THE PREPARED PIANO OF JOHN CAGE:

A NEW LEVEL OF HEARING THE

SONATAS AND INTERLUDES

by

Inara Ferreira

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. Kenneth Keaton, Department of Music, and has been approved by the members of her supervisory committee. It was submitted to the faculty of The Dorothy F. Schmidt College of Arts and Letters and was accepted in partial fulfillment of the requirements for the degree of Master of Arts.

SUPERVISORY COMMITTEE:

Kenneth Keaton, D.M.A.
Thesis Advisor

Heather Coltman, D.M.A.

Irena Kofman, D.M.A.

Heather Coltman, D.M.A.
Chair, Department of Music

Manjunath Pendakur, Ph.D.
Dean, Dorothy F. Schmidt College of Arts & Letters

Barry T. Rosson, Ph.D.
Dean, Graduate College

April 13, 2010
Date

ABSTRACT

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When John Cage invented the prepared piano in 1940, he created a sound world and body of music unlike anything heard before. The innovative music he wrote for prepared piano requires a completely new approach to performance, and expands our understanding of the piano's capabilities.

This study will examine the main prepared piano works by John Cage, with a detailed analysis of the *Sonatas and Interludes*. Cage's Table of Preparations will be examined to establish an aesthetic rationale for this preparation. Different modes of listening will be explored through a selection of the *Sonatas and Interludes* recorded in three different technological systems — conventional AB 2.0, surround 5.1, and *Disk Jecklin.* The latter allows for a true "surround sound" experience as Cage himself might have heard his own pieces. Included is a compact disc of selections from *Sonatas and Interludes* recorded in each of the three technological systems.

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TABLE OF CONTENTS

TABLE OF FIGURES

Introduction

I decided to research prepared piano because I have always had a fascination for twentieth-*century* music. I grew up in a "percussive" environment; since my childhood, I was surrounded by Brazilian popular music and samba, in which rhythm and percussion play an important role. In addition, my father was a percussionist. Eventually I chose the piano as my instrument. Though quite different from what we generally understand as a percussion instrument, it is in fact a percussive instrument because of how the sound is produced. With the prepared piano, I discovered that I could enjoy the piano and at the same time have an entire percussion ensemble under the tips of my fingers. It has been three years since I first heard the *Sonatas and Interludes*; I was fascinated.

The present research begins with a discussion regarding some important aspects of John Cage's life. Following that, I will cover the history of the prepared piano, explaining how and why Cage invented this new extended technique. I will next consider the influences of Asian music, philosophy and aesthetics, which exercised a great impact on Cage's thoughts. He wrote more prepared piano music for dancers than for concert use. I will then focus on the *Sonatas and Interludes*, with a particular emphasis on the Table of Preparations and its effects on the sound.

This research is more than the written thesis. It also focuses on my performance and recording of excerpts from the cycle. I discovered that Cage did not specify, with any precision, the size of the objects or their relative placement on differing sizes of

pianos. He did not even indicate the specific type of piano that he wants. I did discover a quote from Cage indicating that this effect was neither planned nor expected, and it is possible to infer that this was a catalyst, and a bridge, into his later work based on chance processes. Another aspect of Cage's prepared piano relates to the sound space and how it affects perception. Cage once commented that he never heard his prepared piano pieces played by other interpreters. He always performed by himself, so he always had the same perception. I suspect this was a perspective from a point that was almost inside the piano—that is the impression I gained when I performed the pieces myself, though Cage never wrote about this. I realized that we now have several recording technologies available that can reproduce varying perspectives: within the piano, in front of the piano, in the audience (not to mention performance spaces varying in size and resonance). This project concludes with a recording of the works performed on my recital, done in different technologies.

The first one will be the conventional AB 2.0; the second, the surround 5.1, which will try to offer the idea of listening from the audience, where the sound is immersed on the environment; and finally, the Jecklin Disk. This third method imitates the binaural system of recording, though it is not widely used due to its higher cost. Thus, with the accessibility of the Jecklin Disk, this set up will reproduce Cage's own hearing.

It is expected that, through this research, musicians will achieve a better understanding of John Cage's music. I hope to awaken interest on it by exploring richer levels of perception.

Chapter I: An Overview of Cage's Life

Prepared piano music, "chance music," the music of silence, along with several other innovations in music, made John Cage one of the most important and influential figures in the post-war avant-garde. Besides a composer, John Cage was also a writer, artist, mycologist and printmaker, which acknowledged him as a "philosopher musician".

Born in Los Angeles, California, on September 5, 1912, the son of an inventor and a journalist, John Cage had the dream and pursuit of becoming a writer even from a young age. But after some years of study at Pomona College, in Claremont, California, he decided to give up that career path.

> I was shocked at college to see one hundred of my classmates in the library all reading copies of the same book. Instead of doing as they did, I went into the stacks and read the first book written by an author whose name began with Z. I received the highest grade in the class. That convinced me that the institution was not being run correctly. I left (Cage 1991, An Autobiographical Statement, http://www.newalbion.com/artists/cagej/autobiog.html).

At the time (1930), he decided to move to Europe where he became fascinated in painting, poetry and music. In Paris, he became familiar with the music of Johann Sebastian Bach for the first time and some well-known contemporary composers including Igor Stravinsky, Alexander Scriabin and Paul Hindemith. Returning to the United States in 1931, Cage chose to follow the path of music rather than painting: "The people who heard my music had better things to say about it than the people who looked at my paintings had to say about my paintings" (Perloff and Junkerman 1994, 90).

John Cage spent two years in California composing and giving lectures. In 1933, he sent some of his compositions to Henry Cowell, who showed an immense amount of interest in Cage's compositions; later, he invited Cage to move to New York to receive lessons with him. The final goal of Cowell, as Cage's teacher, was to prepare him to have lessons with Arnold Schoenberg; but in order to make that happen, Cage had to learn more in depth about counterpoint, harmony and twelve-tone technique. At that time, he focused spending time in studying music and composition, that he barely ever got a good night's sleep. Immediately upon reaching the desirable level of understanding the required knowledge, Cowell introduced Cage to Schoenberg. When Cage asked Schoenberg for private lessons, he replied by asking if Cage would have enough money to pay for it. The following is a statement of Cage himself about this episode:

> I told him (Schoenberg) that there wasn't any question of affording it, because I couldn't pay him anything at all. He then asked me whether I was willing to devote my life to music, and I said I was. In that case, I will teach you free of charge" (Patterson 2002, 15).

John Cage had lessons with Schoenberg for the next two years. Although Schoenberg did not hold him in high esteem as a composer during these years, he declared some years later: "Of course he's not a composer, but he's an inventor -- of genius" (Perloff and Junkerman 1994, 157).

By 1935, Cage's intentions were to write percussion music that, as he termed, "all sound music of the future." According to Nicholls (2002, 69-70), three things were responsible for increasing Cage's interest in percussion music: first, the performance of Edgard Varèse*'s Ionisation*, which he listened to in 1933, at the Hollywood Bowl; second, the contact with the experimental composer Henry Cowell, who introduced him

to the study of ethnic music; and, finally, the criticism from Schoenberg about Cage's disinterest in harmony, which made him search for other types of composition that were not dependent on harmonics parameters. John Cage's first percussion works were the *Quartet* (1935) and the *Trio* (1936). *Quartet* was composed for any percussion instrument; the work is arranged in three movements and entirely composed of fixed rhythmic patterns. *Trio* is a suite of three movements (Allegro, March and Waltz), also composed using fixed rhythmic patterns. Cage incorporated the waltz as the second trio in his work *Amores* (Kostelanetz 1990, 6).

The years of 1938-1940 were exceedingly influential in Cage's life, as they are the years that he taught at the Seattle's Cornish School. This school granted him access to a vast repository of percussion instruments as well as a recording studio, where he conducted experiments which resulted in his first electronic composition. At that time, Cage composed a series of percussion works entitled *Constructions,* which is comprised of three pieces. In his *First Construction*, he introduces the technique of composing using fixed rhythmic structure, a new method which he called Microstructure and Macrostructure (Nicholls 2002, 71). This idea was essential for the development of Cage's following works. Furthermore, it led him to write a series of electronic compositions called *Imaginary Landscape,* which is a series of five pieces (Kostelanetz 1993, 33). Composed at this same recording studio, *Imaginary Landscape No. 1* was written for a large Chinese cymbal, string piano and frequency recordings that requires disc recordings to be performed on a variable-speed record player. This work is significant for being one of the first examples of electro-acoustic music.

In the following years, Cage composed *Imaginary Landscape No. 2* (1941), scored for percussion instruments, including a large metal coil that is electronically amplified by a phonograph cartridge. Following this series, *Imaginary Landscape No. 3* combines electronic sounds with the percussion. The percussive instruments included in this composition are tin cans and a muted gong, blended with electronic and mechanical devices including oscillators, variable speed turntables playing frequency recordings, a buzzer, an amplified coil of wire and a microphone amplified marimbula. *Imaginary Landscape No. 4* (1951) was limited to twelve radios, respectively having two players control each radio for the volume and frequency. Lastly, *Imaginary Landscape No. 5* (1952) uses sounds drawn from forty-two LP recordings cut up and reorganized on magnetic tape, and *Williams Mix* (1942) which uses over five hundred pre-recorded sounds spliced and pasted together on tape. (CD, *The Wire*, August 1998)

Still in the year of 1938, Cage was in charge of accompanying dance class in the Cornish School. During that time, he was asked to write a piece that was already provided a name: *Bacchanale.* The idea he had in mind was to score the music for a percussion ensemble, but the stage where the group would be performing the work did not have enough space to accommodate all that he had hoped for; Cage was restricted to just a single piano. That episode was responsible for Cage's development of the prepared piano, which will be discussed in the next chapter. Further, it was at the Cornish School where Cage came in contact with some people who ended up becoming his lifelong friends, such as painter Mark Tobey and dancer Merce Cunningham, who later became Cage's lifelong partner and collaborator.

During the followings years, Cage continued composing for prepared piano; between 1940 and 1954, he composed approximately thirty five pieces which includes the most famous and significant prepared piano pieces, the *Sonatas and Interludes (*1946-1948). Further in this research, I will present an explanation about Cage's creative process on these works, as well as an elucidation on the table of preparation.

Another important year in Cage's life was 1948, when he was requested to teach at the Black Mountain College, in North Carolina. Together with Cunningham, Cage began to compose music for dance performances. In fact, Cunningham was one of the most worthy people in Cage's life. After Cage divorced from his wife, Xenia, Cunningham became Cage's romantic partner until his death in 1992. Until then, they worked together in some projects, performances, lectures and compositions (Pritchett 1995, 25).

At the end of 1950, Cage was searching for new compositional techniques. He found the inspiration to achieve, through his studies of the Zen Buddhism, which was introduced to him by Daisetz Teitaro Suzuki, a Japanese philosopher (Pritchett 1995, 74). John Cage joined his musical world of sound with the world of silence based on the Zen concepts. The first piece in which Cage used this idea of silence was the *Concerto for Prepared Piano and orchestra*. In this concerto, Cage used a new method based on chart systems. Using between fourteen to sixteen charts, in which different sonorities were represented by each box, Cage pulled out those sonorities by moving across the chart and the result was the music itself. The concerto is a composition in three parts, with an improvisational piano part as well as an orchestral part completely submissive to the chart

technique. This idea of the chart was further more developed in Cage's following works, opening the doors for the music which is known as the Chance compositions.

The years between 1951 and 1956 can be seen as a time of change in Cage's aesthetics. In 1951, Cage received, from Christian Wolff, a copy of the Chinese book *I Ching* (the Book of Changes), of which Wolff's father had just finished the translation.

> This Chinese book is a symbol system used to identify order in chance events. Cage stayed fascinated with the thoughts about this book. He began to use the *I Ching* procedures to continue his compositions. Essentially he would "ask" the book questions about many aspects of the composition, and use the answers to compose. He consults The *I Ching* in order to decide about which sound event, durations, dynamics and silences he would use. The first piece using the book as an instrument of composition was Music of Changes for solo piano (Pritchett 1995, 78).

In 1952, Cage's interest in silence ideas was still inside his mind. In that year, he visited the Anechoic Chamber at Harvard University. "An anechoic chamber is a room built in a way that the walls, ceiling and floor will absorb all sounds produced in the room" Cage went in this room to prove to himself that it will be impossible to not hear a single noise. Cage entered in the room expecting to hear silence, but as he wrote later, he heard two sounds, one high and one low. "When I described them to the engineer in charge, he informed me that the high one was my nervous system in operation, the low one my blood in circulation" (Cage 1973, 8).

This experience surprised him, and also this occurrence led to his idea about his most famous piece, *4'33''*.

This piece, sometimes referred to as the "Silence Piece" consists of the environmental sounds that the listeners hear while it is performed. Cage wrote in the first page that the piece could be performed by any instrument or combinations of instruments.

4'33'' consists of three movements. In the first movement the performer waits thirty seconds without doing anything, and then he flips the page and begins the second movement where he yet again waits for two minutes and twenty three seconds. After that he turns the page and goes into the third movement in which he waits once more for a minute and forty seconds. In each movement Cage wrote the word *Tacet* which translates to silence in Latin. Though the piece is scored for any single instrument or group of instruments, when it is played on piano, the performer marks the changing movements by lowering and raising the piano lid. There is no indication of these at the score but that is what is traditionally done by performers.

The next important compositional technique in Cage's works is indeterminacy. He approached this technique in 1957 and arrives at the climax in 1961. It is important to understand the distinctions between the Chance compositional technique and indeterminacy. About these definitions, Cage says:

> Chance refers to the use of some sort of random procedures in the act of composition. *Music of Changes* is a perfect example of this, with the *I Ching* being used to order and coordinate elements from the charts in the score. "Indeterminacy", on the other hand, refers to the ability of a piece to be performed in substantially different ways – that is, the work exists in such a form that the performer is given a variety of unique ways to play it (Pritchett 1993, 108).

There are a great number of misunderstandings about the two words chance and Indeterminacy. Accordingly to the quote above, Chance is used by the composer, by means of random procedures when writing a piece. Indeterminacy occurs when the performer executes a piece through random actions. The accomplishment of this new method of composition led Cage to a new type of notation, which will be explained later in this thesis.

Between 1962 and 1969 Cage completed fifteen pieces, which many of that were not published. The reason for not issuing his compositions was that he was occupied giving lectures, touring and performing. In the year of 1961, Cage's first book *(Silence)* was published, and this book is a collection of all his writings from 1937 to 1961. Besides that, during this period, his scores were becoming available by the publisher C. F. Peters. Furthermore, the *Concerto for Piano and Orchestra* was Cage's first recorded piece (Pritchett, 142).

> With all these accomplishments, Cage received several university activities during this period. He held positions at Wesleyan University (1960), the University of Cincinnati (1967), the University of Illinois (1967-1969), and the University of California at Davis (1969) (Pritchett, 142).

John Cage was already renowned by the late 1940s, mainly for his invention of the prepared piano; he was considered an experimental composer. But during the 1960s, he was becoming more well-known. Many of his changes in life and work in 1960 can be connected in some way to his increasing notoriety (Pritchett 1995, 140).

In the 1960s, Cage composed *0'00''* (*4'33''* number two). The score consists of one sentence: "In a situation provided with maximum amplification (no feedback), perform a disciplined action." A day later Cage added a set of instructions:

> The performer should allow any interruptions of the action; the action should fulfill an obligation to others; the same action should not be used in more than one performance, and should not be the performance of a musical composition; and finally, the performer should pay no attention to the situations he finds himself in, whether electronic, musical, or theatrical (Pritchett 1995, 138).

Another notorious piece during this decade was *HPSCHD.* Spelled with six consonants only, H-P-S-C-H-D was collaboration between John Cage and Lejaren Hiller, in 1967-69.

> This piece uses seven harpsichords playing, at the same time, music by Mozart and other composers, 51 tapes of computer-generated sounds, 5.000 slides of nonrepresentational designs and space exploration, and many films, all of which were performed at the same time (Hiller, 2006).

Cage's electronic composition of the sixties had a phenomenal transformation compared with his first electro-acoustic pieces, The *Imaginary Landscape* series. He used amplification in all his pieces during this phase. His interest in technology increased significantly after encountering the work of *Marshall McLuhan,* the prominent critic of media and technology (Pritchett 1995, 150).

The period between 1969 and 1992 can be seen as the last period in Cage's life and also his return to compositions. The first piece of this era is *Cheap Imitation for piano* that is based on *Socrates* (1918) a Symphonic Drama by Eric Satie. He made an arrangement for two pianos to be performed by Cunningham. In the first movement Cage used the *I Ching* to choose the first note of each half measure (Pritchett 1995, 162-163).

In 1970, his *Song Book* was published. There were three volumes divided additionally in three parts. The first subtitled "Solos for Voice 3-58," the second "Solos for Voice 59-92" and the third, "Third of Instructions." The instructions fall into groups of song with the use of electronics, theater, and theater with using of electronics. Cage once again used the *I Ching* to determine the solos (Kostelanetz, 1991).

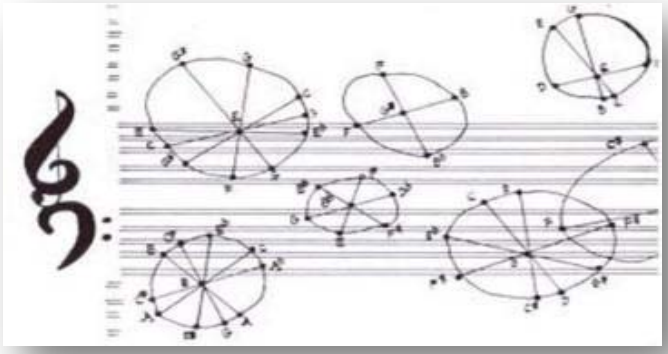


Figure 1. John Cage, *Song Books* (http://www.auriea.org/index.pl/diagram_JohnCageScore-3)

Besides his compositions and writings, Cage was also recognized as a visual artist, particularly in printmaking, etching, drawings and watercolors. He used those techniques in some of his musical scores and his poetic texts, for example in the *Song Books,* as show in the example above.

Between 1987 and 1990 Cage was invited to compose the first two works for the Frankfurt Opera. He wrote a series that he called *Europera*.

> *Europera 3* is scored for six singers singing their favorite arias, six record-players playing classic 78-rpm opera recordings, 2 pianos playing excerpts from opera transcriptions, and the occasional intrusion of the Truckera tape (a collage of over 100 superimposed operas that virtually obliterates the live action)." *EUROPERA 4* is for two sopranos (singing their favorite arias), a 78-rpm Victrola, one piano (playing opera transcriptions) and this time a distant Truckera. Both *Europeras* must be performed together and never separately (Rich, 1995).

In the last years of his life, Cage became engaged in composing instrumental music, especially in response to his eightieth birthday in 1992. These last instrumental works are referred to as "number" pieces and consists of a total of forty-three pieces. Some examples of these are *Two* for flute and piano, *Five* for five voices or instruments, *101,* for 101 orchestral players (Duckworth 5). "These works are also called 'the time-

bracket pieces', a reference to the notation of the pieces. These pieces are composed by single sounds, with silence surrounding them" (Duckworth 5).

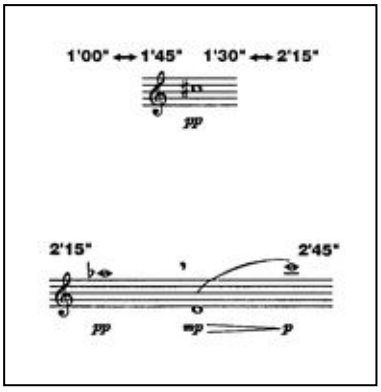


Figure 2: *Piece no. 5* (Cage, 1989)

Throughout his life, Cage was also active as a lecturer and writer. Some of his fine lectures are included in several books he published, such as *Silence: Lectures and Writings* (1961). *Silence* included not only his simple lectures, but also works such as *Lecture on Nothing* (1959), which was composed in rhythmic structures. Also, he wrote: *A Year from Monday: New Lectures and Writings* (1967), and he published *M: Writings '67–'72* (1973), *Empty Words* (1973), *X: Writings '79–'82* (1983), *I–IV* (1990), *First: Sixth* (1990), and *Aerial Six-Seven: Art Is Either a Complaint or Do Something Else* (1991).

Cage died in New York City on August 12, 1992, only a few weeks before the celebration of his 80th birthday. He had influenced and still inspires new generations of composers, dancers and artists in the twentieth *century*, and had opened the door to Minimalism and performance art. Composers as Philip Glass, Morton Feldman, Earle Brown and Frederic Rzewski have cited Mr. Cage as a beacon that helped light their own paths (Kozinn, 1992).

Chapter II: The History of the Prepared Piano

In 1938, Cage and his wife, Xenia Andreyevna Kashevaroff, were living in San Francisco, where Cage had been employed in some odd jobs, such as teaching extension courses through UCLA and working with dancers. During that same year, for the search of new works they went to San Francisco where Henry Cowell, the central figure in a circle of avant-garde composers, arranged Cage to meet one of his students, Lou Harrison (Patterson 2002, 48).

According to Cowell, Harrison had the same interests as Cage; percussion and dance. Cage introduced himself to Harrison: “Hello my name is John Cage, Henry Cowell sent me”. At that time, Harrison was the dance accompanist by the Mills College Physical Education Department (Patterson 2002, 48).

In that same year, Mills College fostered innovative and experimental dance academic programs in the summer section. Bonnie Bird, a dancer for American Modern Dancer and Dancer Educator and head of the dance department at the Cornish School was a specialist of Martha Graham. She was present to offer a workshop in the Martha Graham technique. At Cornish school she had outstanding dance students including Dorothy Herrmann, Syvilla Fort and Mercier Cunningham.

At Mills, she met Harrison and invited him to be her accompanist for her dance group at Cornish school, but he ended up rejecting the job, and recommended Cage. He

accepted the job, mainly because Bird described to him a closet at the school that was filled with percussion instruments (Patterson, 2002, 50).

In that same year he moved to Seattle to work with Syvilla's dance group. On April 28, 1940, one of Bird's students, Syvilla Forte, an exceptional black dancer and choreographer, was supposed to choreograph a dance performance with an African character that was named *Bacchanale,* for which she needed appropriate music for. Three days before the concert, she asked Cage to compose that specific music for her group to dance (Cage 1981, 7).

At that time, he had two ways of composing the work: for piano, or for orchestral instruments with the use of twelve-tone technique, when he tried to come up with an African-sounding row for a piano composition, but was unable to come up with anything appropriate (Kostelanetz 1990, 117).

Also, he had intended to score the music for a percussion ensemble, but because of the limited space, Cage was limited to just a single piano. This episode was accountable for Cage's development of the prepared piano. He experimented with inserting various objects into its strings, having the piano sound like a percussion orchestra (Pritchett 1995, 23). About this episode Cage said:

> Before I left the Cornish School I made the prepared piano. I needed percussion instruments for music for a dance that had an African character by Syvilla Fort. But the theatre in which she was to dance had no wings and there was no pit. There was only a small grand piano built in the front and left of the audience. At the time I either wrote twelve-tone music for piano or I wrote percussion music. There was no room for the instruments. I couldn't find an African twelve tone row. I finally realized I had to change the piano. I did so by placing objects between the strings. The piano was transformed into a percussion orchestra having the loudness, say, of a harpsichord
> (Cage 1991, An Autobiographical Statement, http://www.newalbion.com/artists/cagej/autobiog.html).

Cage invited his friends Mark Tobey and Morris Graves to listen to the premiere of this piece that was presented on April 28th of 1940 (Bernstein and Hatch 2001, 78). About his friend's reactions, he recalls, "They were delighted. So was Syvilla, and so was I, and so was Xenia. We were all so happy, happy as could be. When Lou Harrison heard it, he said 'O Dammit! I wish I'd thought of that'" (Revil 1992, 72).

In many of his works during the 40's, he used many motive repetitions, such as the sixteenth notes-rhythm in the opening.

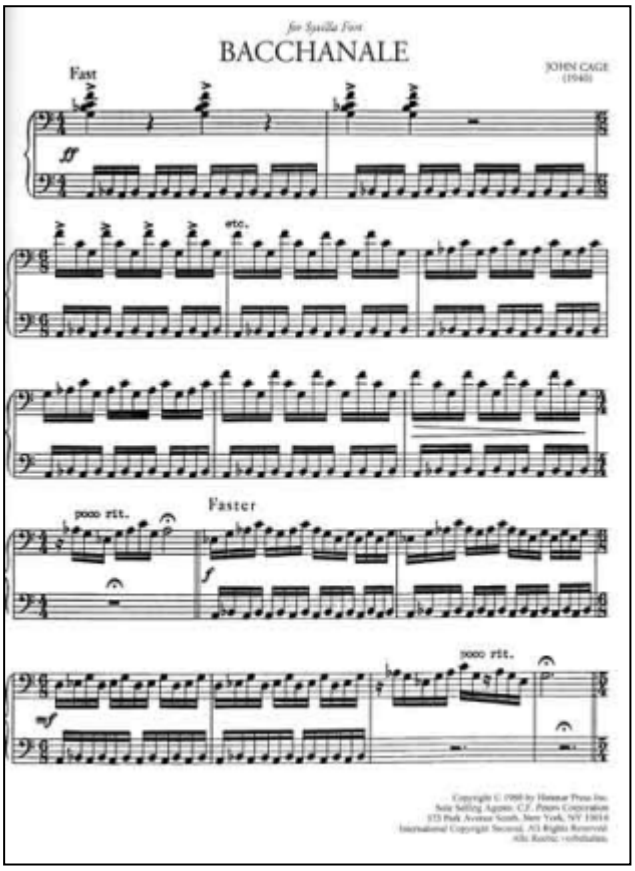


Figure 3: *Bacchanale* (Cage, 1940 ed. Henmar Press Inc.)

In B*accanale,* just twelve notes are prepared and we can often hear many times the "normal" notes of the instrument. In order to prepare the piano, he used small bolts

between the second and third string for one note, a screw with nuts between the second and third screen and a strip of fibrous between the first and second for another. Cage named the result collection of the twelve prepared notes a “gamut”. Cage’s use of gamut consists of the utilization of weather stripping which produces a non-western style sound.

The Piano Table of Preparation in *Bacchanale* consists of the Tone, Material, String and Distance. Cage first writes the tones to be prepared (*i.e.,* specific pitches on the piano), followed by the materials needed to prepare these tones. Then he writes on which strings these materials should be placed and finally he determines the distance from the damper. The musician should use a ruler in order to place the objects a consistent distance from the dampers. Also he inserts this symbol (**) which indicates that the pianist should determine the positions and the size of the material through the process of experiments. It can be seen in the example below.

The prepared piano has been used for a long period of time, but without the extensive development that Cage accomplished. Cage said “American Bach societies, which couldn’t obtain 18th *Century* harpsichords, employed thumb tacks on the piano hammers.” He had also mentioned jazz pianists, who placed newspapers on the strings (Cage, 1995).

In 1913, at the private premiere of the *Piège*, Satie, performing the music, *Le piège de Meduse*, had slid sheets of paper between the strings of the piano for a more mechanical sound. This was known to be the first appearance of a prepared piano in the history of music (Dianova 2008, 49).

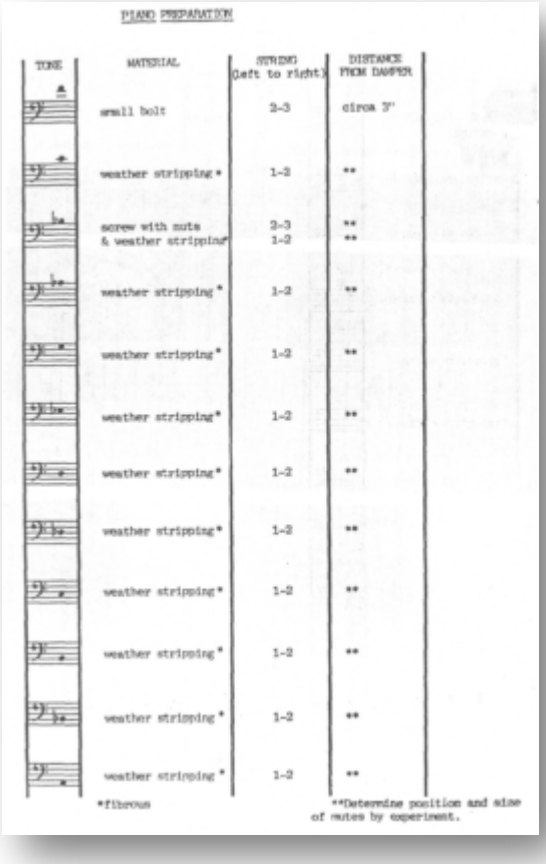


Figure 4: Table of Preparations for *Bacchanale* (Cage, 1940 ed. Henmar Press Inc.)

We can surmise that Cage already had the knowledge about the use of the piano employing extended techniques. He became familiar and gained knowledge of these techniques mainly with his first composition teacher, Henry Cowell.

> Henry Cowell was for many years the open sesame for new music in America… He's early works for piano, long before Varese's Ionization (which, by the way, was published by Cowell), by their tone clusters and use of the piano strings, pointed towards noise and a continuum of timbre (Cage 1973, 71).

In 1952, Cowell wrote:

> He (Cage) got an idea, by knowing my own things for the strings and piano very well, first learning them. I gave them up about 1930… When I gave up this sort of writing for piano in order to write more symphonic music, John was very annoyed. I said, `Why don't you do it? ` So he did do it, and he took it up and prepared the strings, which I had never done (Cage in Dianova, 2008, 49).

Cage was not the first one to use papers between the strings of the piano, but he was recognized as the first to have developed and embraced the prepared piano. *Bacchanale* is the piece commonly known for the development of the prepared piano, as it was never used before. Some years later, Cage went to the extreme of the preparation with his piece *Sonatas and Interludes.*

"The instrument makes possible the invention of a melody which employs sounds having widely different timbres. As far as I know this is genuinely new possibility". (Kostelanetz 1990, 36) Furthermore, the prepared piano makes possible the use of microtones, that is, pitch differences less than our usual half-tones. These characteristics could be seen in some jazz music and folk and oriental music, in addition to works by Ives and Cowell.

Figure 5: John Cage preparing a piano (n.d http://artnews.org/files/0000040000/0000039444.jpg/John_Cage.jpg)

Chapter III: The Evolution of the Prepared Piano and the Influence of Asian Music and Thought

Although Cage began the practice of a prepared piano in *Bacchanale,* the first appearance of a prepared piano was in his *First Construction (in Metal) (*1939), where Cage used the string piano technique. It was also used in the *Second Construction* (1940), which is a piece for a Percussion sextet with an assistant, including a piano. The score instructs to place a piece of cardboard and a screw in the strings (Nicholls 2002, 77).

In *Imaginary Landscape No. 1,* (1939) Cage also uses the piano as an extended technique. He calls the piano a muted piano since the performer should mute the strings with the left hand, while the right hand is playing the keys. This was written for a dance and consists of a mixture of combined recorded sounds (played on two variable speed turntables), percussion and noise.

The period between 1938 and 1943 is the epoch that Cage wrote renamed works for percussion. He used the prepared piano in the majority of these percussion works together with the percussion ensembles.

From 1939 to 1942 Cage composed four works for percussion ensembles and called them *Constructions*. These are the first pieces that he makes use of a prepared piano for a concert.

By the 1940s, Cage's intentions were to write music for prepared piano, because of the difficulty of running a percussion ensemble. The majority of the prepared piano

pieces from the early forties were merely written for dancers. These include *Totem Ancestor* (1942), *Tossed as it is Untroubed* (1943), *Root of an Unfocus,* and *In the name of the Holocaust*.

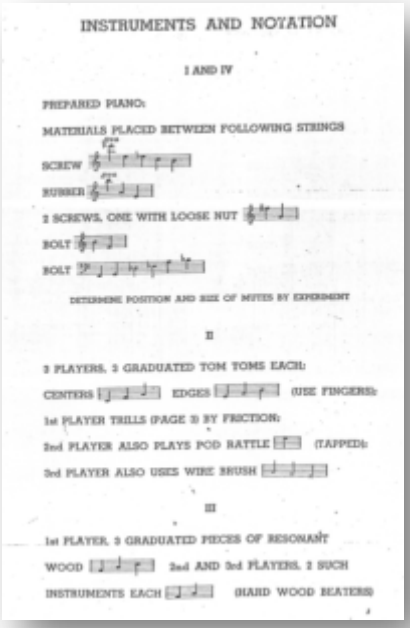
Between 1943 and 1948, Cage began to develop the prepared piano; he tried to explore the maximum use of objects inside the piano. His Suite *Amores* (1943) was the first prepared piano piece that he composed as a concert piece, and was written for prepared piano and percussion. Afterwards, in 1949, Cunningham choreographed it for a dance, and was written in a way that only the opening and last movements are for the prepared piano. For the preparation of this Suite, he used nine screws, eight bolts, two nuts and three strips of rubber.

In the Preface of this piece Cage says:

> The total desired result has been achieved if, on completion of the preparation, one may play the pertinent keys without sensing that he is playing a piano or even a "prepared piano". An instrument having convincingly its own special characteristic, not even suggesting those of a piano, must be the result (Cage 1943).

Amores, composed in 1943, in New York City, was his first prepared piano piece that was ever to be published. It was written for prepared piano and a percussion trio. The premiere was in February 7th, and was performed by Cage's wife, Xenia, and also Cunningham.

This work is divided in four parts, I – Solo, II – Trio, III – Trio, IV – Solo. The first and fourth parts are played by the prepared piano while the second and third parts are performed by the percussion trio. In part two, the trio should use nine tom-toms, and pod rattle while the third part of the trio should bring into play seven woodblocks. The preparation of this piece uses all the ranges of the instrument. At the preparation of the piano, Cage uses diverse objects compared to what was used in *Bacchanale,* as the materials that he uses for this piece are screws, pieces of rubber, bolts and one screw with a loose nut. It is the first time that Cage explains the difference between the bolts and screws as well their correct applications. The example below shows the way that the pianist should prepare the piano.


INSTRUMENTS AND NOTATION

I AND IV

PREPARED PIANO:

MATERIALS PLACED BETWEEN FOLLOWING STRINGS

SCREW

RUBBER

2 SCREWS, ONE WITH LOOSE NUT

BOLT

BOLT

DETERMINE POSITION AND SIZE OF MUTES BY EXPERIMENT

II

3 PLAYERS, 3 GRADUATED TOM TOMS EACH:

CENTERS EDGES (USE FINGERS):

1st PLAYER TRILLS (PAGE 3) BY FRICTION:

2nd PLAYER ALSO PLAYS POD RATTLE (TAPPED):

3rd PLAYER ALSO USES WIRE BRUSH

III

1st PLAYER, 3 GRADUATED PIECES OF RESONANT WOOD 2nd AND 3rd PLAYERS, 2 SUCH INSTRUMENTS EACH (HARD WOOD BEATERS)

Figure 6: Table of preparation for *Amores* (Cage, 1943 Published by Edition Peters).

Perilous Night (1943-44) was the first large work for the prepared piano, using twenty-six notes for the preparation. Consisting of six untitled movements, Cage says that "*Perilous Night* concerned the loneliness and terror that comes to one when love becomes unhappy" (Kostelanetz 1990, 40). It was composed by the time that Cage was awfully confused by his separation from Xenia.

The audience did not take pleasure in the piece and it was misunderstood, so he decided to drift away from the expression of personal feelings in music (Dianova 2008, 116).

In his "An Autobiographical Statement" (1989) he says:

> I was disturbed both in my private life and in my public life as a composer. I could not accept the academic idea that the purpose of music was communication, because I noticed that when I conscientiously wrote something sad, people and critics were often apt to laugh. I determined to give up compositional unless I could find a better reason for doing it than communication. I found this answer from Gita Sarabhai, an Indian singer and tabla player: The purpose of music is to sober and quiet the mind, thus making it susceptible to divine influences. (Dianova, p.116-117). I also find in the writings of Ananda K. Coomaraswamy that the responsibility of the artist is to imitate nature in her manner of operation. I became less disturbed and went back to work (Kostelanetz 1990, 239).

In addition, Cage says:

> I had poured a great deal of emotion into this piece, and obviously I wasn't communicating this at all. Or else, I thought, if I were communicating, then all artists must be speaking a different language, and thus speaking only for themselves. The whole musical situation struck me more and more as a Tower of Babel (Pritchett 1993, 36).

At this point, very depressed and disillusioned, Cage met Gita Sarabhai. She came to America to study Western Music and begun to take contemporary music lessons with Cage. They agreed that Cage will teach these subjects for her in exchange for her introducing him to Indian music and its aesthetics. She provided him with a copy of *The*

Gospel of Sri Ramakrishna which served as a therapy to Cage and moreover introduced him to Indian philosophy (Pritchett 1993, 36).

Perilous Night was a turning point in Cage's life as well as in his compositions. In his subsequent pieces for prepared piano, he approached his aesthetical thoughts and his next works were influenced by that.

Between the years of 1944 and 1945 he wrote two large pieces for two prepared pianos, *A Book of music* (1944) and *Three Dances* (1945), which he received his first commissions from professional performers. It was written for the duo-piano team of Arthur Gold and Robert Fizdale (Pritchett 1993, 28).

About A Book of Music Cage states:

> The *Book of music*… concerned with my idea about Mozart that his music strictly adheres to three different kinds of scales: the chromatic, the diatonic, and the consisting of the larger steps of thirds and fourths… The two pianos are prepared at the same points on the same strings but with different materials… The absence of harmony in my music frequently suggests to listeners oriental music. Because of this, the Book of Music was used… during the war (wwII)… with the hope of convincing the natives (of the South-Pacific) that America loves the Orient (Kostelanetz 2000, 40-41).

There are groupings of different types of scales and arpeggios in this piece, mainly scales particular to Mozart's music. There are two parts to the groupings; the first part has a gently flowing expressiveness that later he will explore in the *Sonatas and Interludes*, and the second part is much like the improvisational solos in jazz music (Dianova 2008, 126).

Three Dances has a much more complex preparation, and it is a very virtuosic piece. Cage mentioned that the *Book of Music* was about the expression of feelings, where as *Three Dances* is about physical expression. As in the first work, scales appear

continually, and in the Three Dances, the chromatic and diatonic scales dominate the entire work. In 1947, Merce Cunningham choreographed this piece.

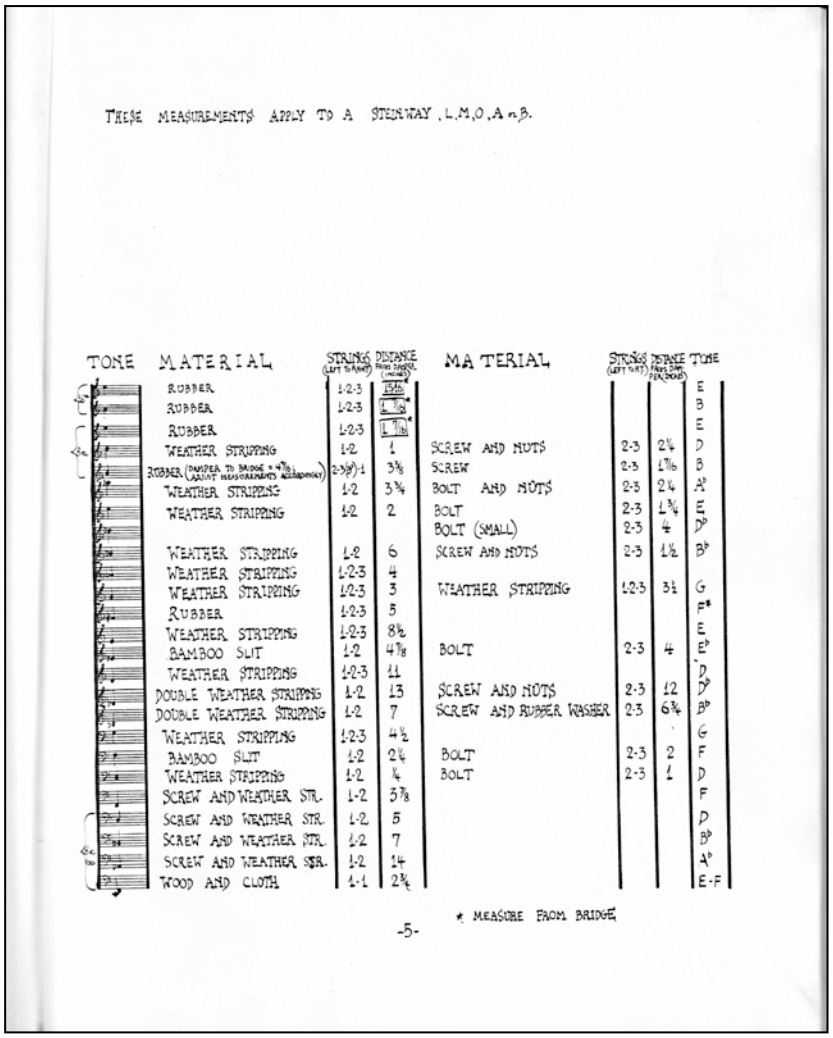
Besides these two pieces, Cage continued composing for prepared piano pieces, in which many of them were composed for dance. *A Valentine out of Season* (1944) was composed for Xenia to play on the prepared piano.

Music for Marcel Duchamp (1947) was a prepared piano composition written for the portion of the sequence of Marcel Duchamp in Hans Richter's surrealistic film *Dreams That Money Can Buy*. The film consists of many unrelated segments designed by different artists.

In relation to the tables of preparation of Cage's prepared piano works, a gradual elaboration is also included.

In *Amores,* Cage describes the preferred results in many ways, such as "a sound resonant, rich in harmonics and free of any metallic buzzing". Cage leaves the sizes and location to the performer. The example shown at the page above is one of the simplest tables of preparation. Different from the next pieces, Cage does not suggest the size of the material nor the distance.

In *The Perilous Night*, a detailed, elaborate table of preparation is given. He indicates the exact Steinway models that the measures are applicable to. Also, he indicates the exact distance from the materials in relation to the dampers.


THESE MEASUREMENTS APPLY TO A STEINWAY, L,M,O,A n.B.

TONE	MATERIAL	STRING (LEFT TO RIGHT)	DISTANCE FROM STRIKE (INCHES)	MATERIAL	STRING (LEFT TO RIGHT)	DISTANCE FROM STRIKE (INCHES)	TUNE
	RUBBER	1-2-3	15/16*				E
	RUBBER	1-2-3	1 1/2*				B
	RUBBER	1-2-3	1 7/16*				E
	WEATHER STRIPPING	1-2	1	SCREW AND NUTS	2-3	2 1/4	D
	RUBBER (DAMPER TO BRIDGE 2 7/8) (ADJUST MEASUREMENTS ACCORDINGLY)	2-3(?)-1	3 3/8	SCREW	2-3	1 7/16	B
	WEATHER STRIPPING	1-2	3 3/4	BOLT AND NUTS	2-3	2 1/4	A♭
	WEATHER STRIPPING	1-2	2	BOLT	2-3	1 3/4	E♭
				BOLT (SMALL)	2-3	4	D♭
	WEATHER STRIPPING	1-2	6	SCREW AND NUTS	2-3	1 1/2	B♭
	WEATHER STRIPPING	1-2-3	4				
	WEATHER STRIPPING	1-2-3	3	WEATHER STRIPPING	1-2-3	3 1/2	G
	RUBBER	1-2-3	5				F*
	WEATHER STRIPPING	1-2-3	8 1/2				E
	BAMBOO SLIT	1-2	4 7/8	BOLT	2-3	4	E♭
	WEATHER STRIPPING	1-2-3	11				D
	DOUBLE WEATHER STRIPPING	1-2	13	SCREW AND NUTS	2-3	12	D♭
	DOUBLE WEATHER STRIPPING	1-2	7	SCREW AND RUBBER WASHER	2-3	6 3/4	B♭
	WEATHER STRIPPING	1-2-3	4 1/2				G
	BAMBOO SLIT	1-2	2 1/4	BOLT	2-3	2	F
	WEATHER STRIPPING	1-2	1/4	BOLT	2-3	1	D
	SCREW AND WEATHER STR.	1-2	5 7/8				F
	SCREW AND WEATHER STR.	1-2	5				D
	SCREW AND WEATHER STR.	1-2	7				B♭
	SCREW AND WEATHER STR.	1-2	14				A♭
	WOOD AND CLOTH	1-1	2 3/4				E-F

* MEASURE FROM BRIDGE

-5-

Figure 7: Table of Preparations for *Perilous Night* (Cage, Published by Edition Peters).

The next chapter will show the table of preparation of *Sonatas and Interludes*, the climax of the preparation process.

Chapter IV: *Sonatas and Interludes* (1946-48): Analytical Notes

By the time he was composing *Sonatas and Interludes*, John Cage was already a famous composer. His name would often appear in the New York press, as well as in the *Time* magazine, and was even considered "one of this country's finest composers". With that, he was also an experimental composer, together with Henry Cowell and Edgard Varèse. His invention of the prepared piano was by far his most famous experimentation (Pritchett 1993, 140).

Cage had been influenced by Asian Music since his earliest years including when he was studying with Cowell, and through his friendship with Lou Harrison as well as the sculptor Richard Lippold, who also had an interest in this style of music. In addition, critics often equate Cage's percussion ensemble works with the gamelan and his interpretation of the prepared piano's delicate timbres as evidence of his music's orientalism.

An earlier example of Cage's exposition on this new philosophy is in his piece *Sonatas and Interludes*. At that time, Cage and his friends Harrison and Merton Brown had began to read the works of Ananda K. Coomaraswammy and became truly inspired. About this works Cage says:

> Were written when I … first became seriously aware of Oriental philosophy. After reading the work of Ananda K. Coomaraswamy, I decided to attempt the expression in music of the "permanent emotions" of Indian tradition: the heroic, the erotic, the wondrous, the mirthful, sorrow, fear, anger, the odious, and their common tendency toward tranquility. These pieces were the first product of that effort … (Cage, in Nicholls 2002, 41).

These same permanent emotions served as a basis for his *Sixteen Dances* (1950-51). Cage did not write any indication in the score about these emotions. There is no evidence about which of the Sonatas he intended to represent the heroic, the erotic, the wondrous, the mirthful etc. The only statement from Cage about this is in the emphasis on the last ten bar phrases in the last four sonatas to represent tranquility (Pritchett, 1995).

Continuing, Cage says:

> Coomaraswamy insisted that certain ideas were true and that these idea as were to be found in both the Occident and the Orient. My first reaction was to express this idea as far as I could in discourse. So I wrote *Sonatas and Interludes*. In it there are some pieces with bell-like sounds that suggest Europe and others with a drum-like resonance that suggest the East. The last piece is clearly European. It was the signature of a composer from the West. Composing for the prepared piano is not a criticism of the instrument. I'm only being practical (http://www.dramonline.org/albums/john-cage-sonatas-and-interludes-for-prepared-piano/notes).

Sonatas and Interludes were composed in his new apartment on the East River in Lower Manhattan during the time. About this place, he says: “[it] turns its back to the city and looks to the water and the sky. The quietness of this retreat brought me finally to face the question: ‘To what end does one write music?’” (Kostelanetz 2000, 41).

Cage composed this piece for the pianist Maro Ajemian, who was a virtuoso pianist dedicated to contemporary music. In January of 1949, she premiered at Carnegie Hall (Kostelanetz 1991, 38).

Cage won a Guggenheim fellowship and an award from the National Institute of Arts and Letters for the *Sonatas and Interludes*. It is arguably the most famous prepared piano piece, and demonstrably the most recorded and performed. It is considered a masterwork for prepared piano (Pritchett 1993, 29). In the New York Times this piece was recalled: “Left one with the feeling that Mr. Cage is one of this country’s finest

composers and that his invention (the prepared piano) has now been vindicated musically" (Pritchett 1993, 35).

The order of these pieces is: Sonatas I to IV, Interlude I, Sonatas V to VIII, Interludes II and III, Sonatas IX to XII, Interlude IV and Sonata XIII to XVI.
The first eight Sonatas, as well as the twelfth and the sixteenth Sonatas are written in an AABB structure. The other three are in ternary form, with some differentiations at the repetitions. The structure of Sonata IX is: //:A: //:B:// //:C://; Sonata X is: //:A:// //:B:// C//; and sonata XI is: //:A:// B //:C://. The First and Second Interludes, together with Sonata XIII are the longest of the whole set, having between only three and four pages. The First and Second Interludes are through-composed and does not consist of repetitions. The Third and Fourth Interludes are in four-part form, //:A:// //:B:// //:C:// //:D://.

He included many elements in these pieces that have already appeared in anterior pieces. For example, the motoric rhythm and ostinato of Sonata V is rather similar to the Second movement of The *Perilous Night*.

All these small pieces have interrelated aspects of form and structure. Cage mentioned that this constant interplay produced the "poetry" in his music.
In his essay, "Forerunners of Modern Music", he defines these two different terms, form and structure.

> Structure in music is its divisibility into successive parts from phrases to long sections. Form is content, the continuity. Method is the means of controlling the continuity from note to note. The material of music is sound and silence. Integrating these is composing (Cage, in Patterson, 2002, 243-244).

With *Sonatas and Interludes* Cage reaches the apex of his prepared piano pieces. The outline of the preparations is enormous and the preparation will reach nearly the entire range of the instrument.

Chapter V: The Preparation of *Sonatas and Interludes*

Throughout his interview with William Duckworth, Cage was asked about *Sonatas and Interludes* as a major piece, and he stated:

> … I think anyone will have to remark eventually on the fact that all of the performances are different, because my table of preparations in 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 this is 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 that 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 (Duckworth 1994, 11-12).

In addition to the fact that the sizes of the materials are not precisely indicated, there is the problem about the sizes and the brands of the piano, on which the length of the string varies from piano to piano. According to Cage in an interview:

> A set of preparations for the *Sonatas and Interludes* is not available. 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 objects that do not become dislodged or in other ways stand out from the music. You will often be able to tell whether your preparation is good by whether or not the cadences "work." If you want to adhere to past models, listen to the recording by Maro Ajemian... then attempt to imitate that preparation. I had written the structure so that I knew the length of the phrases of the piece from the beginning to the end. I placed objects on the strings, deciding their position according to the sounds that resulted.... Having those preparations of the piano and playing with them on the keyboard in an improvisatory way, I found melodies and combinations of sounds that worked with the given structure
> (Cage, n.d. http://www.dramonline.org/albums/john-cage-sonatas-and-interludes-for-prepared-piano/notes).

Afterward, he was asked if he likes that the *Sonatas and Interludes* changed every time they are played, he states:

> I didn't like when I first wrote it. I was persuaded to like it through what I call practicality and circumstances. And it was one of the things that committed me to indeterminacy and chance operations (Duckworth 1994, 11-12).

While Cage's works for prepared piano, particularly *Sonatas and Interludes* are not normally regarded as indeterminate or chance works, it is evident from these quotes that he saw these as a stepping stone into the process, perhaps as important as the influence of Zen philosophy.

The fact that his Table of Preparation was deliberately non-specific in a significant number of areas, coupled with the variations between players and instruments was several steps farther into the release of will than normal interpretive differences. Cage believed that each realization of *Sonatas and Interludes* differed from all others to the extent that the pieces were not actually recognizable, and he strongly embraced that experience. It was, as he put it, "one of the things that committed me to indeterminacy and chance operations."

In this spirit, I will take an extra step to perform this piece as indeterminately as possible, by writing the number of each of the sonatas and each of the interludes on pieces of paper and picking them at random to determine the order of performance.

The Table of Preparations for *Sonatas and Interludes* is highly complex; the process to prepare the piano takes approximately three hours. In these tables, Cage shows the tones that the interpreter should prepare, the material that should be used, this strings that the material should be placed on in addition to the distance that the pianist should put the object. As the reader can see, after the Material is inserted the first time,

Cage once again repeats the material, the distance etc. This is because Cage desires the same note to be prepared two or three times in the same string but with a different distance and occasionally with a different material. The sound produced when there are two or more objects in the same string is entirely different than when there is just a single object in the string.

In this piece he uses the most common objects to prepare a piano which are a bolt and screw, along with other materials like nut, plastic, rubber and eraser.

In the table of preparation, one can see that he requires a total of twenty five varied bolts. He did not write about the size of the bolts, although he noted about different types of bolts, such as: bolt (just bolt), small bolt, medium bolt, furniture bolt, long bolt. It is impressive to discover the difference of sounds between the same object but with different sizes, as I observed that a heavier object produces a strong, short rattle.

In general, the sound of the bolt in the string produces little alteration in the sound of the piches, but it does generate a percussive character. An important difference from the sound of the screws is that the sound of the bolt produces high harmonics.

Below it shows all the different types of bolts that I used to prepare my piano.

Figure 8: Bolts used for my preparation

Figure 9: Bolts between the strings

The next object that he uses is the screw, and in order to prepare the piano, he used twenty-three screws overall. Unlike bolts, he only requests a “screw”, without indicating different sizes.

Figure 10: Screws used for my preparation

In the table of preparation of *Amores*, Cage says:

> If the screw is too small in diameters, an undesired metallic buzz will occur when the proper key is played. The screw must be large enough and so positioned on and between the strings as to produce a resonant sound, rich in harmonics (Cage, 1943).

Based on that, I simply used regular and big screws for the preparation. Each screw preparation was completed by experiment, aiming to imitate the sound of Boris Berman's recording. Essentially, the screw produces roughly the same sound as bolts. It is possible to hear sounds of pitches, but with a percussive character. The difference that I discovered is that unlike the bolts, screws produce low harmonics. Therefore, these two materials produce metallic, gong-like sounds that dominate several of his pieces.

Figure 11: Screws between the strings

From the piano string's position, the primary difference between a bolt and a screw is that the bolt usually has finer threads (more revolutions per inch). This helps determine the amount of surface area that must be in contact wth the strings, and thereby the timbre (Bunger 1973, 11).

Figure 12 : Nuts used for my preparation

The next material used is the nut. In this preparation, nuts are always used in combination with bolts or screws, and requires four objects along with the nuts. The combinations would be, one screw with two nuts, one screw with one nut, one furniture bolt with one nut, and one furniture bolt with two nuts.

The sound of the materials arranged with nuts produce a jangle and a buzz sound. The nut should be larger than the object at all times in order to to have it well fitted on them.

Regarding the sound of a nut together with a screw, Cage says:

> When the proper key is played, a resonant sound… will be produced, but in addition, a metallic rattling sound occurs, due to the free movement of the loose mut on the screw, between the screw head and piano strings. Also, the nut, which

> is made to move by the vibrating strings, comes finally to rest on the strings, stopping their vibration and thereby shortening the dutation of the sound (Cage, 1943).

On the subject of the sounds of the rubbers, Cage says: "… It will produce harmonics when the proper key is played. Because of the nature of the material, however, the sound produced is dull, thud-like, rather than rich."

The strips of rubber are to be used as mutes. There are fifteen notes prepared by rubber, most of them being on the low range. The sound of the rubber on the string excludes pitch and is very percussive recalling the resonance of drums and woodblocks. As Cage did not indicate the type of rubber that he wants, I created several experiments to seek a rubber that sounds similar to the recording of Boris Berman and found the best results using mousepads.

The rubber strips inhibit the pitch of the note, further creating a shorter duration of the sound. I discovered that when the rubber is close to the hammer, the sound produced will be very percussive and practically without pitch. On the other hand, if the rubber is distant from the hammer, the sound will also be percussive, but a pitch will be audible.

Figure 13: Rubbers used for my preparation

The next material used was a single eraser. It should be placed on the bass over D and under C# and Eb. Together with the rubbers, this is used to mute sounds.

I suspect that he used a pencil eraser instead of rubber because the notes on the low range are very deep.

Figure 14: Rubber block used for my preparation

Figure 15: Rubber block between the strings

The last material used is plastic that was prepared with four notes. The sound of the plastic is closely related to that of the rubber strip, as they are both used as muted

sounds. The main dissimilarity from the sound of the rubber strip is that more vibration is produced from sounds of plastics.

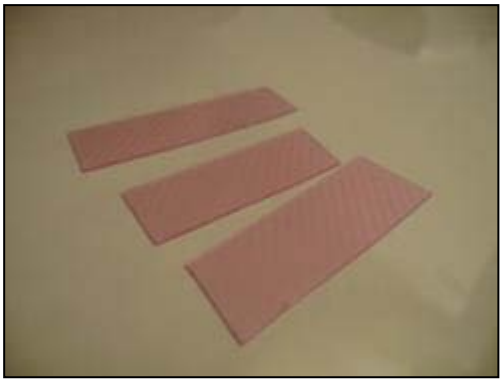


Figure 16: Plastics used for my preparation

Figure 17: Rubbers, plastics, bolts and screws between the strings

The piano used for the preparation was a Yamaha C3.

In addition to the materials, there are several markings of pedal and *una corda*. These are the signs:

Pedal: _____

Una corda: ----------

> The *una corda* pedal can be used to silence the unaltered string by shifting the hammers to the right, thus allowing for two different sounds to issue from the same note. All these factors combine to produce sounds that are complex, inharmonic, microtonal, and hence percussion-like (Pritchett 1993, 23).

Cage is particularly precise in regards to the distance that he wants the objects to be placed; therefore, the pianist should be aware. For instance, if the pianist places the object just an inch more than what Cage wrote on the table of preparation, a different sound from what was to be expected will be heard. Below the reader can see the details of the Table of Preparation of *Sonatas and Interludes*.

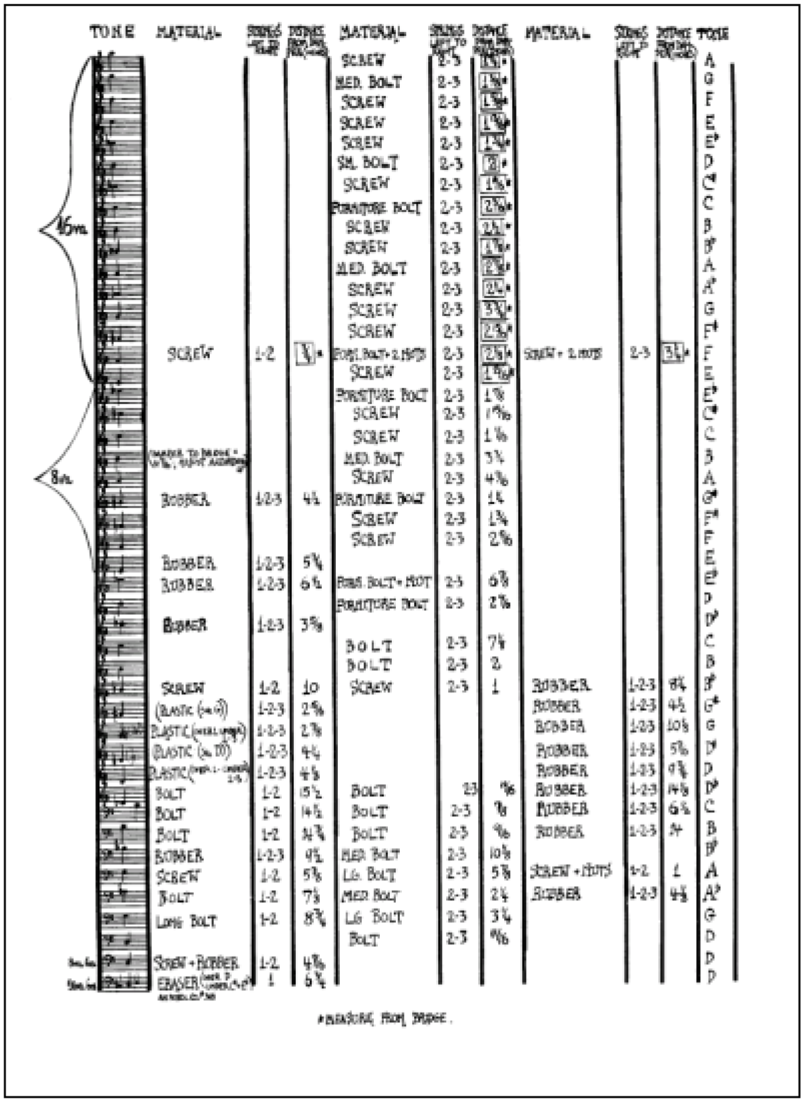


Figure 18: Table of Preparations for *Sonatas and Interludes*. (Cage, Published by Edition Peters).

With the invention of the prepared piano, Cage established himself as one of the leading experimental composers in the a*vant garde*. Numerous composers of the twentieth *century* have been influenced by Cage's prepared piano technique, particularly George Crumb.

Chapter VI: Color Table of Sonatas (I to VIII) and First Interlude

Based on the sounds of the materials needed to prepare the piano, I created a Color Table, to make a visual representation of the sounds of the prepared piano in the Sonatas I to VIII and the First Interlude.

I divided the sounds and the materials into five categories:

- blue = sounds of the bolts
- green = sounds of the screws
- purple = sounds of rubbers
- pink = sounds of plastics
- yellow = non-prepared notes *NPT

By analizying the score and the sound of the materials, I made a representation showing which material is more or less predominant in each of the pieces for the eight sonatas and for the First Interlude. I first constructed an association between the materials and afterward I formulated a connection through the colors based on the sounds.

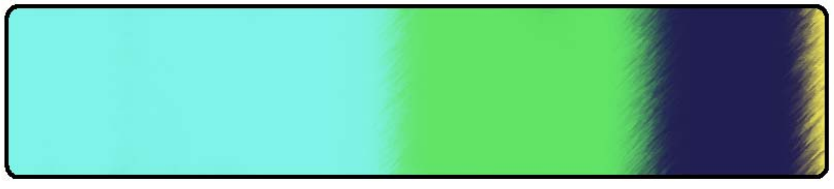
In this analysis, I made interesting detections. For instance, in Sonata IV and V, Cage does not use the sounds of screws. Many authors categorize the sounds of bolts and screws as approximately the same, yet if this statement is true, why does Cage not use screws in these two Sonatas? As I mentioned in the previous chapter, I could determine that the sounds of screws produce low harmonics and the sounds of bolts produce high harmonics. I conclude that Cage was aware of this.

It is possible to recognize that the predominant sound is the sound of the bolts. Also, I could detect that the muted sounds comprise almost the same standard in each and every one of the pieces analized.

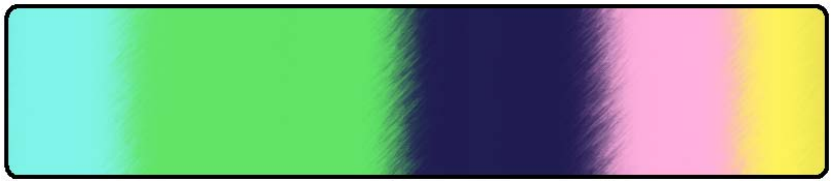
Color Table

Figure 19: Color Table

Sonata I

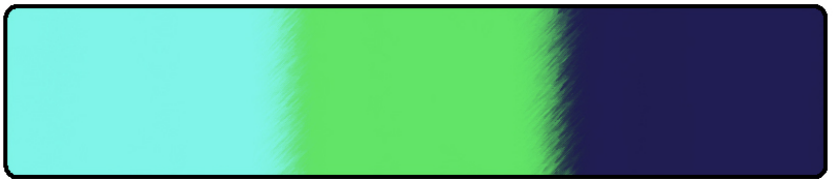


Sonata II

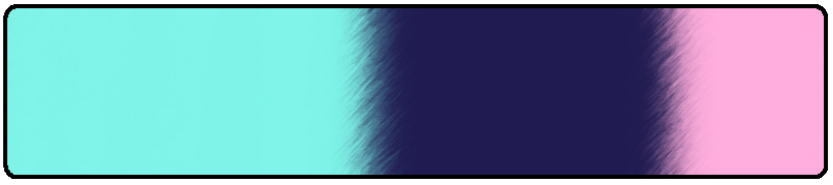


Sonata III

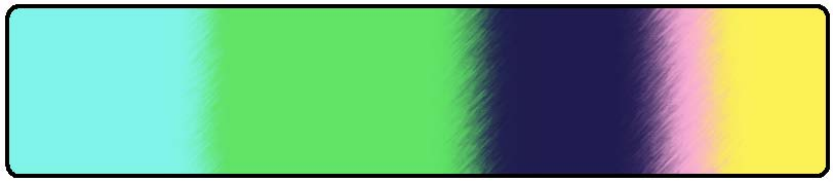
Sonata IV



First Interlude



Sonata V



Sonata VI

Sonata VII

Sonata VIII

Chapter VII: Recording of the *Sonatas and Interludes*

Since my Master's research involves a thesis, a live performance, and a recording project, I chose to only record Sonatas I, II, III, IV, V, VI, VII, VIII and the First Interlude. These are the only works I will perform on my recital, so that I can create room for other repertory. A performance of the entire set of *Sonatas and Interludes* requires a full hour, but I had to select only 20 minutes of music, because the Department of Music requires contrasting styles of works on a graduate performance recital.

For the recording I will choose, by means of chance, the order of the Sonatas and the First Interlude, as I will also do at the performance of my recital; each performance will be in a different order, ascertained by chance operations.

The project involved quite a few forms of recordings, as well as: AB Stereo Microphone Technique (inside the piano and far from the piano), Blumlein Pair, Jecklin Disk recording and captation in Surround Recording in 5.1 systems.

I could not achieve an ideal sound of these recordings, because it was not recorded in the studio as was recommended. Due to technical difficulties, the project was recorded at the University Theater.

Figure 20: Picture of the AB system on the lid of the piano

Listening to this recording, one can sense that the piece was recorded in a small room, so it is possible to hear the sound as if it were very close. In addition, the listener can hear all the details of these pieces. This recording worked splendidly for the prepared piano, since it is possible to detect all the distinctions between the preparations.

Figure 21: Picture of the AB system of recording

This is another recording in the AB technique, but with the different distance of placing the microphones far from the piano. This is the kind of recording from the audience's perspective. Unlike the other AB inside the piano, listeners can have a sense of a larger room. Furthermore, it is fairly difficult to listen to the contrasts of the dynamics.

Figure 22: Picture of the Blumlein Pair

The Blumleim Pair was placed as close as possible to the piano. As opposed to the AB technique, it is a recording from the pianist's perspective.

Another technique used was Surround 5.1. This recording has a different spatial hearing, since there is no intention to be realistic.

Figure 23: Picture of the System of 5.1 (front view)

Figure 24: Picture of the 5.1 (rear view)

The Surround 5.1 is only possible to hear using surround 5.1 equipment. Since it is difficult to find time when this equipment is available, I divided the 5.1 into two separate recordings, having both use Ortf pairs System.

The rear pair is the farthest microphone from the piano. Listening to this pair, one can feel that the room is very large and the sound is not well defined. Also, it is possible to hear background noise, making the contrasts of dynamics very difficult to identify.

Figure 25: The Jecklin Disk

The goal of using the Jeckin Disk was to achieve a recording as Cage himself possibly would have heard his own pieces from the vantage of the performer; one purpose of this recording project is to imitate the pianist's own hearing.

The Jecklin Disk is an attempt to closely imitate the Binaural System, since the disk is not as realistic as the binaural system, but it is very similar. The great advantage of the Disk is that it is a self-use item and it is inexpensive.

Simultaneously with the AB inside the piano, in this recording it is possible to hear all the contrasts of dynamics and the differentiation between sounds of the materials

prepared on the piano. For a more enhanced sound of this recording, one should listen with headphones.

Figure 26: General view of the recording's set

For the final mix, I tried to make altered combinations of the recordings. I could obtain excellent results with the AB inside the lid together with the rear pair of the 5.1. With the detailed sound of the AB inside the piano with a tad of the environmental of the room obtained from the rear pair I could have a very close, dry recording. I strongly believe that this combination helps the listener feel as if they are in a room and have a detailed perspective of the piece.

Furthermore, with the Jecklin Disc recording, I could obtain the results that I was searching for. I presume that the listener could hear as the way Cage heard when he was playing these pieces.

Below is a scheme showing each recording that I have completed. These techniques were recorded in unison.

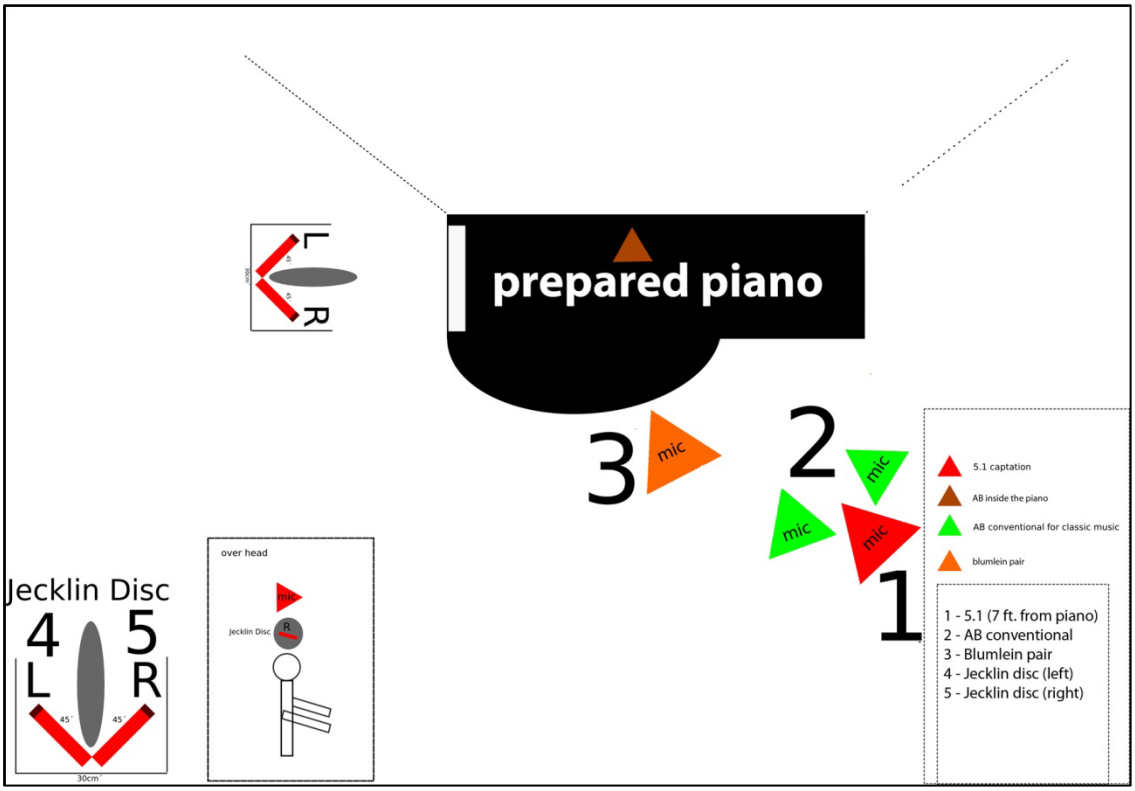


Figure 27: Scheme for recording

Chapter VIII: Continuation of the Influence of Asian Music and Thought in Cage's Later Prepared Piano Works

1951 was definitely a turning point in Cage's compositions. In the decade of 1940, *Grete Sultan*, one of the greatest pianists of the time was also one of Cage's mentors and performers. Grete was also the piano teacher of Christian Wolff, who was introduced to Cage. Wolff presented Cage to the Wilhelm translation of the Chinese *Book of Changes*, or *I Ching*. According to Cage:

> Christian Wolff arrived one day wanting to study composition with me… I didn't make him pay for his lessons. Well, his father was a publisher. To thank me, Christian brought me books published by his father. One day, the *I ching* was among them. On seeing the *I ching* table I was immediately struck by its resemblance to the magic square. It was even better! From that moment on, the *I Ching* has never left my side (For the Birds, p.43 or Dianova 145).

The *I Ching* is based on the interpretation of figures made of six solid or broken lines, which represent the basic principles of weak and strong, otherwise known as *yin* and *yang*. There are sixty-four such hexagrams, numbered one to sixty-four, and represent various situations in life. To consult the *I Ching*, one throws three coins in determining each individual line of a hexagram. These lines, whether strong (solid) or weak (broken), may be either stable or moving; moving lines are considered to be in the process of altering into their opposites. If the hexagram obtained contains any moving lines, a second hexagram is formed in addition to the first by changing all the moving lines into their opposites (Pritchett 1993, 70).

The *Concerto for Prepared Piano and Chamber* Orchestra (1950-1951), according to James Pritchett is a "bridge between Cage's traditional and chance-composed works". About this work Cage says:

> I made it (the concerto) into a drama between the piano, which remains romantic, expressive, and the orchestra, which itself follows the principles of oriental philosophy. And the third movement signifies the coming together of things which were opposed to one another in the first movement (Cage 1995, 41).

During this period, Cage was exploring a different style of composition, and he found it in his last movement of this Concerto. The use of gamut was transformed into the use of charts. In 1950, Cage wrote in a letter to Boulez about this composition comparing it to throwing sound into silence. Cage connected his musical world of sounds into the silence of the Zen concepts of "unimpededness and interpenetration" He explains this in one of his lectures:

> This unimpededness is seeing that in all of space each thing and each human being is at the center and furthermore that each one being at the center is the most honored one of all. Interpenetration means that each one of these most honored one of all is moving out in all directions penetrating and being penetrated by every other one no matter what the time or what the space… In fact each and every thing in all of time and space is related to each and every other thing in all of time and space (Cage, in Pritchett, date, 209).

For Cage, this doctrine of "unimpededness and interpenetration" relates to his compositional work. He states that the interpenetration is sound. The chart technique of the *Concerto for Prepared Piano* could be looked at as a musical translation of the doctrine of interpenetration. James Pritchett gives an example saying that:

> …When one hears a sound in the last movement of the concerto (say a combination of harp and percussion), one is hearing a unique, individual sound, isolated from all others in the piece by silence and the lack of a conscious continuity. At the same time, this sound is, with all the other sounds in the movement, a member of the same chart – the chart is thus a single entity that permeates the entire composition (Pritchett 1993, 75).

The preparation for this concerto is one of the most complex preparations in Cage's pieces. The objects that he uses for preparation are: eight screws, fourty bolts, four short strips of rubber, four rubber bolts, one US penny, two strips of soft plastic and a plastic bridge.

This concerto consists of three parts including the solo part in the first movement, in which opposition to the orchestra is composed freely. The orchestra part uses a fixed gamut of single tones, intervals and aggregates arranged in a chart (Kostelanetz 1993, 51). By other means, the orchestra is, in consequence, a prolongation of the prepared piano.

The third Movement of this concerto was the first piece that Cage used the method of charts for his compositions.

In *Music of Changes* (1951), Cage establishes indeterminacy in his compositions. Although this piece is not for prepared piano, it is an important work that should be discussed, since it is his first instrumental work that uses chance throughout.

The title *Music of Changes* is derived from the title occasionally given to the *I Ching*, the "Book of Changes". The process of composition involves applying decisions made using the *I Ching* to large charts of sounds, durations, dynamics, tempo and density.

With his new method of composition, Cage begins to use an untraditional notation, which can be seen in the example below.

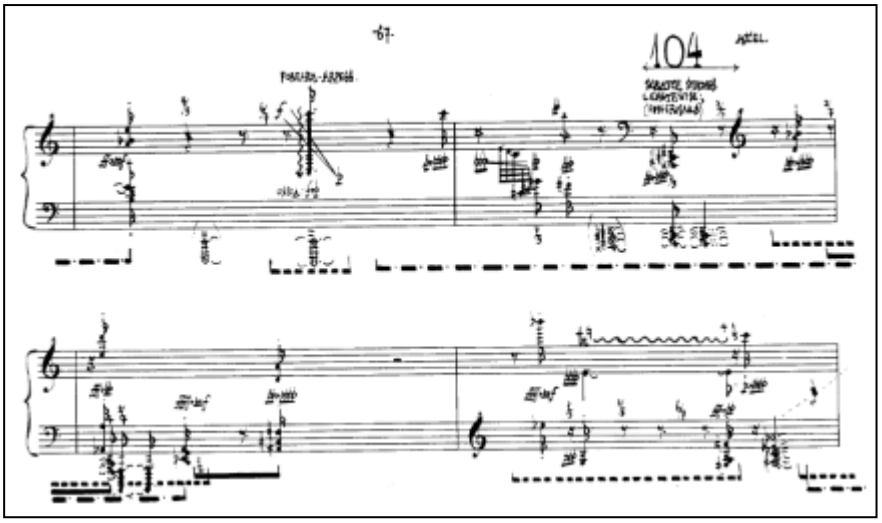


Figure 28: Cage's non-traditional notation in *Music of Changes.* (http://upload.wikimedia.org/wikipedia/en/1/1e/Music-of-changes-4-1.gif))

An early example of Cage's latest approach to notation can be seen in his compositions *Winter Music for Piano*s (1957), where he developed new indeterminate notations. These pieces consist of twenty pages to be played in whole, or part by one to twenty pianists. He reaches the climax of untraditional notation during the Solo Piano part of his *Concerto for Piano and Orchestra.*

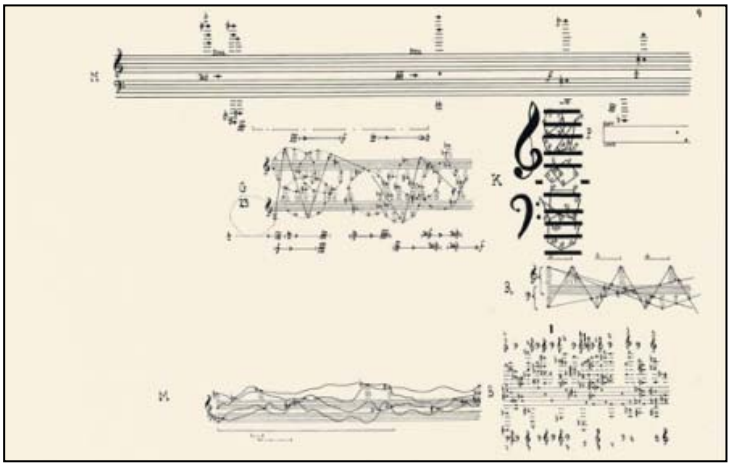


Figure 29: Cage's non-traditional notation in *Concert for Piano and Orchestra* (John Cage, 1957 http://krupnik1503.blogspot.com/2009/10/john-cage-macba.html)

After Cage used indeterminacy and chance procedures, he did not compose many new works for prepared piano. For these late prepared piano works he incorporated this new style of composition and he also used chance as a compositional procedure in each of the last pieces.

Two Pastorales (1952) was written for a dance and for prepared piano with two whistles. The next work, *Waiting* (1952) was also for a dance, and was written in space-time notation, which he started using after 1950s. Out of the piece's thirty-six bars, twenty-five are silent, since he enjoys employing silence as expressive means. He composed this piece half a year before *4'33''* (Dianova 2008, 152).

In 1953, he composed *The Ten Thousand Things;* this title was a reference to the meaning of the number ten thousand in Oriental philosophy, which stands for infinity and diversity of the universe (Dianova 2008, 155). Once again, he uses chance in order to choose the specific pitches and rhythms.

His last two prepared piano pieces composed in 1954 are *31'57.9864"* and *34'46.7764"*. He was asked to write these pieces by a new-music festival in Germany for David Tudor to play, but he did not denote the exact preparation objects.

These pieces were composed using chance operations and were written down in proportional graphic notation. The preparation only lists the notes that should be prepared and the types of objects to be used. The placement of the objects was left to the performer, but the interpreter had the free will to choose the objects. Both works may be performed solo or together.

Conclusion

One of the key purposes of this research was to study the main prepared piano works by John Cage, with a special focus on the *Sonatas and Interlude*. My main goal was to study and analyze the table of preparation for *Sonatas and Interludes* and its respective materials used for the preparation. While I was examining the table of preparation, I discovered some differentiations among the materials and the sounds. Furthermore, a scheme was built in order to have a precise definition between the uses of the materials and its personal sounds. The Sonatas analyzed were I through VIII and the First Interlude.

In order to write about this, I reviewed certain main points of his time giving an overview of Cage's life. It is impossible to write about Cage and not mention Zen, Chance, *4'33''*, electronic compositions, new notation, and other innovations, as they are all important factors in understanding his work and his thought.

Furthermore, I stated the brief history of the prepared piano. Cage created the prepared piano in the modern sense, experimenting with inserting various objects into its strings. Therefore, Cage wrote additional pieces to accompany dance groups such as: *Totem Ancestor* (1942), *Tossed as it is Untroubed* (1943), *Root of an Unfocus,* and *In the name of the Holocaust*. His Suite *Amores* (1943) was the first prepared piano piece that he composed as a concert piece. In 1944, Cage and Xenia divorced, and during these depressed moment he wrote *Perilous Night,* the first large work for prepared piano. This

is the moment when Cage questioned his pieces and tried to search for a new nature of composition and life. That is when Cage found this in Indian philosophy.

> The purpose of music is to sober and quiet the mind, thus making it susceptible to divine influences (Dianova, p.116-117). I also find in the writings of Ananda K. Coomaraswamy that the responsibility of the artist is to imitate nature in her manner of operation (Kostelanetz 1990, 239).

Cage was exposed to this new philosophy, and mainly took interest in the "permanent emotions" of Indian tradition: the heroic, the erotic, the wondrous, the mirthful, sorrow, fear, anger, the odious, and their common tendency toward tranquility. Based on these emotions, Cage wrote his masterwork for prepared piano, *Sonatas and Interludes.* His last prepared piano pieces are *31'57.9864"* and *34'46.7764,"* both composed and performed by chance processes. I discovered that the prepared piano is not a different type of traditional composition as is usually assumed, but a bridge into Cage's mature style. It is perhaps no accident that he took that step after three crises in his life: personal (his divorce from his wife Xenia and his coming out as a homosexual with partner Merce Cunningham), philosophical (his encounter with Asian thought, particularly Zen), and aesthetic (his unexpected discovery that the end result of prepared piano varied to the extent that pieces were unrecognizable as a specific composition).

The resulting sound of the *Sonatas and Interludes* was attained after a detailed study of the sizes of the materials. As it is unachievable to have the exact sound as Cage had when he composed this piece, so I tried to find the best sounds by experimenting and listening to several recordings. I believe the best sounding recording, and the one that I tried to imitate, was that of Boris Berman on Cherry Red Records. He is a Russian pianist who has played various contemporary works.

All the altered sounds for the preparation either reduce or eliminate the propriety of pitches produced by the piano. The materials inhibit the vibration of the strings and increase the perception of sound of the hammers that hit the strings. This creates an affected change in the mechanics of the piano.

Besides that, with the experimentation with the materials, I noticed that there are two types of sounds on the *Sonatas and Interludes:* first, the sounds of bolts, screws, and both with nuts; and second, the sounds of rubber, eraser and plastic. The first type of sound I would describle as a metallic buzz. On the whole, the sound of the bolts and screws in the string produces little alteration on the sound of the piches, but gives the sound a more percussive character. I obersed that there was a difference between these two objects. When the pianist plays a note with the preparation of a bolt, the buzzy sound will produce a low harmonic. On the other hand, the sound of the screw will produce a high harmonic. The second type of sound are the muted sounds formed by strips of rubbers, eraser and plastics. The sound is very percussive and many times lacks an identifiable pitch. I noticed that when the hammers pluck the string with these materials, the sound will have a very short duration. I discovered that when the rubber was used close to the hammer it produced a percussive sound, almost without pitch. And, if the rubber is far away from the hammer, the sound will be percussive, but it will be quite possible to hear a pitch.

Finally, the last part of this research was concerned with the recording of *Sonatas and Interludes.* I must point out that this part of the project involved several of the students and faculty. First, I had to request a piano just for me, in order to do the preparations. Second, the piano requested had to stay at the University Theatre, therefore

making it difficult for me to find available time to practice, since the schedule of the theater is busy and students need to have a faculty present in order to practice there. Lastly, because the recording involved various kinds of listening, I had to depend on the contributions and support of members of the Commercial Music Program. With their help, I could have a proper set up. The AB technique and Blumlein Pair were realized to provide an example of a conventional recording. With the use of the 5.1 technique, I could have a different spatial and, interestingly, unrealistic hearing—just the opposite of what one would have expected with that technology. Perhaps this was because I was seeking to recreate the sound experienced by the performer, rather than that experienced by the audience.

The Jecklin disk, which is a mechanism that helps to record the most natural-sounding stereo, was used to make a realistic projection, imitating the pianist's own perception. There are only a few recordings available using this device, particularly when dealing with classical music. Finally, with all these recording experiences established, I could have a better understanding of Cage's preparation, as also sense how he listened to these pieces when he performed them.

I hope that through this research, recording and recital, people could discern more about John Cage and the prepared piano. Also, I hope that this encourages musicians to realize that the prepared piano can be used as an accessible instrument. I expect that with the recording and the presentation of these pieces, musicians could enjoy and recreate the sounds of the piano and take pleasure in playing prepared piano pieces.

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