six – A Case Study: *The Perilous Night*

### 6.1: Context

Chapter six will explore the six movement work *The Perilous Night*, and use it as a case study to identify and explain all of the issues discussed within this thesis.

*The Perilous Night* composed in New York City, winter 1943-1944<sup>395</sup> has been chosen because it is an example of Cage's more mature writing for the prepared piano. It is also one of only a handful of prepared piano pieces that is a multi-movement work (along with *A Valentine Out of Season*, *Sonatas & Interludes*, *Works of Calder*, and *Mysterious Adventure*) and was composed specifically for the concert hall, rather than to accompany a dance. As mentioned previously in chapter two, *The Perilous Night* is circa twelve minutes long. It has six movements (I: 2'30"c., II: 1'c., III: 4' 20"c., IV: 1' 20"c., V: 50"c., VI: 3' 30").

In composing *The Perilous Night*, his first large-scale concert work for the prepared piano, Cage began his move away from using the prepared piano simply as a percussion orchestra for the accompanying of dance.

It is also with *The Perilous Night* that Cage begins to take note of the problems with sustaining a continuity of sounds. As mentioned in chapter two 'he put into the piece some of the anguish he felt at the time over his break up with Xenia, but discovered that people listening to it heard "a woodpecker in a church belfry."<sup>396</sup> The title of the piece takes its name from an Irish Folktale that Cage had read from a collection of myths by Joseph Campbell. The story concerned 'a perilous bed which rested on a floor of polished jasper.'<sup>397</sup> The piece was written at a time when Cage was experiencing issues in his personal life, and so he also comments that 'the music tells of the dangers of the erotic life, the misery of "something that was together and is split apart" and "the loneliness and terror that comes to one when love becomes unhappy"<sup>398</sup>

As Cage would describe in *Empty Words*, his desire when he began placing objects between strings was to be able to repeat the sounds that he had discovered. Cage would almost give up on the idea

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<sup>395</sup> Manuscript held by John Cage trust

<sup>396</sup> K. Silverman, p. 100.

<sup>397</sup> D. Revill, p. 85

<sup>398</sup> *Ibid.*

of the prepared piano, due to the, as he considered them, inadequate preparing of pianos for his music. This was until he heard Richard Bunker perform *The Perilous Night*, Cage would say that he was 'amazed to discover that he loved and understood the music and that he had prepared the piano beautifully.'<sup>399</sup> As it will have been noted, chapter four utilises many suggestions made by Richard Bunker regarding the performance of prepared piano music. It is possible that due to the effect of such inappropriately prepared pianos and because of the emotional nature of this piece (acting a form of psycho-analysis) Cage would comment on the type of piano that the measurements refer to within *The Perilous Night*. Cage adds a note which does not appear in any other prepared piano score: 'these measurements apply to a Steinway L, M, O, A or B'.

Chapter six will analyse key moments from within the six movements of *The Perilous Night* and quantify, using the research collected from this thesis, the differences that can be achieved when preparing a piano for the performance of this piece. To aid the discussion, a selection of different performances by pianists known for performing the prepared piano music will be analysed.

## **6.2: Preparing the Piano for *The Perilous Night***

As suggested in chapter five, performers should begin preparing a piano for performance with Cage's instructions as a starting point and then experiment with the preparations to create the best sonic effect. Unlike the analysis in chapter three, chapter six will not isolate specific notes, but instead isolate specific gestures within the different movements that are affected by the preparations – these differing gestures have been highlighted throughout chapter four. It should also be mentioned again that the analyses are not judging each performance, but instead highlighting the differences between each and make suggestions as to how slight alterations in the variables, discussed in chapter three, can alter the sound produced by varying degrees. It is then up to the performer to judge for themselves the effect that they are trying to produce.

The six performances being analysed are:

1. Boris Berman: Music for Prepared Piano Vol. 2, Naxos
2. Jeanne Kirstein: John Cage: Music for Keyboard 1935-1948, New World Records
3. Philip Thomas: John Cage and Twenty-First Century Britain, Private Copy (not released)

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<sup>399</sup> J. Cage, *How the Piano Can be Prepared*, p. 8.

4. Grete Sultan: Piano recital, The Legacy Vol.1, Labor Records
5. Margaret Leng Tan: Cage: Perilous Night, Four Walls, New Albion Records
6. Joshua Pearce: John Cage Piano Music, Vol. 2, Wergo

As has been examined in chapter two, there are twenty-five different pitches prepared with thirteen different types and combinations of preparations used in *The Perilous Night*. These are: rubber, weather stripping, screw and nuts, screw, bolt and nuts, bolt, small bolt, bamboo slit, double weather stripping, screw and rubber washer, screw and weather stripping, wood and cloth; Cage prepares eleven strings twice. In an interview with Daniel Charles, Cage comments on the materials chosen for preparation. He tells of the advice his mother had given him 'that the effects would be better if I put natural things in the piano.'<sup>400</sup> The sonic effect of the piece falls largely into the non-metallic sounding, and this is due to the large amount of preparations involving weather stripping. Metal and non-metal preparations, however, are located close together on the same string.

The types of piano that Cage states the measurements apply to are the Steinway models L, M, O, A or B. Each model varies in size and therefore length of string. The table below describes the various sizes of each piano in comparison to each other.

Piano	Length	Width
Steinway Model L	179cm	147cm
Steinway Model M	170 cm	147 cm
Steinway Model O	180cm	146.5 cm
Steinway Model A	188cm	147 cm
Steinway Model B	211cm	148 cm

### 6.2.1: Preparations for each movement:

#### Movement 1

Note Prepared	Material	Strings to be prepared	Measurement from Damper
F1	Wood and Cloth	E-F 1-1	2 $\frac{3}{4}$ "

<sup>400</sup> J. Cage, *For the Birds*, p. 38.

<b>D2</b>	Screw and Weather Stripping	1-2	5"
<b>F3</b>	Bamboo Slit Bolt	1-2 2-3	2 1/4" 2"
<b>G4</b>	Weather Stripping	1-2-3	3"
	Weather Stripping	1-2-3	3 1/2"
<b>F#4</b>	Rubber	1-2-3	5"
<b>Ab5</b>	Weather Stripping	1-2-3	4"

## Movement 2

Note Prepared	Material	Strings to be prepared	Measurement from damper
<b>Bb4</b>	Double Weather Stripping	1-2	7"
	Screw with rubber washer	2-3	6 3/4"
<b>Db4</b>	Double Weather Stripping	1-2	13"
	Screw with nuts	2-3	6 3/4"
<b>Eb4</b>	Bamboo Slit Bolt	1-2 2-3	4 7/8" 4"
<b>Gb4 (F#)</b>	Rubber	1-2-3	5"
<b>Bb5</b>	Weather Stripping	1-2	6"
	Screw and Nuts	2-3	1 1/2"
<b>E5</b>	Weather Stripping	1-2	2"
	Bolt	2-3	1 3/4"
<b>Ab6</b>	Weather Stripping	1-2	1"
	Bolt and Nuts	2-3	2 1/4"
<b>B6</b>	Rubber	1-2-3	1 7/16"
<b>D6</b>	Weather Stripping	1-2	1"
	Screw and Nuts	2-3	2 1/4"

## Movement 3

Note Prepared	Material	Strings to be prepared	Measurement from damper
<b>F1</b>	Wood and Cloth	1-1	2 3/4"
<b>D2</b>	Screw and weather stripping	1-2	5"
<b>F2</b>	Screw and weather stripping	1-2	3 7/8"
<b>D3</b>	Weather Stripping	1-2	1/4"
	Bolt	2-3	1"
<b>G3</b>	Weather Stripping	1-2-3	4 1/2"

<b>D4</b>	Weather Stripping	1-2-3	11"
<b>Eb4</b>	Bamboo Slit	1-2	4 7/8"
	Bolt	2-3	4"
<b>G4</b>	Weather Stripping	1-2-3	3"
	Weather Stripping	1-2-3	3 1/2"
<b>Ab5</b>	Weather Stripping	1-2-3	4"
<b>Bb5</b>	Weather Stripping	1-2	6"
	Screw and Nuts	2-3	1 1/2"
<b>Db5</b>	Small Bolt	2-3	4"
<b>E5</b>	Weather Stripping	1-2	2"
	Bolt	2-3	1 3/4"

## Movement 4

Note Prepared	Material	Strings to be prepared	Measurement from damper
<b>F1</b>	Wood and Cloth	1-1 E-F	2 3/4"
<b>D2</b>	Screw and Weather Stripping	1-2	5"
<b>F3</b>	Bamboo Slit	1-2	2 1/4"
	Bolt	2-3	2"
<b>Eb4</b>	Bamboo Slit	1-2	4 7/8"
	Bolt	2-3	4"
<b>Gb4</b>	Rubber	1-2-3	5"

## Movement 5

Note Prepared	Material	Strings to be prepared	Measurement from damper
<b>F1</b>	Wood and Cloth	E-F 1-1	2 3/4"
<b>D2</b>	Screw and Weather Stripping	1-2	5"
<b>D3</b>	Weather Stripping	1-2	1/4"
	Bolt	2-3	1"
<b>F3</b>	Bamboo Slit	1-2	2 1/4"
	Bolt	2-3	2"
<b>G3</b>	Weather Stripping	1-2-3	4 1/2"
<b>Bb4</b>	Double Weather Stripping	1-2	7"
	Screw and Rubber Washer	2-3	6 3/4"
<b>Db4</b>	Double Weather Stripping	1-2	13"
	Screw and Nuts	2-3	12"
<b>Eb4</b>	Bamboo Slit	1-2	4 7/8"



	Bolt	2-3	4"
<b>G4</b>	Weather Stripping	1-2-3	3"
	Weather Stripping	1-2-3	3 1/2"
<b>Bb5</b>	Weather Stripping	1-2	6"
	Screw and Nuts	2-3	1 1/2"
<b>E5</b>	Weather Stripping	1-2	2"
	Bolt	2-3	1 3/4"
<b>Ab6</b>	Weather Stripping	1-2	3 3/4"
	Bolt and Nuts	2-3	2 1/4"

## Movement 6

Note Prepared	Material	Strings to be prepared	Distance from damper
<b>E1</b>	Wood and Cloth	1-1 E-F	2 3/4"
<b>F1</b>	Wood and Cloth	1-1 E-F	2 3/4"
<b>Ab2</b>	Screw and Weather Stripping	1-2	14"
<b>Bb2</b>	Screw and Weather Stripping	1-2	7"
<b>D2</b>	Screw and Weather Stripping	1-2	5"
<b>F2</b>	Screw and Weather Stripping	1-2	3 7/8"
<b>D5</b>	UNPREPARED		
<b>E5</b>	Weather Stripping	1-2	2"
	Bolt	2-3	1 3/4"
<b>B6</b>	Rubber (N.B.)	2-3 (Bb)	3 3/8"
	Screw	2-3	1 7/16"
<b>E6</b>	Rubber	1-2-3	1 7/16" (N.B.)

Refer to Chapter 2	Common Name	Exact Name	A Meas.	B Meas.	C Meas.	D Meas.	E Meas.	F Meas.	Weight
<b>C.</b>	<b>Sm. Bolt</b>	<b>3/16 carriage bolt x 3/4 long</b>	1.0CM	0.3CM	1.8CM	1.5CM	N/A	N/A	3g 15rung
<b>E.</b>	<b>[Bolt]</b>	<b>1/4 x 1 1/2 rd head iron stove bolt</b>	1.1CM	3.8CM	4.0CM	N/A	N/A	N/A	9g 29 rung
<b>F.</b>	<b>Nut</b>	<b>Square Iron Nut 1/4 /20</b>	0.9CM	0.6CM	N/A	N/A	N/A	N/A	4g
<b>G.</b>	<b>Rubber</b>	<b>Rubber</b>	5.7	4.5	0.7	0.7	N/A	N/A	9g
<b>H.</b>	<b>Screw</b>	<b>No. 10 x 1 1/2 flat head iron wood screw</b>	1.8CM	0.5CM	4.0CM	1.0CM	2.4CM	N/A	4g 14 rung
<b>M.</b>	<b>Cloth</b>	<b>Cloth</b>	3.0CM	4.2CM	3.0CM	4.2CM	N/A	N/A	
<b>O.</b>	<b>Bamboo</b>	<b>Bamboo Slit</b>							

P.	Weather Stripping	Weather Stripping							
Q	Wood	Wood							

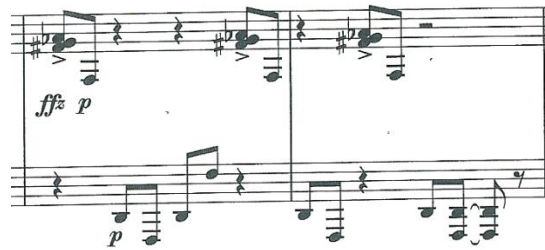
### 6.3: The sounds of *The Perilous Night*

The very first note in *The Perilous Night* is a combination of wood and cloth on F1 located at 2 ¾" from the damper and screw and weather stripping on D2 at 5" from the damper (figure 61). The combination of wood and cloth create a sonic result that retains a lot of its original pitch with subtle fluctuations in the sound. When combined with another preparation such as in the first two bars of movement one, this creates a distinct sound that is quite rich. A result of this combination of preparations will be the absorption of the vibrational energy, and it will shorten the decay of the sound produced. This effect will be more prominent in the lower pitches.

Analysing three performances for this movement by Grete Sultan, Margaret Leng Tan and Boris Berman, it is clear that all of the preparations used create an effect that still contains much of the fundamental tone. The sounding *F* is still very prominent above the *D*. The first chord in Leng Tan recording sounds less pitched than Berman and Sultan and more percussive sounding, incorporating more complex sonorities (the *F* is still prominent, however). This may be a result of the weight of the preparation being heavier and restricting the vibration of the strings and thus restricting the relative strengths of each harmonic. The preparations that Sultan uses, keep a strong sense of the fundamental on the prepared *F* however it sounds an octave higher at *F2* rather than at pitch, but there is also a residue of *A4* that lingers in the decay of the sound. Berman's preparations have the strongest sounding fundamental.

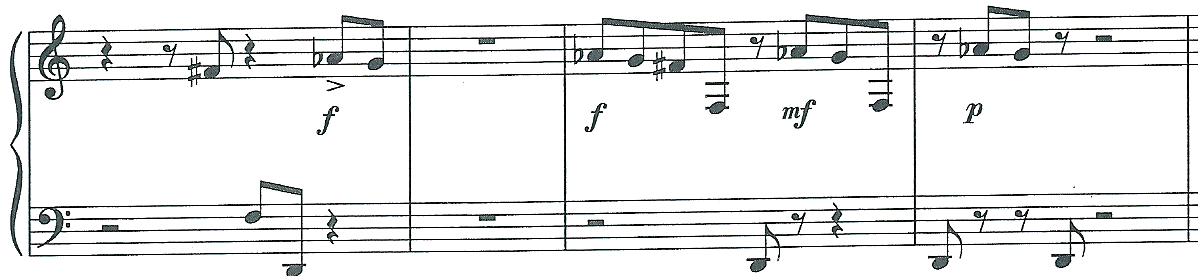
The Ab5 prepared with weather stripping is a very dead sound with no prolongation of the sound at all. In all performances the sound produced by the weather stripping resembles the sound of a plucked string. Cage accents the first occurrence of the *F3* in bar four (figure 61). The enunciation of this notes brings to prominence the most notable sound in this movement; a rattling sound produced by a bamboo slit located at 2 ¾" from the damper in strings 1-2 and a bolt located at 2" from the damper in strings 2-3. The sound is very much reminiscent of the Balinese gamelan instrument the ceng-ceng. This is a layered group of small cymbals.





**Figure 75: *The Perilous Night* (movement 1, bars 8-9)**

The preparation that Berman uses for *D2* is particularly highlighted in bar 16 (figure 76) as the sounds follows through in to the bar of silence. The screws and weather stripping produce a note equivalent to *F#4* and this resonates and gradually decays throughout the bar of silence in bar 17.



**Figure 76: *The Perilous Night* (movement 1, bars 16-19)**

Leng Tan makes the most of Cage's dynamic markings at bar 28 (figure 77), where he requires a crescendo from *p* to *mf*. This is particularly important as the greater dynamic means a greater velocity of the hammer, which transpires as a greater percussive sound which, when played with greater force, produces a severe rattling sound.



**Figure 77: *The Perilous Night* (movement 1, bars 28-30)**

Leng Tan's performance at bar 71 (figure 78) particularly highlights the introduction of a new pattern consisting of *Ab5*, *G4*, *F#4*, *G4*, *Ab5*, *G4*. These notes are all prepared with weather stripping and located between three to five inches from the damper. Due to the weather stripping, the sound still contains a very tonal quality and the fundamental is very obvious in each of the prepared notes. The location of the preparations on the string means that no nodal points are struck and there is no resulting distinct harmonics. This crotchet pattern appears to be a very deliberate action from Cage, as it lasts ten bars and it also occurs after a succession of accented quavers, slowing the pace of the movement. At this point Cage inputs another discordant set of notes *F3* and *F#4*, prepared with bamboo slit and bolt and rubber respectively; the discordance sounds when the notes clash particularly with *G4* prepared with weather stripping. Therefore, it is suggested that, when positioning the preparations, make sure that the passage with the notes mentioned above still contain a degree of the fundamental tone, to allow the clash.



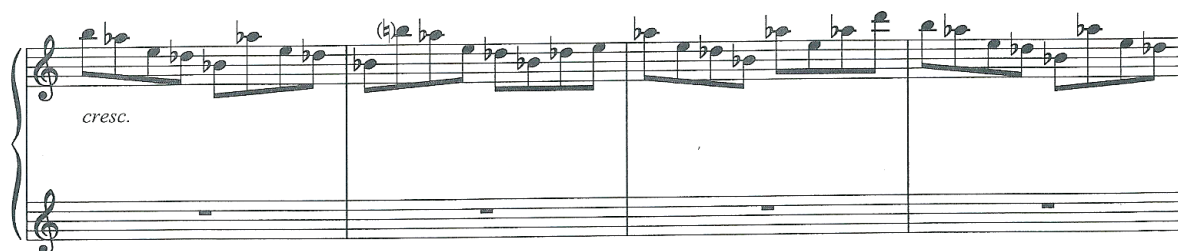
**Figure 78: *The Perilous Night* (movement 1, bars 71-75)**

Cage composes a cadence at the end of the movement which begins properly at bar 98 (figure 79). He repeats the *Ab5*, *G4*, *F#4* figure that was seen earlier but this time he uses quavers instead of crotchets to cause acceleration towards a climax. To further the drama of the ending Cage inserts three crescendos ending with *fortississimo*. The final motif of the piece consists of the notes *F3*, *D2*, *F1*. *F3* is the most important prepared note in this selection of three as it is accented in the last bar and the final note should be at a volume of *fff*. The increased crescendo is important not only for increasing the drama of the last section, but also to create a more 'violent twanging' sound and it is this that serves as the final 'bang' of the movement. All three performances create this sense of drama and each make the last bar (bar 100) dramatic with its crescendo and bamboo slit and bolt prepared *F3*.



**Figure 79: *The Perilous Night* (movement 1, bars 98-100)**

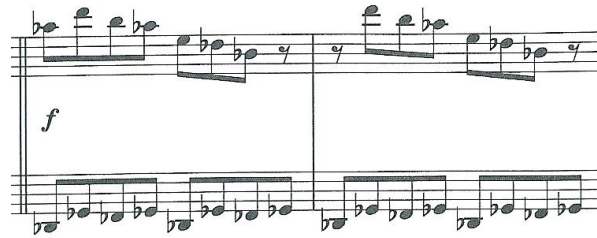
Movement two, in comparison to movement one features notes all in the treble register and the most prominent sounds appear in the right hand stretching up to *D6*. Joshua Pearce's performance is full of energy which is heightened with the continual sounding of *Ab6* prepared with weather stripping and bolt with nuts and located at 3 ¾" and 2 ¼" respectively from the damper. In Pearce's performance the predominant sound is the still very tonal *Db5* (figure 80). *Db5* is prepared with a small bolt between string 2-3 at 4" from the damper and the dampened sound comes across clearly with an *A7* partial, and shines out like a beacon through the rapid scalar passages creating an interesting timbral pallet.



**Figure 80: *The Perilous Night* (movement 2, bars 13-16)**

The preparation of *Eb4* prepared with bamboo is a unique sound (figure 81). Bamboo creates quite a sonorous sound which is immediately rounded, much like that of a xylophone, but the sonority does not last long and the sound decays rapidly. The pianist must play the *Eb* with an increased velocity in order for the sound to speak to its full potential.

When *D6* prepared with weather stripping and screw and nuts appears it is noticeable as the highest pitched note in the movement (figure 81). However in Pearce's performance a clear sense of pitch is not obvious and a more percussive sound is demonstrated. This is juxtaposed with the highly tonal *Ab6* that precedes and follows it each time it appears. Therefore it would appear that Cage wanted to demonstrate the contrast between the pitched and percussive elements of this section of the movement.



**Figure 81: *The Perilous Night* (movement 2, bars 19-20)**

Cage gesturally creates a feeling of slowing down beginning at bar 31 (figure 82), which one could suggest is a very romantic idiom, however he still manages to create a sense of tension within this section. He does this with the use of rests and preparations that deaden the sound, such as the rubber on the *Gb4*. The result is a stark contrast to the previous ostinato pattern in the lower register of the treble clef with vigorous activity in the right hand that includes the tonal sounding *Ab*.

Cage adds to the relaxation of the end of the movement and cuts through the agitated preceding bars, with a sonorous sustained *Db5* prepared with a small bolt. The bolt creates a very sonorous sound like a reong instrument (a bell like instrument that is suspended on two ropes) from the Balinese gamelan orchestra.



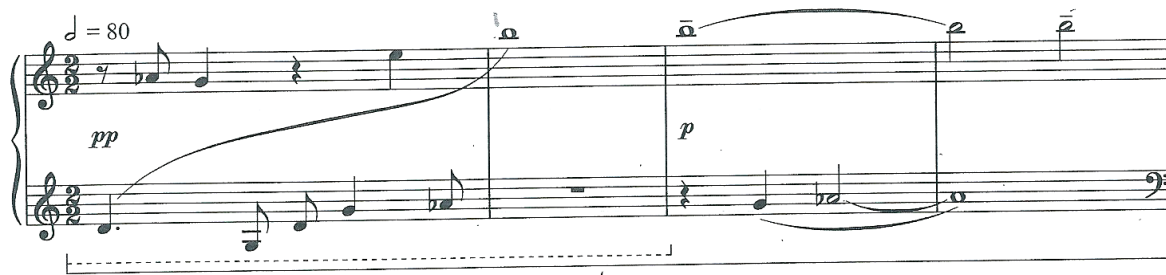
**Figure 82: *The Perilous Night* (movement 2, bars 29-36)**

Movement three is the first instance where Cage really makes use of the sustaining pedal and the una corda pedal. The effect of the sustaining pedal is obvious and Cage utilises the use of it particularly when the duration of the note is long. This is because the natural sustaining of the string is taken

away due to the preparation of the string. The una corda pedal, however as mentioned in chapter three, has an interesting effect on the string that is being prepared. This pedal when depressed lifts the hammer to the right. Therefore, if Cage was to prepare a piano that had triple strings per note as grand pianos do, and only prepares the two strings to the left leaving the third string unprepared he could create two different effects. One result would be a combination of all three strings, mixing the sounds of preparation and non-preparation and having a strong feel of the fundamental tone. Another could be with the third string silenced, leaving just the sound of prepared strings. The connection of altered and non-altered strings can cause sympathetic vibrations between strings or beating due to two steady sounds of near equal frequencies. It is important, therefore, that when the pianist is preparing strings 2-3 that the preparation does not come into contact with the first string, unless stated by Cage, as this will lessen the impact of the pedal shifting to the right. Cage utilises the una corda pedal technique in the first two bars of the third movement. The prepared notes are *G3*, *D4*, *G4*, *Ab5*, *E5* and *B6* – all are prepared with weather stripping between strings 1-2-3 apart from *E5* which is only prepared between strings 1-2 and *B6* which is prepared with rubber between strings 2-3 (figure 83). Further to that, *G4* has another piece of weather stripping prepared half an inch further up the string at 3 ½". *E5* is also prepared with a bolt between strings 2-3 and *B6* is prepared further down the string towards the keyboard end with a bolt. Due to the movement of the una corda to the right, the weather stripping located between strings 1-2 will have a decreased effect on the sound, however there will be an increased effect on the bolt on *E5* and Screw and Rubber on *B6*. These two sets of preparations will produce a more pronounced plangent pallet, which will sound different to the same pitched notes in the following two bars, where *B6* is played again but this time will have a lesser audible presence due to the hammer being located centrally to the strings. When the *B6* sounds in Kirsten performance it sounds an octave higher than written. This note appears to be a key feature of *The Perilous Night* as cage adds an erratum stating the measurement of the damper to bridge on the piano he was composing the music on, and tells the pianists to adjust the measurements accordingly. However, after experimentation and utilising Cage's measurements the sound that is produced from the preparation of the *B6* is a strong knocking sound with an almost inaudible residual of the *B6*, definitely not *B7* as produced from Kirstein's recording. Further, the weather stripping would deaden of the resonance produced from the preparation of the bolt. It may be suggested then that, as Kirstein was experimenting with sounds for her performance, she may have pushed the preparation further up

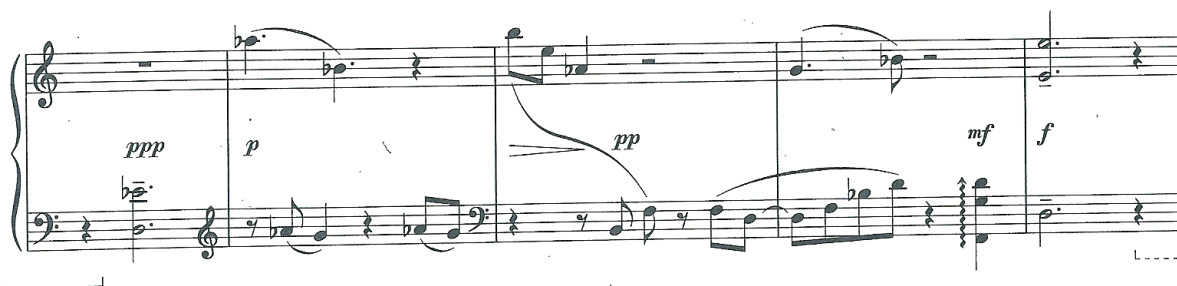


the string, and more likely as far as half way, this would explain the production of the *B7* sound due to the preparations being located at the mid-way point of the string part of the string, the anti-node.



**Figure 83: *The Perilous Night* (movement 3, bars 1-4)**

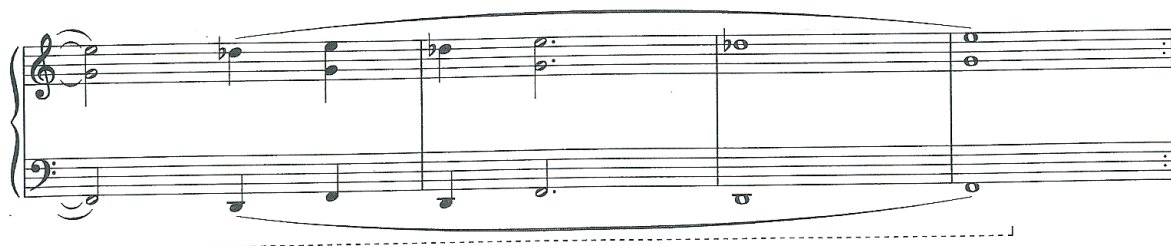
At bar 5 (figure 84) Cage introduces a chord of *D3* and *Eb4*, prepared with weather stripping and a bolt and weather stripping respectively. However, neither the *D* nor the *Eb* is the prominent sound, but instead a strong *G* partial is audible. The chord with the highest amount of different pitches appears at bar 12 consisting of *Bb5* prepared with weather stripping and screw and nuts, *Db5* prepared with a small bolt, *E5* prepared with a bolt and *Ab6* prepared with screw and nuts – this is another fine example of Cage's use of the *una corda* technique as the pedal is shifted to the right on this chord it will have less impact on the weather stripping which is all located between strings 1-2, so therefore the slight pitch that remains within the weather stripping prepared notes is removed and the sound becomes a very percussive noise without any clear identifiable pitch. The *Db4* which is prepared with weather stripping and screw and nuts is an important feature at bar 25 as it is accented and stands proud above the *piano D2* as it has a dynamic marking of *forte* and is accented. The accent in this case plays an important part as it enables a greater velocity to set the nuts in motion and produce a striking 'twanging' noise. To make this more audible, the pianist should wind the bolt between the string less and make the diameter of the hole in the nuts large enough for them to move and create a 'jangling sound'. In bar 40 Cage introduces another chord, this time consisting of *D3* and *Eb4*, in Kirstein's performance the prominent sound is the *D3*, however in Thomas's performance a more percussive sound is heard with a partial of *Db3* sounding instead.



**Figure 84: *The Perilous Night* (movement 3, bars 5-9)**

There are two occasions in this movement where Cage inserts a split chord, located at bars 8 (figure 85) and 24. On both occasions the most prominent tone to be heard is the *D4* which is prepared with weather stripping, and although this will deaden the vitality of the sound, it does still remain very tonal.

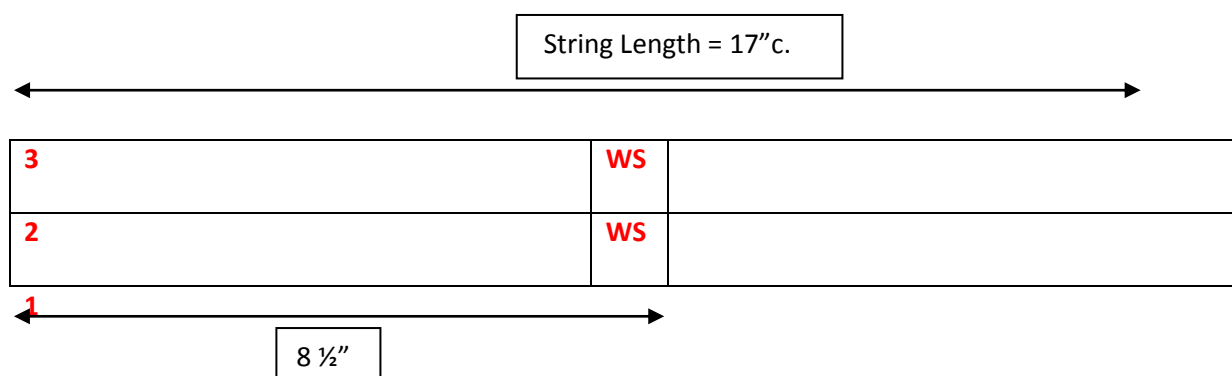
The last three systems of the third movement introduce the pitch *F2* alternating with *D2*, both of which are prepared with a screw and weather stripping (figure 85). The introduction of these two pitches gives the impression of an inconclusive cadence, with a very clear diminution of tempo and prominent *F* and *D*s sounding as if the movement is coming to a trudging halt.



**Figure 85: *The Perilous Night* (movement 3, bars 117-120)**

There are only three occurrences of the *E4* in the whole of *The Perilous Night*, and these occur at bar 33 on the last beat of the bar as a crotchet and bar 35 the end of the first beat as a quaver and the last beat again as a crotchet. *E4* is prepared at 8 ½" from the damper with weather stripping between strings 1-2-3 (figure 72). This note is interesting because it is a fine example of the difference a slight adjustment on the positioning of a preparation on the string can make. The *E4* string has a length that is approximately 17" long and the weather stripping is located at 8 ½" along it; this is half way, dividing the string into two equal parts and causing a harmonic that is an octave above the fundamental note. The octave harmonic produced is a very resonating clean and clear sound that pierces through the melee of noise that occurs at the same time.

A representation of this may look as follows, where WS is the weather stripping.



D4 is prepared with weather stripping between strings 1-2-3 and is located at 11" from the damper. It occurs at numerous times during movement three, but particularly at the same time that Cage introduces the E4. The effect of the weather stripping will cause the fundamental to be lessened and increase the occurrence of other partials. The equation used in chapter three will give an approximation of the strongest tone that should be heard if prepared at this point on the string.

So to work out the change in frequency for each 'mode' (or 'partial'), the following equation is used:

$$\frac{\text{Maximum reduction in frequency}}{\text{Original frequency}} = \frac{\text{Added mass}}{\text{Original mass}}$$

So, where A4 is calculated at 440.00Hz, D4 can be calculated as 293.66Hz.

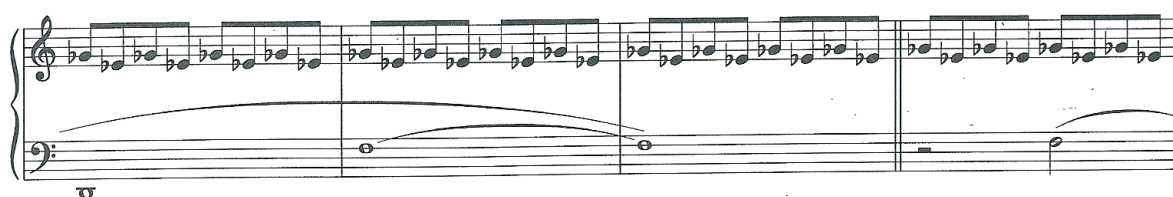
$$\frac{\text{Maximum reduction in frequency}}{293.66\text{Hz}} = \frac{2\text{grams}}{3.80\text{grams}} = 155\text{Hz reduction}$$

2 grams is the original mass of the preparation, and 3.80 grams is the mass of the string without a preparation. This tells us the difference between the old frequency and the new prepared frequency.

Since the weather stripping is 11" from the damper, and the anti-node is at approximately 5.5", the preparation would be expected to have about 20-30% of the total effect. This is equal to an approximation of 27-41 Hz. This would give a total frequency of 266-252 Hz. This can be equated to a pitch somewhere between the B3 and C4, i.e. between one and three semitones difference. When experimenting with the weather stripping on D4, the lower fundamentals were quite muddy however,

and the clearest partial to be audible was a ringing A6. This is likely due to the deadening effect that the weather stripping has on the lower partials of a note.

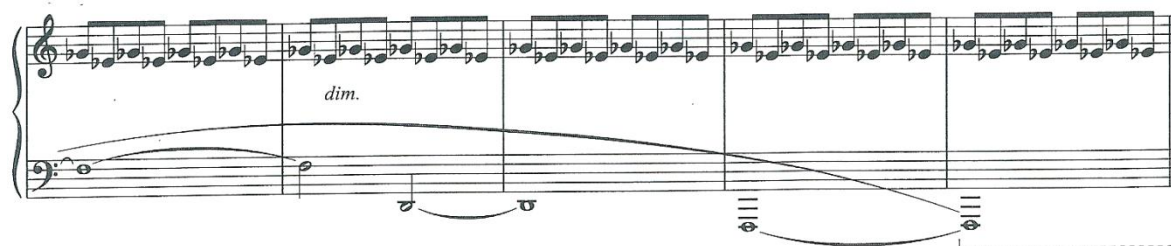
The thematic material in the fourth movement is sparse compared to the preceding movements. A repeated figure of Gb4 prepared with rubber and Eb4 prepared with a bamboo slit and a bolt continues relentlessly throughout the movement like a heartbeat (figure 86). The rubber mutes the overtones produced making the fundamental particularly prominent and the bamboo produces quite a sonorous effect. However, in both cases the sonority will not last long, and therefore the repetition of the note is important.



**Figure 86: *The Perilous Night* (movement 4, bars 5-8)**

Interestingly Cage uses the largest amount of long notes, but does not choose to use the sustain pedal. Instead he chooses to let the sound decay of its own accord. The two noteworthy differences come in the bass part of the movement. F3 is prepared with a bamboo slit and a bolt, but in Kirstein's recording it produces a distinct rattle that stands in stark contrast to the monotony of the repeated Gb4 and Eb4 *legatissimo* line. However, the preparation suggested by Cage would not normally produce such a defined rattling sound. The bamboo slit and bolt according to previous experiments should produce a more mellow sound with little resonance, a sound akin to a xylophone, and this is apparent in Thomas's recording. On the whole Thomas's performance produces a far more percussive effect than Kirstein's.

The gradual diminuendo at the end of the movement and the constant repetition with long *legatissimo* phrases hypnotises the listener into a false sense of security, as there is an abrupt contrast when the music of the fifth movement begins. Cage creates a romantic-esque ending to the fourth movement by using the deep sonorous notes of F1 prepared with cloth and wood, creating a rich timbre, but also adds a romantic gesture from bar 44 by adding a swelling, with a crescendo from *pp*, which has been the dynamic throughout the whole movement followed by a prolonged diminuendo to the end of the movement (figure 87).



**Figure 87: *The Perilous Night* (movement 4, bars 45-49)**

Movement five is the most aggressive sounding of all the movements, but is the shortest in duration. The thematic material is divided between right and left hand in a call and response fashion with all of the right hand being composed at a dynamic marking of *fff* with every single note being accented until bar 7, whilst all of the left hand responses are composed for dynamics between *p* and *ppp* with delicately placed phrase markings. At no point in the first eighteen bars of the piece do the left and right hand play together. One might argue that this idea is a condensed version of the rivalry between orchestra and prepared piano in the *Concerto for Prepared Piano and Chamber Orchestra*. This premise fits even more exactly as the final six bars both hands play together in a form of reconciliation as in the final movement of the *Concerto*.



**Figure 88: *The Perilous Night* (movement 5, bars 1-4)**

Although the fifth movement is a stark contrast to the quiet sustained end of the fourth movement, in essence it acts merely as an introduction to the sixth and final movement of *The Perilous Night*. However there are two sounds of particular interest in this movement. Although played at *pp* the short ostinato figure between *F3* and *D3* prepared with bamboo slit and a bolt and weather stripping and a bolt produce a glorious sound reminiscent of a tam tam. The other prepared sound of interest comes in the final bars of the piece, when both hands play together. The *G3* prepared with weather stripping also has a dynamic marking of *ffz*. These need to be strongly emphasised by the pianist to

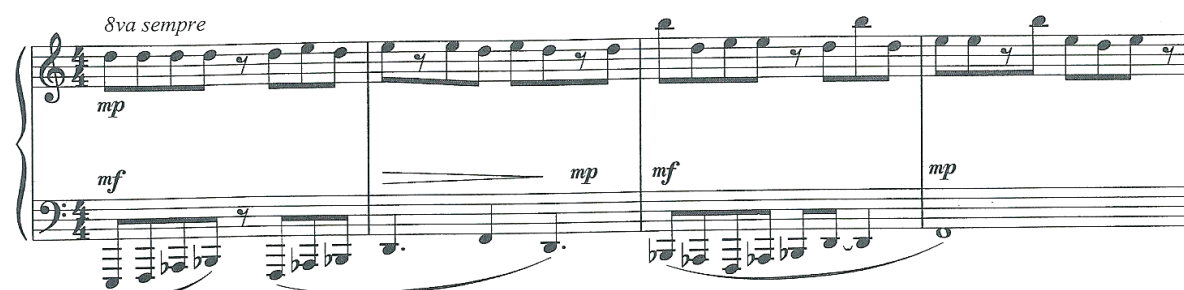
create the contrast between the undulating chordal figures in the right hand. The weather stripping deadens the tone of the note, but in Berman's performance, one would be pressed to tell that this note is prepared at all. Unlike the romantic cadential feel to the fourth movement, movement five has no alteration in the tempo as it approaches the end and there is no change in the dynamics or swell of crescendo and diminuendo. The movement closes with an abrupt halt and although the G3 is accented there is no use of the sustain pedal and the sound decays rapidly.<sup>401</sup>



**Figure 89: *The Perilous Night* (movement 5, bars 20-24)**

In movement six Cage creates an energetic rhythmic drive throughout with seven quavers in the right hand and eight quavers in the left hand (figure 89). Cage composes two autonomous lines for each hand which, unlike the other movements have similar status in terms of importance, but which intermingle together throughout the movement and meander around the offbeat patterns, creating a sense of intrigue and suspense.

Each line has its own independence in terms of the sonic result that it produces. The right hand produces a much dampened sound akin to the sound of a wood block and the right hand has a lower sonority which retains a lot of the original pitch of the note and as such produces a more metallic sonority. Yet Berman's performance does not produce the rich and deeply sonorous noise often associated with the preparation of wood and cloth.



**Figure 90: *The Perilous Night* (movement 6, bars 1-4)**

<sup>401</sup> It should be noted that the first occurrence of the G3 in bar 19 of movement five is written as an E3 in the Edition Peters Edition No. 67886a, but it should be G3.

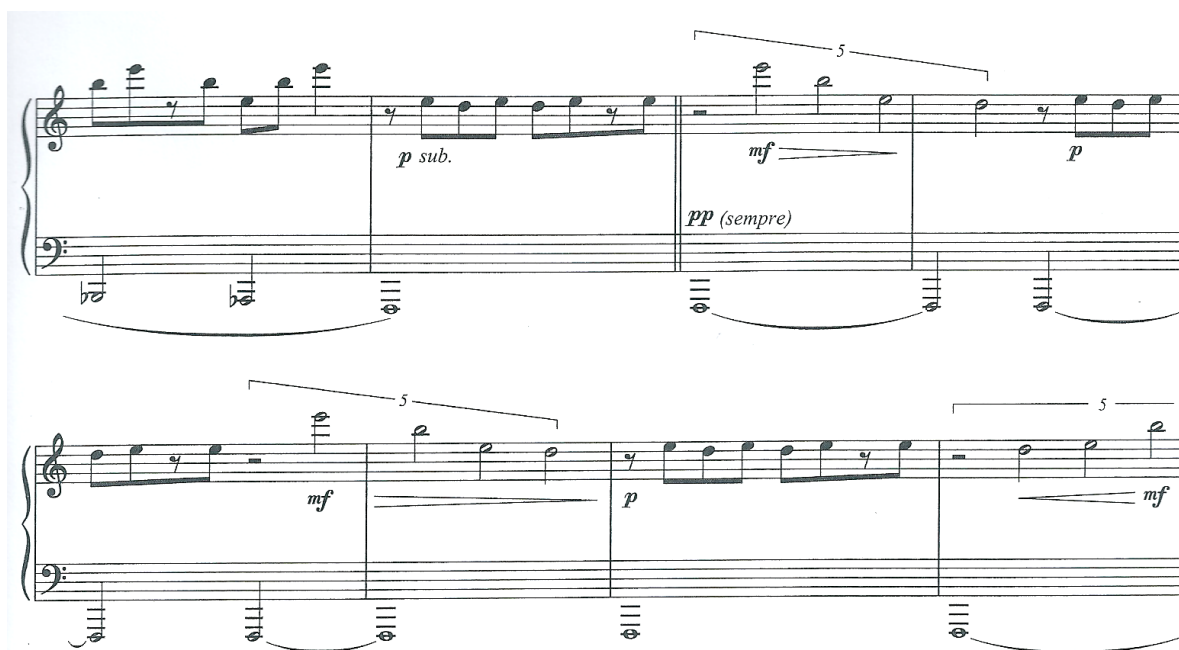
Cage's use of dynamics in this movement is very precise with each hand having its own dynamic marking, and there being some change at most every three bars (figure 90).

When Cage uses a long held D2 prepared with a screw and weather stripping, it creates low ringing sonority that bleeds into the following bar, and this becomes very apparent at bar 61, beat 2 (figure 91).



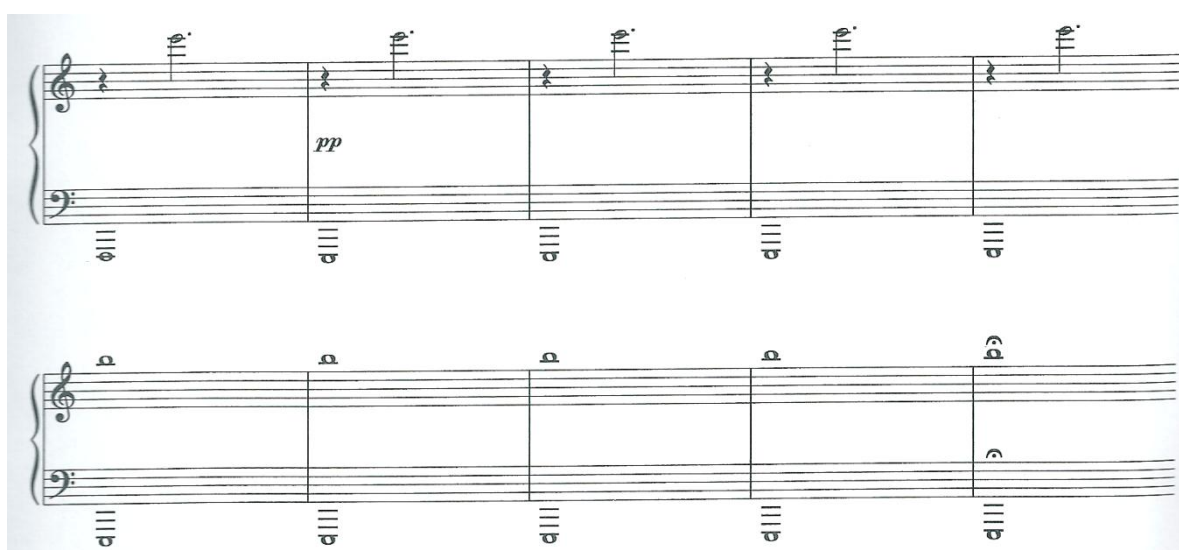
**Figure 91: *The Perilous Night* (movement 6, bars 61-62)**

D6 prepared with weather stripping in strings 1-2 and screw and nuts between strings 2-3 and E6 prepared with rubber between strings 1-2-3 play important roles in this movement and provide the constant knocking that reminds one of a woodpecker knocking against a tree. This is ever present throughout the movement (figure 92). The importance of these two notes are emphasised with the introduction of quintuplets that come as an interruption in the previous frantic rhythmic activity.



**Figure 92: *The Perilous Night* (movement 6, bars 125-132)**

The conclusion to movement six comes as a surprise in as much as it is the complete opposite to the rhythmic tenacity of the opening. In bar 145 Cage creates a sort of prolongation that acts as a kind of floating cadence. The piece becomes calm and still with the introduction of E1 and F1 semi-breves prepared with wood and cloth and dotted minims E6 prepared with rubber and drifts quietly to a close with the dynamics decreasing in stages until the music sounds as if it is far away in the distance. The final 18 bars (figure 93) strike a resemblance and look back to *Prelude for a Meditation* from the same year.



**Figure 93: *The Perilous Night* (movement 6, bars 153-162)**



Chapter six has set about bringing together many of the issues discussed in the previous five chapters and applying them to *The Perilous Night* by analysing key moments from within the six movements. Using the research collected from this thesis, the differences that can be achieved when preparing a piano for the performance of this piece have been revealed. It has highlighted possible decisions that a performer needs to make when considering performing the prepared piano oeuvre. Although important, the overall outlook of the piece is not as important as the minutiae of parts that make it up, in particular the individual decisions that impact on the type of sound that is produced.

# Conclusion

Someone asked Schoenberg about his American pupils, whether he'd had any that were interesting, and Schoenberg's first reply was to say there were no interesting pupils, but then he smiled and said "There was one," and he named me. Then he said, "Of course he's not a composer, but he's an inventor – of genius."<sup>402</sup>

Whether Cage would be preferred to be considered as a composer or an inventor of genius is unclear. However, what is obvious is that Cage was one of the most influential composers of the twentieth century and to many people he is considered the father of the avant-garde. It could be suggested that, without John Cage, music would have missed out on exploring wonderful syntheses of philosophy, chance, silence and 'mechanics'.

The research contained in this thesis provides an in-depth study to establish an understanding of the sounds and preparations used in the prepared piano music of John Cage. The research takes a linear approach by tracing the context for the creation of the prepared piano and qualifying the reasoning for its creation. It will be seen in chapter one that although the invention of the prepared piano came through necessity, it was not an autonomous decision, but a logical progression from ideas born from other leading lights in the avant-garde period. However, Cage's inquisitive mind, desire and love for things that he had not heard, together with an inventive background (John Cage Snr. was a bona fide inventor) all helped to aid the process of creation. This idea is echoed in the following statement by Cage about the choices he made when composing for the prepared piano

The prepared piano, impressions I had from the work of artist friends, study of Zen Buddhism, ramblings in fields and forests looking for mushrooms, all led me to the enjoyment of things as they come, rather than as they are processed or kept or forced to be.<sup>403</sup>

Traditionally, notated music is constrained with the idea of a musical sound that can be controlled and re-produced at the will of the composer and performer. It was John Cage, via the ideas of Russollo et al, that brought to the forefront of modern music the idea that all sound is music, including noise and he accomplished this through the prepared piano. The key developmental research in this thesis is contained within chapters two and three where a concentrated analysis of the exact preparations Cage utilised in his performances takes place. This enables a greater understanding of the dimensions and probable sounds – the pitches, the noises, timbres, resonances, etc. - that are

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<sup>402</sup> J. Cage, *Conversing with Cage*, p. 6.

<sup>403</sup> J. Cage, *How the Piano Came to be Prepared*, p.8.

created in performance when using Cage's measurements. This form of understanding enables the performer to make judged and informed decisions as to the appropriate actions when preparing a piano for preparation. Chapters four to six filter the advice given by professional pianists and applies it to the knowledge gained in chapter three and advises the difference between the noises and 'musical sounds'.

One would later understand that Cage was not interested in the possession of sound, but instead wanted sound to be 'free', and for other composers to explore the possibilities available to them in a vast field of sonic discovery. In this sense the prepared piano is a pre-cursor to the ideas of Cage's later chance music; there would be no way for Cage to control the sounds from each performance – therefore each performance would create new and unique opportunities for the exploration of sound.

During the twentieth century some artists shifted towards the ideas that the end product was no longer the significant part of any artistic movement. For these artists, the ideas and philosophy of the art form were in fact the main concern and artefact was only a by-product of the creative imagination. Ellsworth J Snyder sums this facet of the artist no longer making art for arts' sake by quoting Celant Germano who says 'by doing so [...] abolishes his role of being an artist, intellectual, painter or writer and learns again to perceive, to feel, to breathe, to walk, to understand [...]',<sup>404</sup>. Cage would go on to say that:

My favorite music is the music I haven't yet heard. I don't hear the music I write: I write in order to hear the music I have yet heard. We are living in a period in which many people have changed their mind about what the use of music is or could be for them. Something that doesn't speak or talk like human being, that doesn't know its definition in the dictionary or its theory in the schools, that expressed itself simply by the fact of its vibrations. People paying attention to vibratory activity, not in reaction to a fixed ideal performance, but each time attentively to how it happen to be this time, not necessarily two times the same. A music that transports the listener to the moment where he is.<sup>405</sup>

The continuation of further research could be focussed on the psychological aspect of choice in the selection of preparations. Styles of performing or in this case preparing the piano develop from the psychology of the performer; that is, as ingrained habits which have been learned through practice, experience teaching and the perception of performance. The mind of the performer is 'hard-wired' to process stimuli and develop it via ingrained habits. Psychologists such as Gordon Rugg claim that

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<sup>404</sup> E. Snyder, p.102.

<sup>405</sup> <http://www.sterneck.net/john-cage/anarchic-harmony/index.php>

there is a certain amount of evidence to suggest that people are hard-wired to prefer certain things, including touch, smell and hearing which can be easily analysed with reference to visual stimuli. Many psychologists believe that people are 'hard-wired' to prefer things which appear visually smoother and round, likely as a result of evolution impacting on our 'hard-wiring' for instance as 'honest indicator' for food or prospective mates.<sup>406</sup> Onomatopoeic descriptive words, such as those used by many of the pianists consulted in this thesis, may also impact on this theory. Words such as smooth, round, spiking, angular, shrill can equally be applied to the sounds produced by preparations in a prepared piano. The description of sounds may result in a choice of a smoother sounding description of a noise produced, rather than a brash sounding description. It may be likely that humans are hard-wired to prefer certain sounds and dislike others.

Ingrained habits also establish as a result of people who have previously produced the same stimuli. As a result of these habits, it is possible to make judgements on the validity of the choices of preparations.

What is essential to take from this thesis is the idea that although Cage allowed and encouraged new sounds to be used in his music, all decisions made in the prepared piano music (and indeed his later chance music) should be considered to produce the most appropriate for that composition. Performers should take into account all of the analytical examples stated in this thesis to decide what impact the positioning of a preparation will have on the overall impact of the piece and not just at that moment in time. As John Cage would say:

'Music is everywhere, you just have to have the ears to hear it.'<sup>407</sup>

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<sup>406</sup> For further information see A. D. Patel, *Music, Language and the Brain*, Oxford University Press, 2008 and W. R. Clark and M. Grunstein, *Are we Hardwired? The Roles of Genes in Human Behaviour*, Oxford University Press, 2000.

<sup>407</sup> <http://www.sterneck.net/john-cage/anarchic-harmony/index.php>

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