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"Einstein on the Beach" by Philip Glass: A musical analysis

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EINSTEIN ON THE BEACH BY PHILIP GLASS:

A MUSICAL ANALYSIS

by

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Abstract

EINSTEIN ON THE BEACH BY PHILIP GLASS:

A MUSICAL ANALYSIS

by

Milos Raickovich

Advisor: Professor John Graziano

This analysis deals with the pitch content of the opera Einstein on the Beach by Philip Glass. Chapter 1 provides an introduction to Minimal Music. Compositional techniques from the 1960s and 70s by composers La Monte Young, Terry Riley, Steve Reich and Philip Glass are discussed. Chapter 2 describes Einstein on the Beach on the macro-form level. Dramatic and visual aspects are compared with the musical themes of the opera. In Chapter 3, the thematic unity of the entire work is defined by the melodic contours of the "Core Motive," present in virtually all sections of the opera. Chapter 4 deals with the ambiguities of Glass's harmonic language. The use of the pentatonic modes within the functional-harmonic context and the blend between the functional harmonies and non-chordal sonorities are discussed. Chapter 5 presents some conclusions about the original aspects of the pitch content of Einstein on the Beach.

Acknowledgements

I would like to thank several people for helping me in my work on this analysis. First of all, I would like to thank my wife, Miwako, for supporting me and giving me the energy (and a couple of deadlines) to complete this analysis. I am especially grateful to my adviser, Professor John Graziano, who was extremely helpful in supporting me and guiding me to accomplish this undertaking in a professional and efficient manner. I also thank Professor Joseph Straus for his suggestions on how to improve my analytic techniques, and Professor Carol Oja for improving and clarifying my statements and the composition of the text. Members of the Dissertation Committee, Professors David Del Tredici and Philip Lambert have also been very helpful as well as receptive to my ideas. I want to thank the Chairperson of the Committee, Professor Barbara Hanning, for her suggestions and the commitment to finalize the shape of this analysis before the deposition of the dissertation. I also gratefully acknowledge my friends and colleagues, Leslie Lassetter and Zdravko Blažeković, for their help and support. Finally, I thank Maestro Philip Glass and Dunvagen Music Publishers for their support and permission to use the excerpts from Mr. Glass's scores.

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Einstein on the Beach by Philip Glass: A Musical Analysis

Chapter 1

INTRODUCTION

Einstein on the Beach, an opera conceived by composer Philip Glass and director Robert Wilson, is among the few works of contemporary music theater that have been able to reach a wide audience. To this day, almost twenty years after its world premiere in 1976, the work has retained its popularity and continues to be produced throughout Europe, the United States and Asia.[1]

Since the premiere, performances of Einstein have been extensively covered by the press. Much has been said (and repeated) about the minimalist features, obvious to many listeners of this music. Paradoxically, Einstein has seldom been an object of musical analysis. In this respect, Einstein is not an exception among the wide repertory of minimalist works, which have often been ignored by mainstream music theorists. This can be explained by the simple fact that the radically new techniques and aesthetics of minimalist music

[1] Commissioned by the French government, Einstein was premiered at the Avignon Festival in 1976. During the same year, the premiere was followed by a European tour (Venice, Belgrade, Brussels, Paris, Hamburg, Rotterdam, and Amsterdam) and two performances at the Metropolitan Opera House in New York. Since then, Einstein has been performed at the Brooklyn Academy of Music in 1984, and in the Stuttgart State Opera production of the Glass's operatic trilogy (Einstein, Satyagraha, and Akhnaten) in 1989. The second revival at the Brooklyn Academy of Music in 1992 was followed by a world tour that included the United States, Europe, and Asia.

require equally new theoretical approaches as well.

The only analytical work on Einstein available today can be found in descriptions of the piece by Leslie Lassetter, Daniel Warburton, and Mr. Glass himself.[2] Although these works are helpful in understanding the opera and its musical structure, their analytical dimension is mainly limited to a general description of the piece.[3] The present analysis will attempt to go beyond such descriptive approaches, and to offer an analytic and critical look at the music of Einstein. Before embarking on such an undertaking, it will be helpful to look at Glass's compositional style in the context of so-called "minimal music," as well as to show the importance of Einstein within Glass's oeuvre.

Used first by the English composer and writer Michael Nyman, the term minimal music (or its American derivation, minimalist music) describes a style most commonly associated with the composers La Monte Young (b. 1935), Terry Riley (b.

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[2] Following are the main works that incorporate descriptions and, to some extent, analyses of Einstein: Philip Glass, Notes on "Einstein on the Beach," (Tomato records 4-2901, 1979) [liner notes]; Philip Glass, Music by Philip Glass, New York, Harper & Row, 1987; Daniel Warburton, "Philip Glass's Einstein on the Beach and Its Influence on the Subsequent Development of Minimal Music," M.M. thesis, Gonville & Caius College, 1984; Leslie Lassetter, "The Operatic Trilogy of Philip Glass: Einstein on the Beach, Satyagraha, and Akhnaten," M.M. thesis, University of Cincinnati, 1985.

[3] The main focus of all three authors is not on analysis, and their musical descriptions of Einstein function in the context of broader considerations.

1935), Steve Reich (b. 1936) and Philip Glass (b. 1937):

> This music not only cuts down the area of the sound-activity to an absolute (absolutist) minimum, but submits the scrupulously selective, mainly tonal, material to mostly repetitive, highly disciplined procedures which are focused with an extremely fine definition (though the listener's focus is not done for him).[4]

The term minimal music is still most commonly used to represent a style that was initiated in the 1960s by the four American composers mentioned above, yet is general enough to include a variety of compositional techniques, applied by numerous composers since the 1960s. It is also more suitable than alternative terms, such as trance music, repetitive music and pulse music.[5]

In 1960s and 70s, music by Riley, Reich and Glass was based on the use of constant pulse, multiple repetitions and patterns. In this respect, La Monte Young stands apart from the others, since his main focus is not on pulse, repetition, or patterns, but rather on very long single tones or intervals, as well as on the listener's perception of their harmonic overtones (e.g., The Tortoise, His Dreams and

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[4] Michael Nyman, Experimental Music: Cage and Beyond (New York: Schirmer Books, 1974), 179.

[5] The main flaw of most alternative terms is that they are often focused on only one aspect of the music which they are trying to define. For example, "repetitive music" (used often in France, as musique repetative) would disqualify any (minimal) music without multiple repeats. A number of composers, qualified often as "minimalist," would likewise hardly fit any of the alternative terms (Meredith Monk, Frederic Rzewski, Brian Eno, Michael Nyman, Arvo Part, John Tavener, etc.).

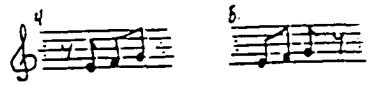
Journeys, intended for continuous performance over several days).

Of the three, Riley was the least interested in creating a musical language that relied on a systematic application of a single technical device. He was more interested in using a variety of techniques, often combining them and shifting from one to the other in a way that was non-systematic, unpredictable, and sometimes improvisatory. This can be seen in his well-known composition In C (1964), where several related, as well as unrelated, patterns were used in a number of disconnected and uncompleted musical processes. Example 1.01, from Riley's In C, shows a compositional device that is often found in the music by Steve Reich.[6]

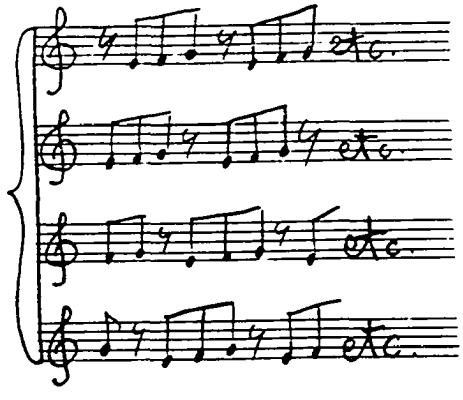
[6] Reich's compositional principles are described in detail in his book Writings about Music (Vienna: Universal Edition, 1974).

Example 1.01: Terry Riley, In C, pattern nos. 4 and 5 (played simultaneously, by several performers).

a) as written in Riley's score:

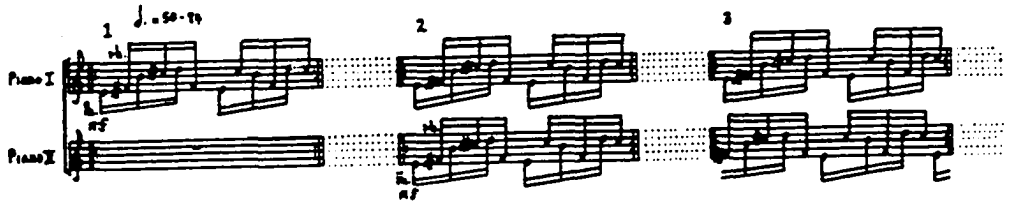


b) as realized in the performance:



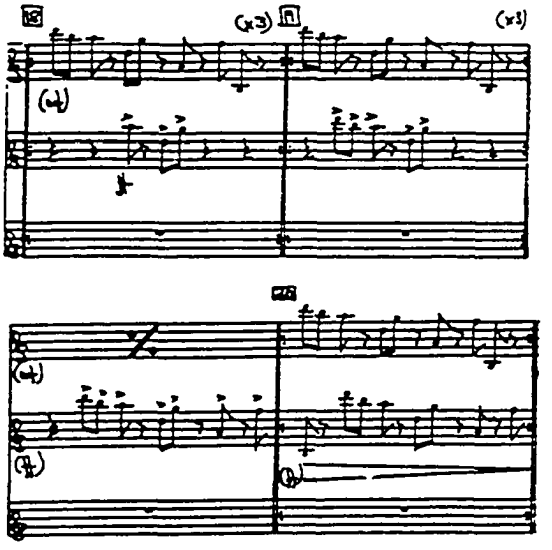
This device, of using the identical patterns with a delay, was used by Riley in his In C only as an isolated musical event. In pieces by Reich, this device has been used systematically, and further developed into an elaborate technique, called phasing. Phasing can be found in Reich's earliest minimal pieces, like It's Gonna Rain (1965). It is the process of superimposing two identical melodic and rhythmic patterns, and gradually shifting one of the patterns out of phase with the other. This process of gradual shifting can be achieved by applying a slightly faster tempo in one of the two voices (Example 1.02).

Example 1.02: Steve Reich, Piano Phase (1967), patterns 1-3.



Another of Reich's techniques involves a gradual process of adding (or subtracting) notes of a repetitive pattern over a steady, unchanged meter. Daniel Warburton calls this technique block additive process (Example 1.03).[7]

Example 1.03: Steve Reich, Sextet, first movement, reh. nos. 18-20.

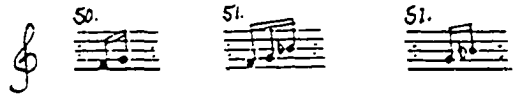


[7] Daniel Warburton, "A Working Terminology for Minimal Music," Intégral 2 (1988), 135-158.

In addition to block additive process, the above example also illustrates the previously discussed device of using identical patterns with a delay (a device that has been applied by both Reich and Riley).

A technique that plays a central role in the compositions by Philip Glass can also be recognized in Riley's In C (Example 1.04).

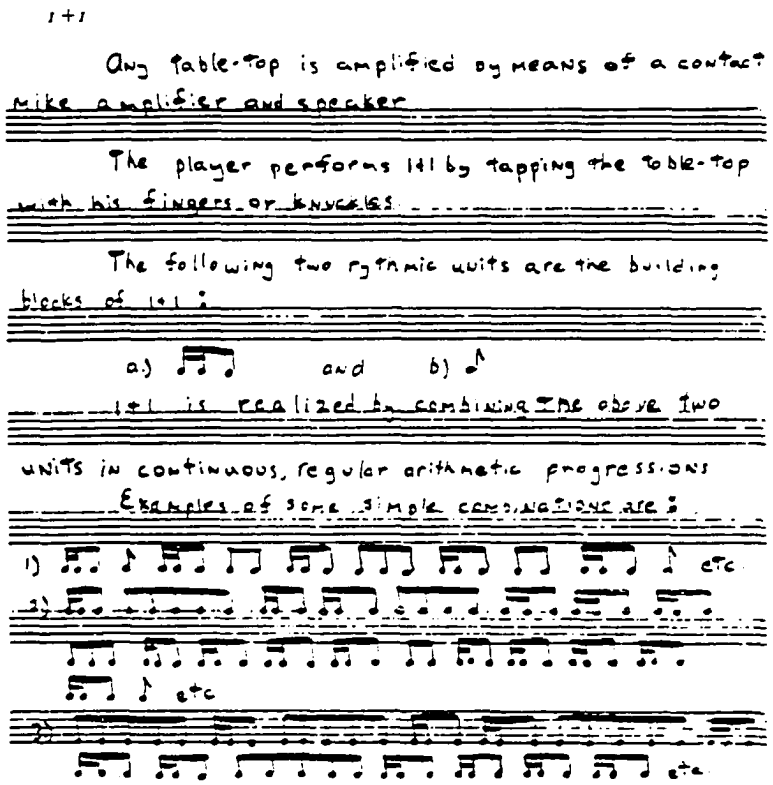
Example 1.04: Terry Riley, In C, patterns nos. 50-52.



This technique, much more elaborately explored in his own music, is called an additive process by Glass.[8] As it will become clear during this analysis, the additive process is an essential device in Glass's music. This is already evident in one of the early minimal pieces, One Plus One (Example 1.05), composed in 1968:

[8] Warburton calls it linear additive process.

Example 1.05: Philip Glass, One Plus One, the entire score.



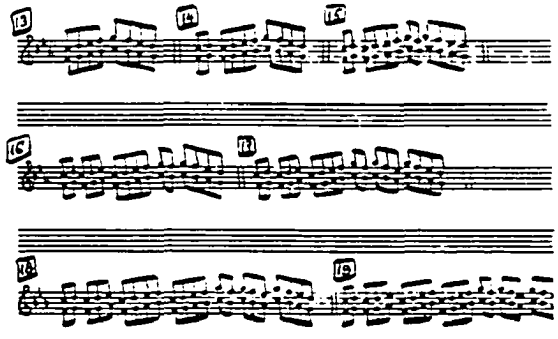
The only formal principle on which the music of One Plus One is based is the additive process. This technique is often present in compositions by Glass. Glass's own description and example of this technique follows:

> Additive process is one of those very simple ideas that can quickly lead to very complicated procedures. It can easily be explained: A musical grouping or measure of, say, five notes is repeated several times, then is followed by a measure of six notes (also repeated), then seven, then eight, and so on. A simple figure can expand and then contract in many different ways, maintaining the same general melodic configuration but, because of addition (or subtraction) of one note, it takes on a very different rhythmical

shape. Example A, taken from the first Trial scene of Einstein, shows this process as played in the violin part.[9]

In Glass's early minimalist pieces, the texture is often monophonic (unison or octave doublings), or in two parts (voices) that are in rhythmic unison, either in parallel fifths (Example 1.06), or in similar or contrary motion.

Example 1.06: Philip Glass, Music in Fifths, patterns 13-19.



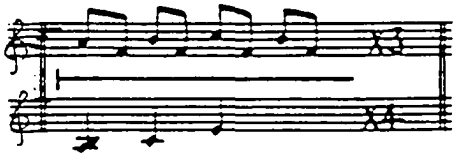
Such simple textures, in combination with the use of a limited number of pitches within pentatonic or modal scales, provide the basic material for the procedures involving complex additive processes. Thus, the simplicity and austerity of the textures and tonal materials are balanced with the complexities of the additive arithmetical procedures. The additive process does not affect only the melodic

[9] Philip Glass, Music by Philip Glass (New York: Harper & Row, 1987), 58.

patterns, but it constantly alters the rhythmic patterns and meter of the music as well.

Another technique, especially explored in Glass's monumental composition Music in Twelve Parts (1971-74), is the repetition of superimposed rhythmic figures of different length. Glass calls this technique cyclic structure, and gives the following description and example:

> I have used rhythmic cycles (repeating fixed rhythmic patterns of specific lengths) to create extended structures in my music by superimposing two different rhythmic patterns of different lengths. Depending on the length of each pattern, they will eventually arrive together back at their starting points, making one complete cycle. This has been described by some writers as sounding like "wheels inside wheels," a rather fanciful but not wholly inaccurate way of evoking the resulting effect. The opening of the first Train scene from Einstein is a good example of this (Example B). In this case, three repeats of the upper part (indicated by "X3") are equal in length to four repeats of the lower part (indicated by "X4").[10]



A third technique, used by Glass for the first time in Another Look at Harmony (1975), is a combination of the additive process with harmonic progressions. Each repetitive cycle of the additive process corresponds to one repetition (cycle) of the harmonic progression (Example 1.07).

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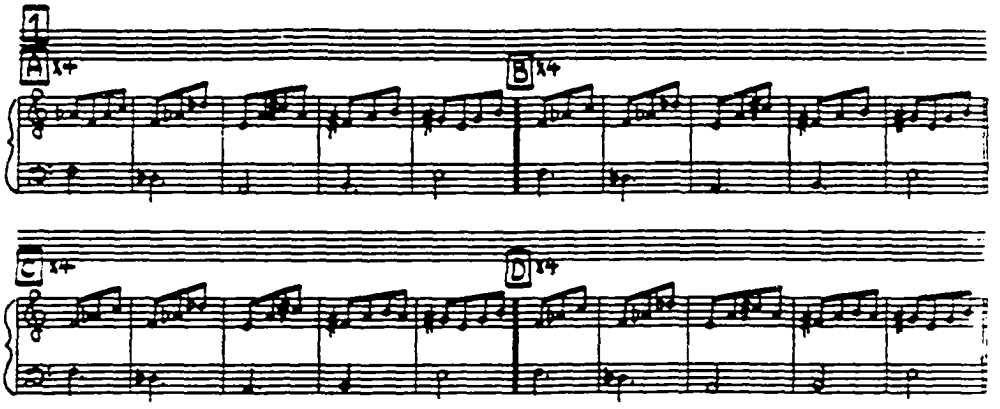
[10] Glass, Music, 59.

Example 1.07: Philip Glass, Einstein, "Spaceship," beginning.



With this technique, the additive process becomes "harmonized," and therefore, easier to follow, since the beginning of each additive cycle coincides with the beginning (first chord) of the harmonic progression. I will refer to this technique as harmonic cycles.

These three techniques--additive process, cyclic structure and harmonic cycles--are the main compositional techniques used in Einstein.

One can conclude from this brief comparison of the four composers that each composer's techniques are different. Accordingly, different analytical devices should be applied when dealing with each composer's music. The few existing analyses of minimal music have shown this idea to be right, since no systematic analytical mechanism has been offered yet

for dealing with minimal music as a whole.[11] Even a basic terminology on minimal music has not yet been successfully established. In "A Working Terminology on Minimal Music," Daniel Warburton recognizes this lack of coordination among writers on minimal music, and offers a few terms (i.e., phasing, block additive process and linear additive process).[12] His term, linear additive process, is derived from Glass's own term, "additive process." Warburton is using the prefix linear to distinguish it from the block additive process, a term which he uses for the previously described process by Steve Reich. Since Glass does not use the block additive process in his music (Einstein included), in the following analysis, his own term, linear process, will be used instead of Warburton's corresponding term, linear additive process.

This analysis deals with some of the musical aspects of Einstein on the Beach, with the main focus being on the pitch content of the work. In the following chapters, an attempt is made to show the original features and the significance of Einstein's pitch content. The rhythmical aspects of the work (Glass's additive process and cyclic structure techniques) will be discussed only within the context of the pitch structure. Such focus is due not only to the limited scope of

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[11] These analyses are included in the Selected Bibliography.

[12] Warburton, "A Working Terminology for Minimal Music."

this analysis, but, more importantly, to the fact that the pitch content of Einstein is an original, complex and well organized feature of this work.

Chapter 2

DESCRIPTION OF EINSTEIN AND ITS MUSICAL THEMES

In this chapter, the music of Einstein on the Beach will be described only in general terms. Before analyzing this work, such description is needed as a point of departure from which the subsequent chapters, based on particular musical aspects of the work, will evolve.

The multiple musical aspects of Einstein are closely related. Contrary to many compositions in the Western tradition and their corresponding analytical practices, where the hierarchy of the musical aspects (elements) usually starts with pitch, harmony, and melody at the top and ends with meter and rhythm at the bottom, Einstein (as well as a number of other minimal-music works) is a piece where aspects such as pitch, melody, harmony, meter, rhythm, structure, texture and form are closely related and of relatively equal importance within the musical language. According to Warburton:

> Just as minimalism has eroded the relationship between form and content, this work (Einstein) has effected the neutralization of musical values such as melody, harmony and accompaniment, by reducing them all to aspects of a single macro-process.[1]

In order to start the analytic process and to make some musical aspects of Einstein more familiar, the present chapter will describe the work only in general terms, while

[1] Daniel Warburton, "Philip Glass's Einstein," 16.

considering all of its musical aspects as equally as possible.

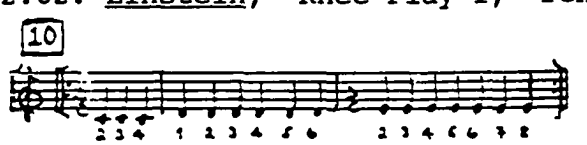
The work was jointly conceived by the performance artist and director Robert Wilson and the composer Philip Glass. After preliminary considerations of a subject, the authors decided to create an opera about the scientist Albert Einstein. The work has no plot in a traditional sense. Its four acts and nine scenes do not depict any specific event from Einstein's life. It consists of static scenes with action that progresses very gradually. Each scene can only loosely be associated with Einstein and his theories.

One of the most unusual features of Einstein is its libretto, which consists only of the solmization syllables (Do, Re, Mi, Fa, Sol, La, Si) and the numbers (1, 2, 3...). The solmization and numbers always reflect the musical structure of the voice part. Sometimes, the text describes the melody (Example 2.01).

Example 2.01: Einstein, "Dance 2," soprano solo, beginning.

At other times, the text reflects the rhythmic or metric structure of the music (Example 2.02).

Example 2.02: Einstein, "Knee Play 1," reh. no. 10.



In addition to the sung text, there is considerable use of spoken text, always accompanied with music. The spoken texts were written by Christopher Knowles, Samuel M. Johnson and Lucinda Childs. The spoken text reflects (although not as directly as the sung text) the repetitive and minimalist structure of the music and the action on the stage.

In addition to music and text, the opera uses dance, projections, and very elaborate lighting sets.[2] It is performed in a traditional opera-house setting, with use of an orchestra pit, where the instrumental ensemble and choir are situated.

The vocal forces include two soloists (soprano and tenor) and a four-part mixed choir of twelve (or, in recent performances, sixteen) members. The soloists and chorus sing the solmization and numbers only. The spoken texts are performed by four actors.

The instrumental ensemble consists of a solo violin and the standard instrumentation of the Philip Glass Ensemble, which includes two electric (or, as in recent productions, electronic) organs and three wind players, who alternate among the following instruments: a piccolo, three flutes, three saxophones (soprano, alto, and tenor) and a bass clarinet. All the instruments, as well as the vocal parts, are

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[2] For more information on the theatrical dimension of Einstein, see Lassetter's thesis "The Operatic Trilogy of Philip Glass," or Glass's Music by Philip Glass, cited earlier.

amplified. The solo violin part has special dramatic importance, since the violinist represents Einstein himself (he is dressed and looks like Einstein in his later years) and takes part in the opera on the stage, just above the pit.

Einstein is approximately four-and-half hours long, to be performed without intermissions, although the public is free to exit and re-enter at any moment of the performance. The work is divided into a "Prologue," five "Knee Plays" and four acts, that are further divided into nine scenes. The "Prologue" and each of the four acts are followed by a "Knee Play," which bears such a name due to its function as a "joint" between the acts.

The formal division of the opera is represented in Figure 2.01.

Figure 2.01. The formal division of Einstein.

"Prologue"

"Knee Play 1"

Act One:

Scene 1: "Train"	(A1)
Scene 2: "Trial"	(B1)

"Knee Play 2"

Act Two:

Scene 1: "Dance 1"	(C1)
Scene 2: "Night Train"	(A2)

"Knee Play 3"

Act Three:

Scene 1: "Trial/Prison"	(B2)
Scene 2: "Dance 2"	(C2)

"Knee Play 4"

Act Four:

Scene 1: "Building/Train"	(A3)
Scene 2: "Bed"	(B3)
Scene 3: "Spaceship"	(C3)

"Knee Play 5"

The musical material of Einstein is closely related to its theatrical/visual materials. The main materials from the first three scenes are repeated and transformed throughout the opera. The first scene, "Train," reappears transformed as

"Night Train," and later again, as "Building/Train." The second, "Trial," reappears transformed as "Trial/Prison," and "Bed." The third scene, "Dance 1," reappears transformed into "Dance 2" and "Spaceship." The order of the first three scenes ("Train," "Trial," "Dance 1") has been kept in the appearances of the subsequent related scenes. Thus, the "second cycle" of three scenes has the same thematic order: "Night Train," followed by the "Trial/Prison" and "Dance 2." The third cycle follows the same order as well: "Building/Train," "Bed," and "Spaceship."[3]

If the first three scenes can be symbolically represented by A1, B1 and C1 (letters represent the distinct materials of the related scenes, while the numbers represent the cycles of appearance), the order of the nine scenes can be represented as: A1, B1, C1; A2, B2, C2; A3, B3, C3 (see the figure above).

"Knee Plays" play a significant role in Einstein. They function as musical transitions between the acts and facilitate the change of the scenery (since the curtain is always down during them). "Knee Plays" are not based on a single body of musical material. As further discussion will

[3] Although the visual and theatrical materials of the "Spaceship" are related to "Dance 1" and "Dance 2," its musical materials are derived from the "Train" and "Trial" scenes. In this respect, "Spaceship" is an exception among the nine scenes of Einstein, since its music does not correspond to the previously established relationship between the theatrical/visual and musical materials. This inconsistency, however, does not disturb the already established rhythm among the scenes, but rather helps the closing of the work, since "Spaceship" is the last scene of the opera.

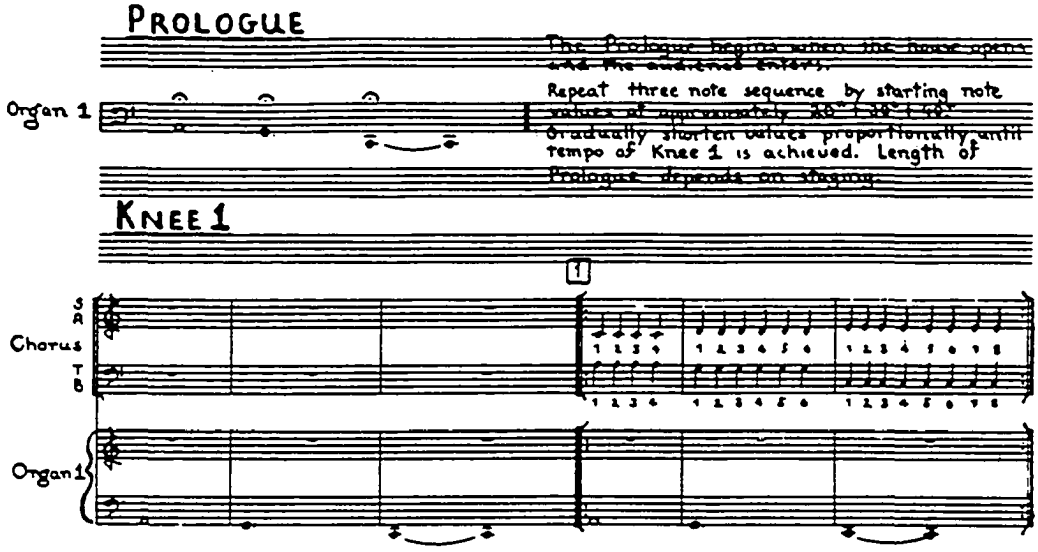
show, the musical materials of "Knee Plays" are related to some of the scenes of the opera.

The use of musical materials in the opera reflects the dramatic divisions of the work into the scenes and Knee Plays. For the purpose of easier identification, these musical materials will be called "themes." There are several themes upon which entire sections of Einstein are built. Following is a brief description of the main dramatic content and the corresponding musical themes.

Einstein starts with a "Prologue" that consists of a static scene, with the curtain down, in which two actresses sit by a table and simulate typewriting movements with their fingers. The "Prologue" starts before the public enters the theater, and ends about the time when all of the audience is in their seats. It consists of a single melody of three notes, played in the low register of the organ (A-G-C). This melodic figure is played in an extremely slow tempo, and it is gradually accelerated, until it reaches the tempo of the "Knee Play 1," which starts attacca. "Knee Play 1" represents an extension of the opening "Prologue," since the curtain is still down, and the three-note bass figure is kept throughout. During "Knee Play 1," the chorus, standing in the pit, sings the numbers and the solfege syllables, while the two actresses recite random numbers.

The first musical theme of Einstein is exposed in the "Prologue" and "Knee Play 1" (Example 2.03).

Example 2.03: Einstein, "Prologue" and "Knee Play 1," mm. 1-6.



For the purposes of further identification of the thematic material, this theme will be called Theme in C, due to its tonal center in C.[4]

The compositional manipulation of a single theme at one time is a characteristic of Einstein, as well as of other, earlier works by Glass. Therefore, one can associate the term theme with whole sections of the opera, since they are built exclusively on repetitions and minimal transformations of single thematic materials.

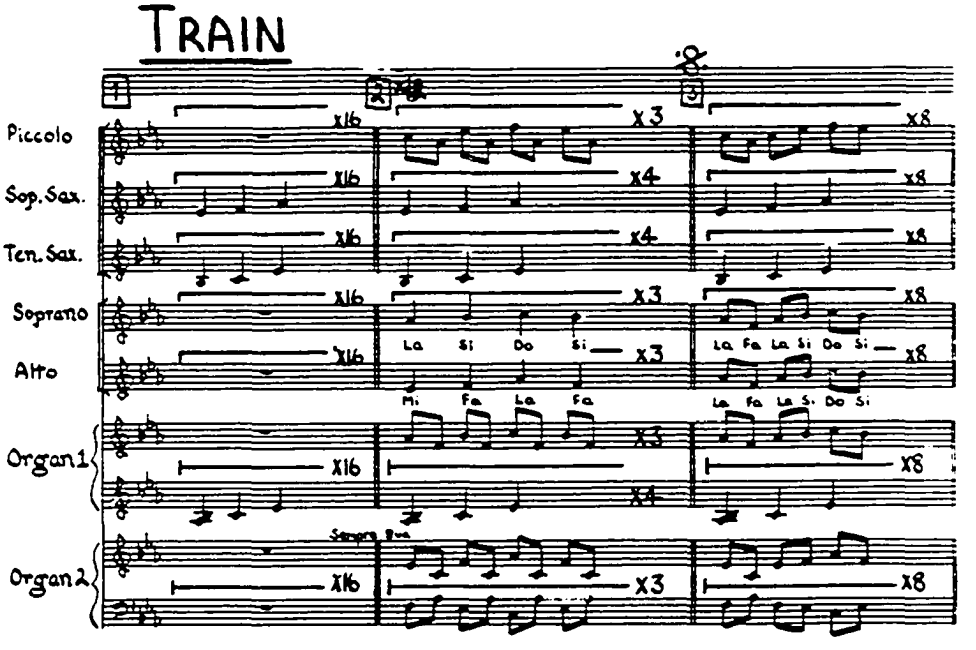
The first scene, "Train," relates to Einstein's interest

[4] Although this theme is harmonized as a C-Major entity (C Major: VI, V, I), at the same time, it is built on a pentatonic scale derived from the notes of the C-Major scale. Therefore, using the name of the (seven-pitch) C-Major scale ("Theme in C Major") would not be an accurate description of this pitch material. For further discussion on the harmonic language of Einstein, see Chapter 4.

in trains, and the single major object of the scenery is a full-sized replica of a train. The music is divided into six sections, with a form of: a1, b1, a2, b2, c1, a3, b3, c2. Sections marked with the same letter can be described as distinct musical themes.

Sections a1, a2 and a3 use the additive process and cyclic structures. They are based on the material exposed in the opening of the scene (Example 2.04).

Example 2.04: Einstein, "Train," the beginning.

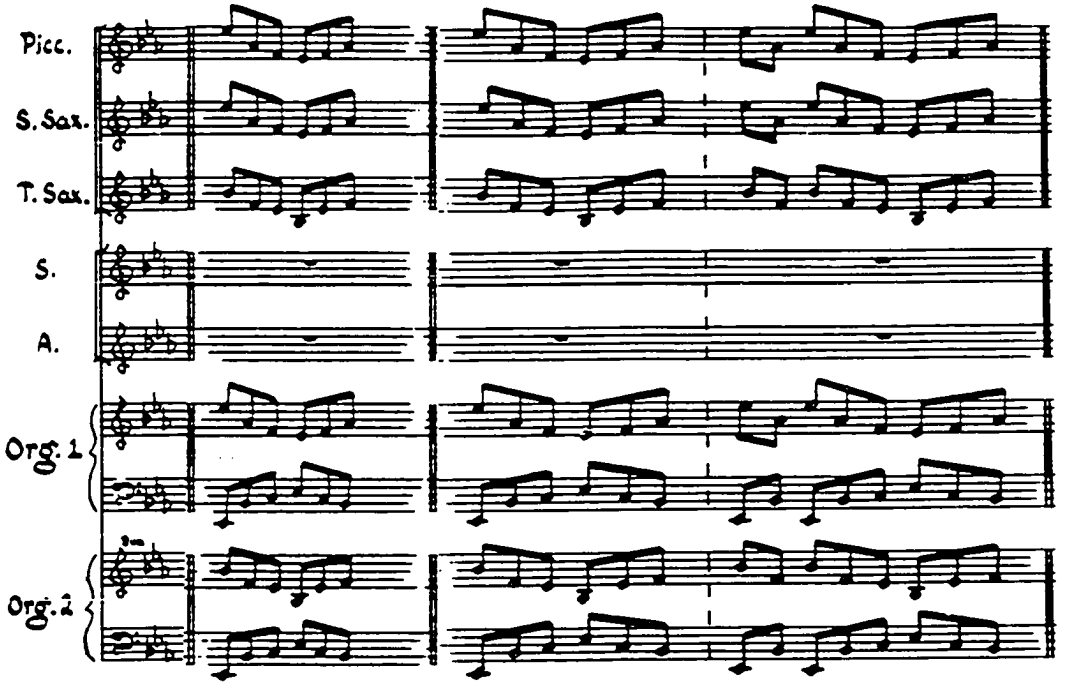


This material is labelled Theme in A flat, due to its tonal center.[5]

[5] Like Theme in C, Theme in A flat is also based on a pentatonic scale (A flat, B flat, C, E flat, F). The only extension of this scale appears in reh. nos. 6 and 7, where a sixth note, G, is introduced.

Sections b1, b2 and b3 are built exclusively by the use of additive process, and they are distinct in their fast-pulsating rhythmic character (Example 2.05).

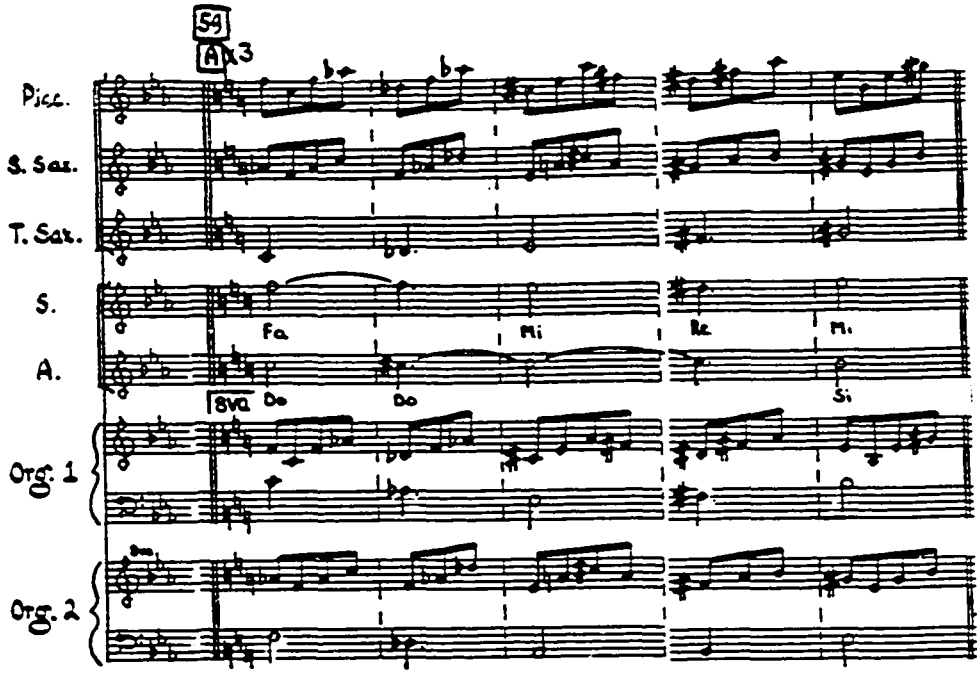
Example 2.05: Glass, Einstein, "Train," reh. nos. 19-20.



This theme is labeled Theme in E flat.

Sections c1 and c2 are built on Glass's technique, described earlier, of harmonic cycles. This technique is combined with the use of additive process. The theme of sections c1 and c2 is based on a five-chord progression (Example 2.06).

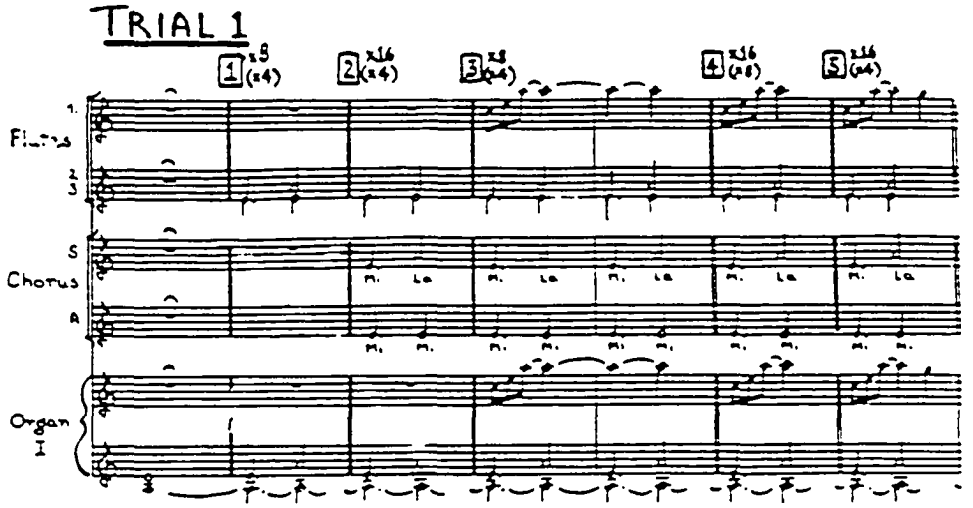
Example 2.06: Einstein, "Train," reh. no. 59A



This theme consists of a five-chord progression from F Minor to E Major, and it is labelled Theme in f-E.

The short "Introduction to Trial" gives time for the stage preparations and sets a new (slower) mood by introducing an accompanying figure, used in the opening of "Trial." "Trial" is a scene based on an abstract trial that takes place in a traditional courtroom, with two judges, acted by an elderly man and a boy. The music is divided in two distinct sections, a and b. Section a (Example 2.07) is based on the additive process:

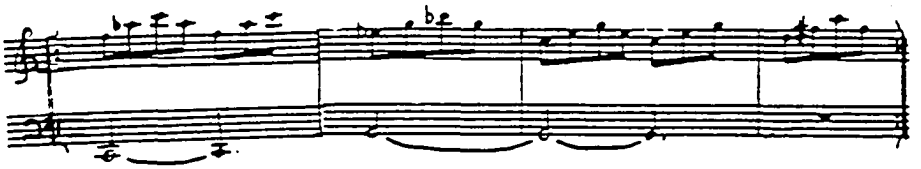
Example 2.07: Einstein, "Trial," beginning.



This section is based on a single harmony, A-Minor 7, hereafter Theme in a.

Section b is based on techniques of the harmonic cycles and additive process. The following chord progression (F-Minor 6/4, E-Flat Major 6, C-Major 6/4, D Major) is used (Example 2.08).

Example 2.08: Glass, Einstein, "Trial 1," reh. no. 53.



This will be referred to as the Theme in f-D.

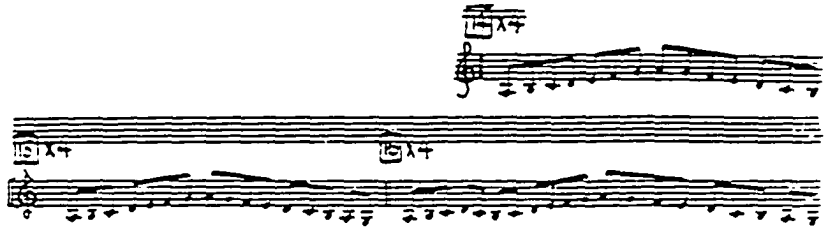
"Knee 2" is a violin solo, complemented with a text that

is read at a very fast speed, simultaneously by two actresses. Its formal structure is: a1, b1, a2, b2. Sections a1 and a2 are based on arpeggiated chords of the harmonic progression taken from the previously described Theme in f-E (Example 2.09).

Example 2.09: Glass, Einstein, "Knee Play 2," reh. no. 3.

Sections b1 and b2 (as well as the short introduction in reh. nos. 1 and 2) are based on Theme in a (Example 2.10).

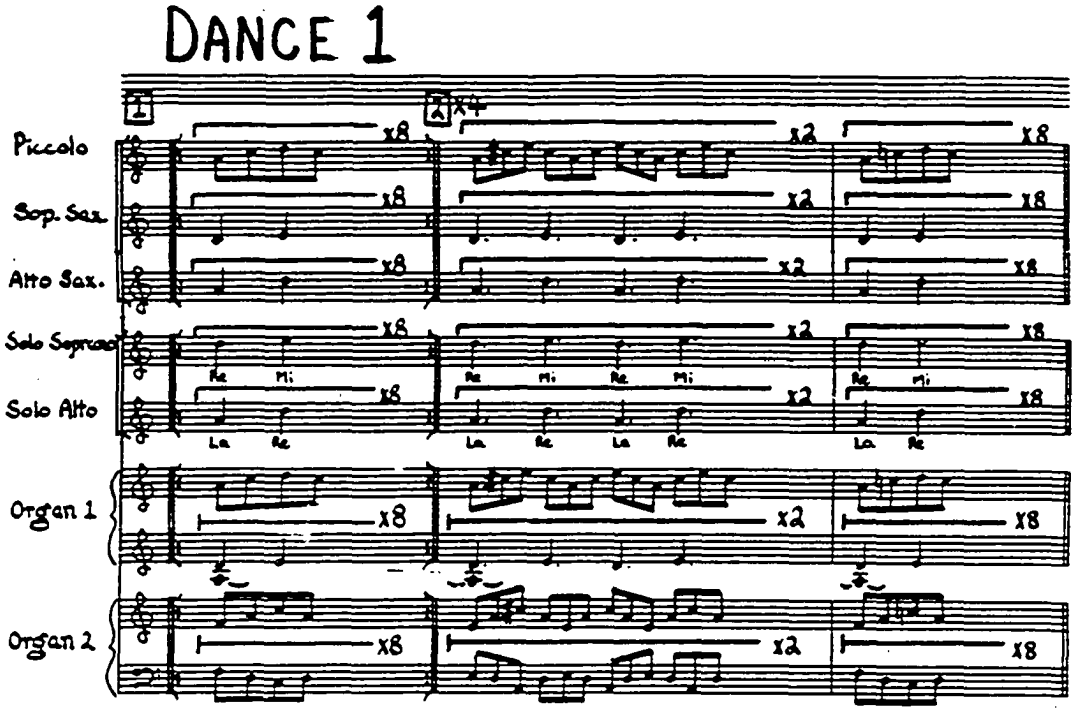
Example 2.10: Glass, Einstein, "Knee Play 2," reh. nos. 14-16.



"Dance 1" is a scene without props, except for a small spaceship in the distance. A group of dancers performs high-speed energetic and abstract dance movements. There is a single musical texture. The implied harmonic successions are alternations between a D-Minor 7 Chord and the following four chords: A Major, B-flat Major 7, E-Minor 7 and C-Major 7. The most prominent chord, D-Minor 7, serves as the tonal center of "Dance 1." Three ostinato pitches, A, D, and E are repeated

throughout the scene (Example 2.11), reinforcing the tonal center of D:

Example 2.11: Glass, Einstein, "Dance 1," beginning.



This theme (which encompasses the whole "Dance 1") will be called Theme in d.

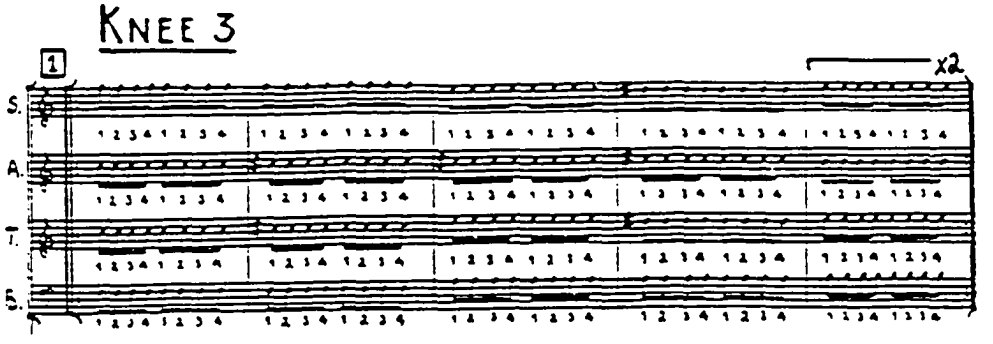
At this point in the opera, all the main musical/dramatic themes have been "exposed." During the rest of the opera, the above-described seven musical-themes (in C, A flat, E flat, f-F, a, f-D, and d) will be used, and no other themes will be introduced (Figure 2.04).

"Night Train" is a "romantic" duet for soprano and tenor, sung on the background of an old train at night. Its two sections are derived from the materials of Theme in A flat and

Theme in E flat. Theme in f-E from the third section of the corresponding "Train" is omitted in the "Night Train." However, Theme in f-E follows immediately after this scene, at the beginning of "Knee Play 3."

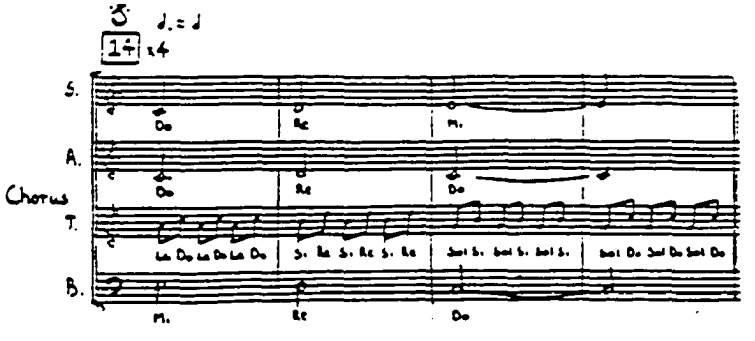
"Knee Play 3" is a four-part a cappella chorus; its formal structure is a1, b, a2, b. Sections a1 and a2 (Example 2.12) are based on Theme in f-E:

Example 2.12: Glass, Einstein, "Knee Play 3," beginning.



Section b is based on Theme in C (Example 2.13).

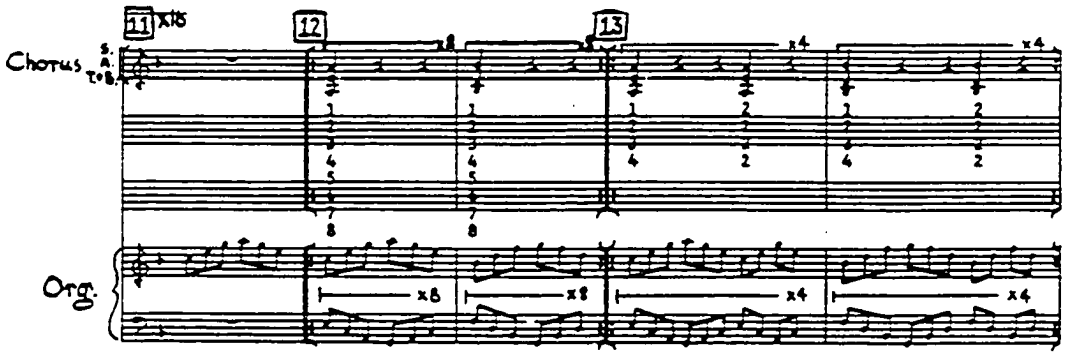
Example 2.13: Glass, Einstein, "Knee Play 3," reh. no. 14.



"Trial/Prison" combines an imaginary trial with the pantomime of two prisoners, and an image of Patricia Hearst during the bank robbery. The music follows the two-part form

of "Trial": a, b. Accordingly, the first section, a, uses thematic material that is derived from the Theme in a. This section represents a substantial departure from the Theme in a of "Trial," since a new chord, G-Minor 7, has been introduced (Example 2.14).

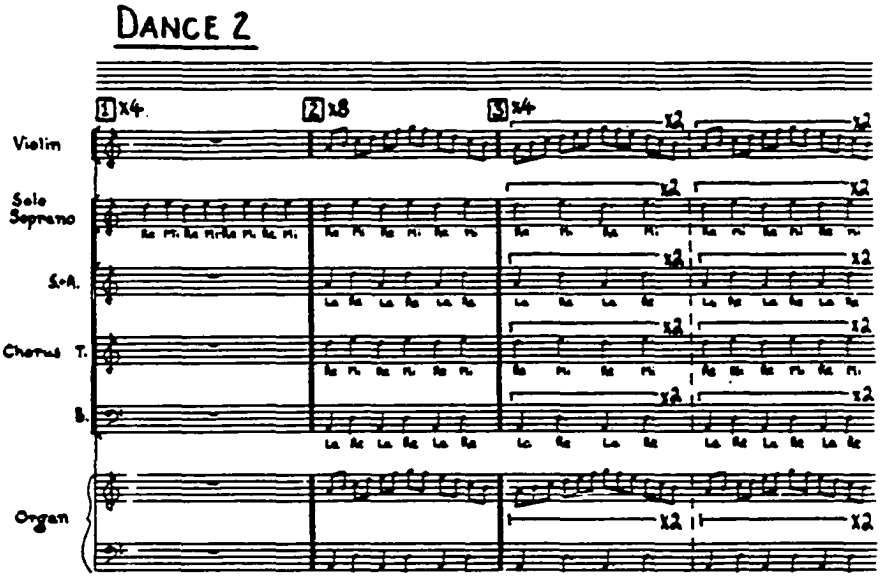
Example 2.14: Glass, Einstein, "Trial/Prison," reh. no. 11-13.



Section b of "Trial/Prison" is identical to the section b of "Trial" (Theme in f-D). Glass introduces a new element here, a different orchestration (soprano saxophone and bass clarinet). Thus the elements of B2 ("Trial/Prison") are substantially derived from B1 ("Trial").

The scene "Dance 2" resembles its earlier counterpart, "Dance 1." This time, the spaceship appears to be closer. The music of "Dance 2" is also based on "Dance 1." A substantial addition to the melodic content of the Theme in d is the use of the scale-wise movements (Example 2.15).

Example 2.15: Glass, Einstein, "Dance 2," beginning.

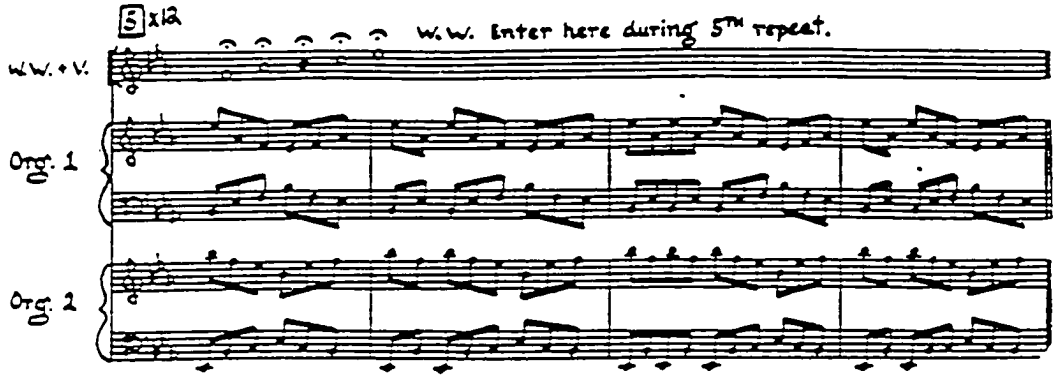


"Dance 2," as well as "Dance 1," are based on elaborate additive processes.

"Knee Play 4" is scored for violin and four-part male choir. The form is a1, b1, a2, b2, a3. Sections a1, a2 and a3 are based on Theme in f-E, while b1 and b2 sections are based on Theme in C.

"Building" is a scene that visually resembles the "Night Train," since the shape of the night train has been retained, and the train has been transformed into a factory building. The music is entirely based on the Theme in E flat. While the two organs are playing (in a very fast tempo) a texture based on an additive process, other instruments, as well as the singers, are improvising on the same notes of the pentatonic scale (Example 2.16).

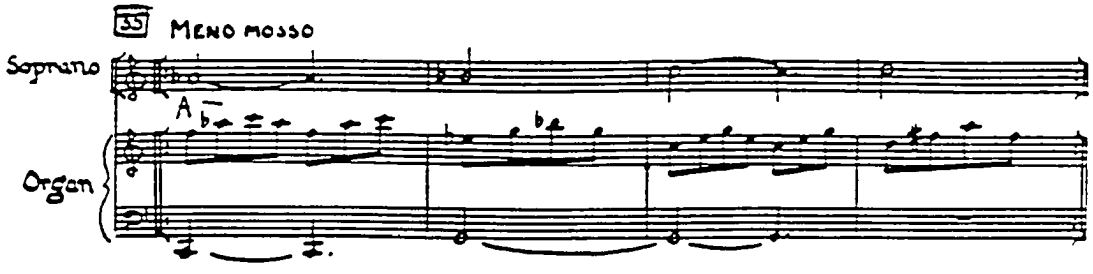
Example 2.16: Glass, Einstein, "Building," reh, no. 5.



"Building" ends with a brief statement of the Theme in f-E.

"Bed" consists of a single major event on the stage: a beam of light rises slowly, from a horizontal to vertical position. The music has two sections. Section a is based on Theme in A. Section b, based on the Theme in f-D, is the only aria of the opera. On the background of the already familiar Theme in f-D, Glass adds a new melodic line (soprano, Example 2.17), derived from the notes of the chordal progression:

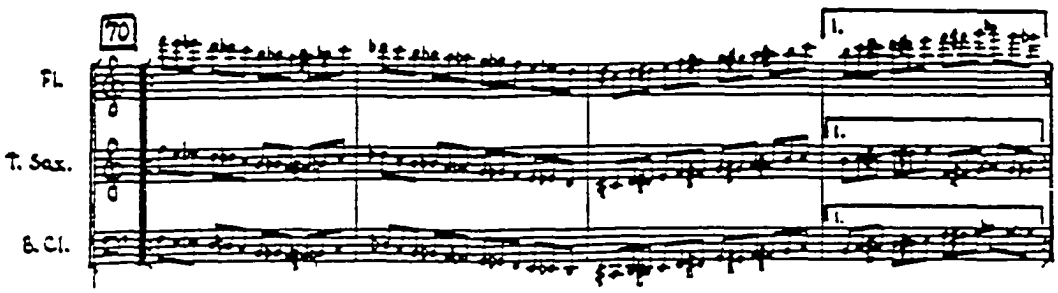
Example 2.17: Glass, Einstein, "Bed," reh. no. 35.



"Spaceship" is a scene where all the musicians leave the pit, and perform on a high-rise construction that represents

a spaceship, at the rear of the stage. Its form is aba. The opening and the closing sections are based on the Theme in f-E, while the middle section is based on the Theme in A. A major novelty is the use of the chromatic scale (Example 2.18) in the climactic ending of the scene:

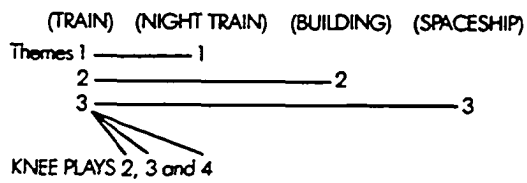
Example 2.18: Glass, Einstein, "Spaceship," reh. no. 70.



Einstein ends with "Knee Play 5," which is entirely based on Theme in C.

In his own description of Einstein, Glass shows some of the relationships among the sections of his opera. In the following figure (Figure 2.02), he describes the distribution of the three themes that were introduced in "Train" (his Themes 1, 2, and 3 correspond to the earlier described Themes in A flat, E flat, and f-E).[6]

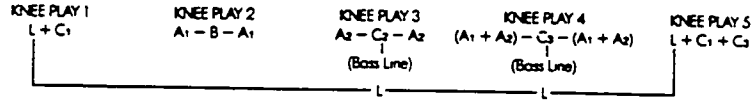
Figure 2.02: Glass's representation of "Train" themes' distribution.



[6] Glass, Notes on "Einstein," 18.

In his representation of the musical materials from "Knee Plays" (Figure 2.03), Glass uses letter symbols. This somewhat obscures the existing relationships between the three "Train" sections and "Knee Plays," since his Theme 3 from the "Train" sections (a theme present in both "Train" scenes and "Knee Plays") is now represented differently, by the letter A:[7]

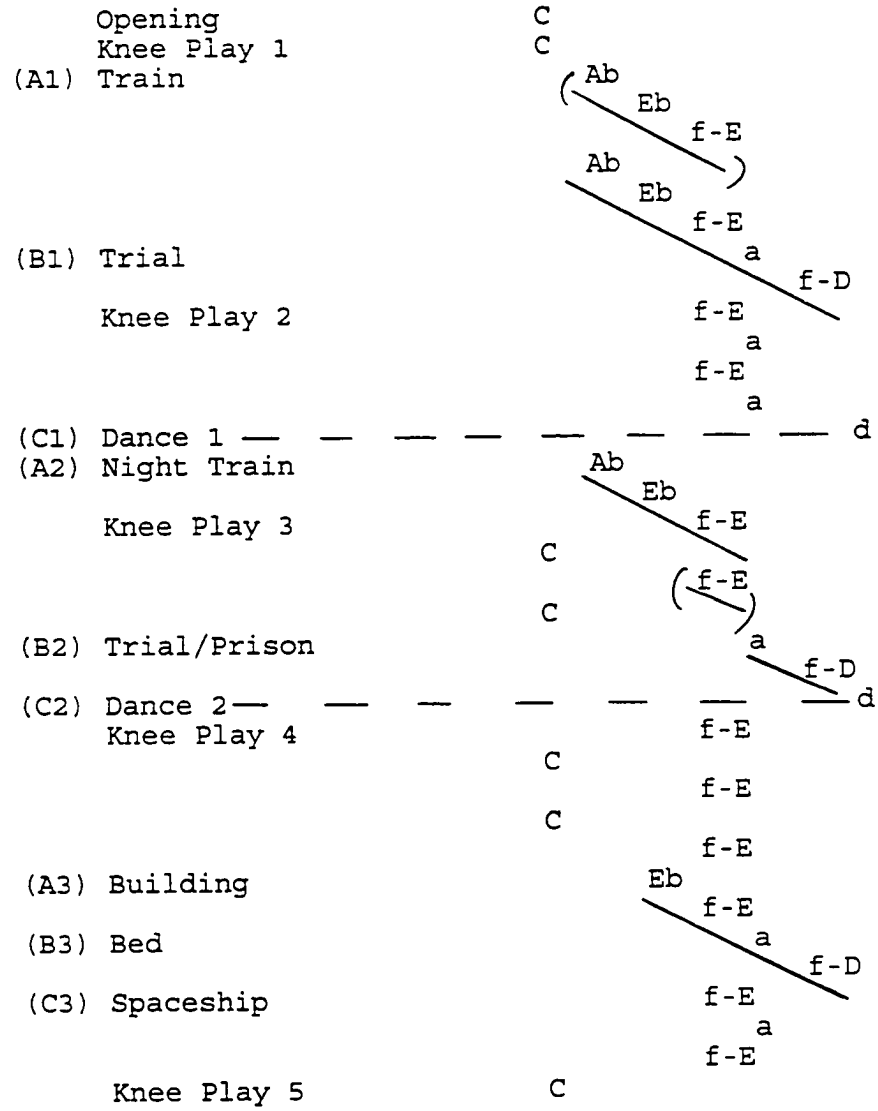
Figure 2.03: Glass's representation of "Knee Plays."



In Figure 2.04, all the previously discussed themes of Einstein, labeled according to their tonal center, are represented in their order of appearance.

[7] Glass, Notes on "Einstein," 21.

Figure 2.04: Macro-form and the Themes of Einstein.



Distribution of the themes within the macro-form of Einstein does not reveal a strict organization. Unlike the dramatic division of the opera (in Figure 2.01, the nine scenes are related as A1,B1,C1; A2,B2,C2; A3,B3,C3), the order of themes within the opera does not follow a rigid pattern. However, some regularities are noticeable. First, each set of three dramatically-related scenes (Train-Night Train-Building; Trial-Trial/Prison-Bed; Dance 1-Dance 2-Spaceship) has its own theme(s), that do not appear in the other two sets. However, "Spaceship" is an exception, since it uses Theme in f-E from "Train."[8] Second, "Knee Plays" have their own theme (Theme in C), but they also "borrow" themes from "Train" and "Trial" scenes. In this respect, "Knee Plays" are thematically less confined than the scenes. Third, there is a sequence of appearances of themes, first noticeable in the beginning of the opera ("Train" to "Trial"): Themes in A flat, E flat, f-E, a, f-D. In Figure 2.04, this thematic sequence is marked with oblique lines. The sequence is repeated twice. In the repeats, the thematic sequence is unchanged, except for the "intrusions" of "Knee Plays 3 and 4" and the omission of Theme in A flat in the last repeat. Finally, Theme in d has a special significance: it appears only twice (Figure 2.04, dotted lines), dividing the opera into three parts, each part containing one thematic sequence.

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[8] This exception has been discussed earlier in this chapter.

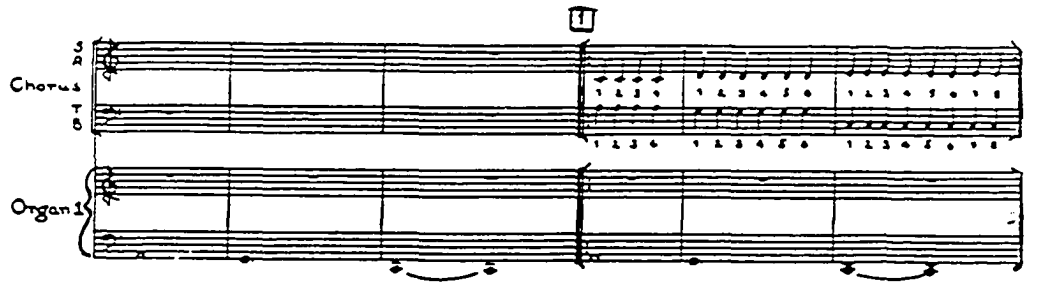
Chapter 3

THEMATIC UNITY: THE CORE MOTIVE

One of the musical achievements of Einstein on the Beach is its thematic unity. As a further examination will show, the melodic material of each of the previously discussed themes of the opera has been derived from a single musical motive.

The "motive" of the entire opera, which will be called the Core Motive, is stated (and relentlessly repeated in its simplest version) in the two opening numbers of the opera, "Prologue," and "Knee Play 1" (Example 3.01).

Example 3.01: Einstein, "Prologue" and "Knee Play 1," reh. no. 1.



At least one of the following two attributes of the Core Motive is present in any musical section (theme) of the opera: 1) a three-pitch ascending movement, Contour Class=<012>, usually in the upper part; and/or, 2) a three-pitch descending movement, CC=<210>, usually in the bass (and in contrary

motion with the ascending movement).[1]

The three-pitch ascending or descending movement can be step-wise, including skips, or both. In some sections of the opera, after the initial three pitches of the Core Motive, there is an extension: <0121>, <2101>, <0123>, <3210>, or even <0123456789>. However, the main property of the Core Motive, the three-pitch mono-directional movement, can be found at the beginning of any measure (or repetitive pattern) of the entire opera.

For the purposes of further analysis, the ascending attribute 1) will be called Ascending Core-Motive; the descending attribute 2) will be called Descending Core-Motive; while the simultaneous appearance in contrary motion will retain the name Core Motive.

The appearances of the Core Motive in the original key of C (as in Example 1) have the intervallic properties of set classes [0, 2, 4] in the Ascending, and [0, 2, 5] in the Descending Core-Motive.[2] These set classes have a special significance in the unification process among the themes of Einstein. In further analysis, the appearances of the Core Motive in the key of C will bear a prefix original: Original

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[1] Contour Class (CC) is defined by Michael L. Friedmann, in his article, "A Methodology for the Discussion of Contour: Its Application to Schoenberg's Music," Journal of Music Theory XXIX/2 (Fall 1985), 223-248.

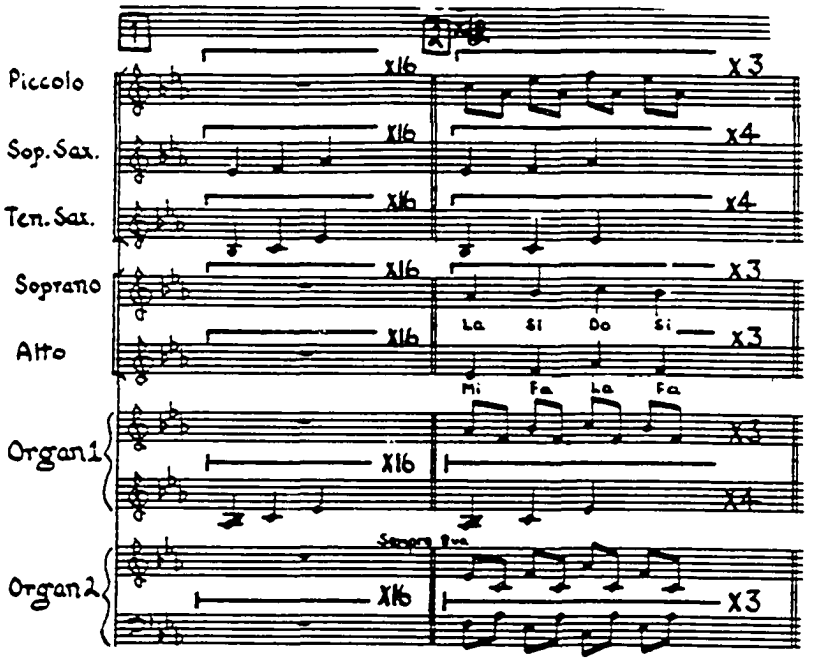
[2] In this analysis, set classes are represented with Tn/TnI set types (inversional equivalence), as defined in John Rahn's Basic Atonal Theory (New York: Longman, 1980), 76.

Core-Motive, Original Ascending Core-Motive, and Original Descending Core-Motive.

The focus of this chapter is twofold: 1) to identify the appearances of the Core Motive by its contour properties; and, 2) to identify the intervallic similarities between the Original Core-Motive and the subsequent appearances of the Core Motive.

The first scene, "Train," is composed of three contrasting themes (in A flat, E flat, and f-E), each based on materials of the Core Motive. The first theme of "Train," Theme in A flat (Example 3.02), starts with a pattern of three ascending notes (Ascending Core-Motive):

Example 3.02: Einstein, "Train," reh. nos. 1 and 2.



While the soprano and tenor-saxophone parts display the attributes of the Ascending Core-Motive (three-pitch patterns: E flat-F-A flat, and B flat-C-E flat), the intervallic structure of the pitches involved, [0, 2, 5], is identical with the set class of the previously described Original Descending Core-Motive. The use of this set class in the very first measure of "Train" establishes a correlation with "Knee Play 1," since both numbers either begin with, or are preceded by, an ostinato figure based on the same set class.[3]

Also, at reh. no. 1 of "Train" (organ 1), the simultaneous A flat and B flat, in combination with the next pitch, C, represent a condensed version of the Ascending Core-Motive, A flat-B flat-C. This establishes a further correlation with "Knee Play 1," since this set class, [0, 2, 4], is identical with the one of the Original Ascending Core-Motive.

At reh. no. 2 of "Train," the Ascending Core-Motive appears in the soprano part, while the Descending Core-Motive is in the bass of organ 2. The contours of the mono-directional three-pitch Ascending and Descending Core-Motives have been changed by the addition of a fourth note, which is a repeat of the second pitch: <0121> and <2101> (Example 3.03).

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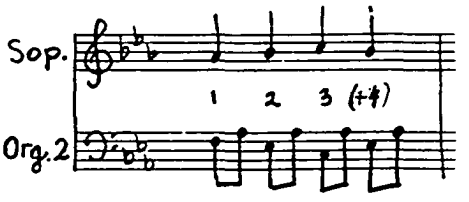
[3] "Knee Play 1" is preceded by "Prologue," which introduces the ostinato figure (A-G-C) used throughout "Knee Play 1."

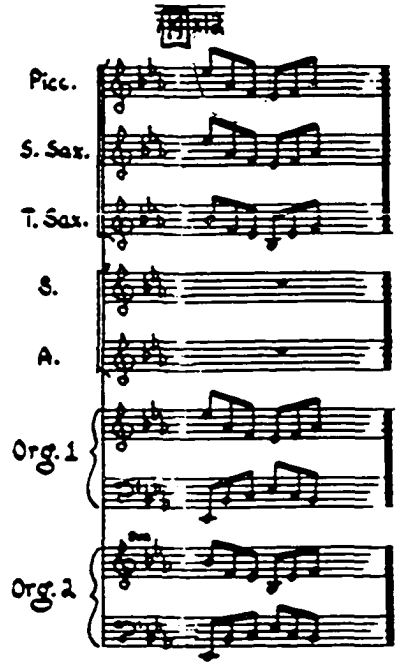
Example 3.03: Einstein, "Train," reh. no. 2, Core Motive in A flat.



The set classes involved, [0, 2, 4] and [0, 2, 5], correspond again to the Original Core-Motive. The rest of the first section of "Train" (Theme in A flat) is based on the above-described material.

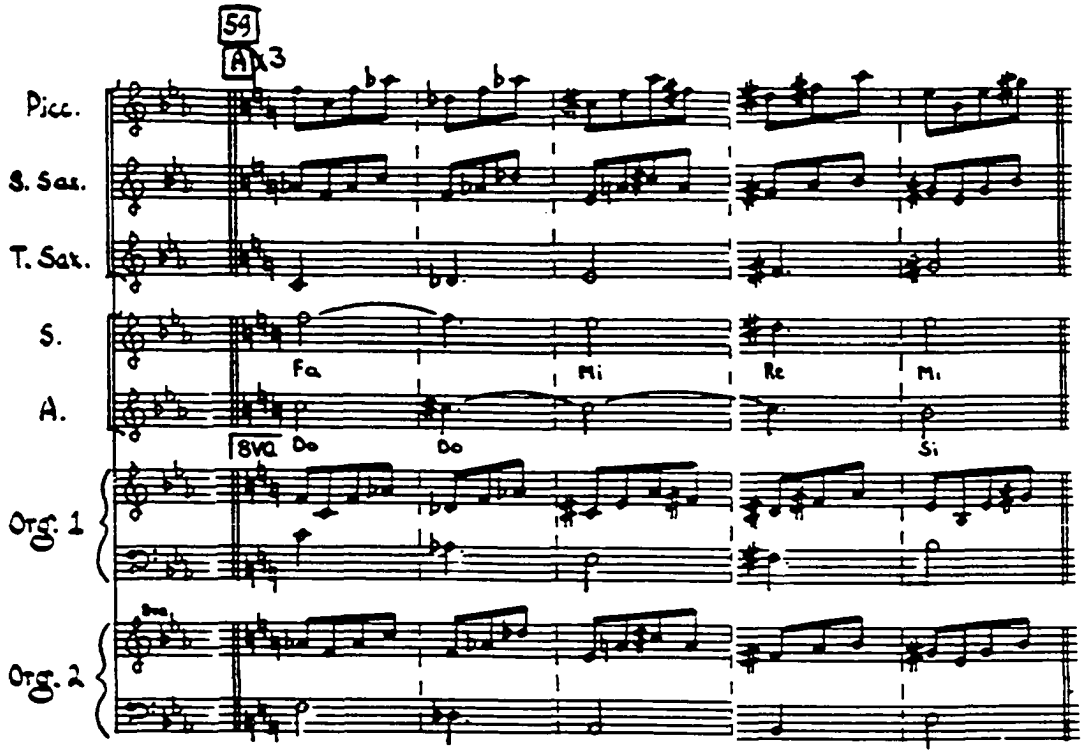
In the second section, starting at reh. no. 19 (Theme in E flat), the melodic contours have been extended into <012321> and its inversion, <321012>. Such extension combines the Ascending and Descending Core Motives: <012, 321> and <321, 012> (Example 3.04). Three pitches from the Original Descending Core-Motive (C-G-A) have been transposed into E flat-B flat-C (bass line of both organs). The same set class, [0, 2, 5], has been retained in the two upper melodic-lines: E flat-A flat-F, in organ 1, piccolo, and soprano saxophone; and, B flat-F-E flat, in tenor saxophone (Example 3.04).

Example 3.04: Einstein, "Train," reh. no. 19.



In the third section of "Train," starting at reh. no. 59 (Theme in f-E), a Descending Core-Motive with one note extension, <2101>, appears in soprano part (Example 3.05).

Example 3.05: Einstein, "Train," reh. no. 59.



A simultaneous melody line in the tenor saxophone, C-D flat-E-F sharp-G sharp, is an extended Ascending Core-Motive, <01234>. The last three notes, E-F sharp-G sharp, are the exact transposition of the Original Ascending Core-Motive into the key of E Major.

Both the Descending and Ascending Core-Motive contours appear in the bass line: F-D flat A (<210>) and A-B-E (<012>).

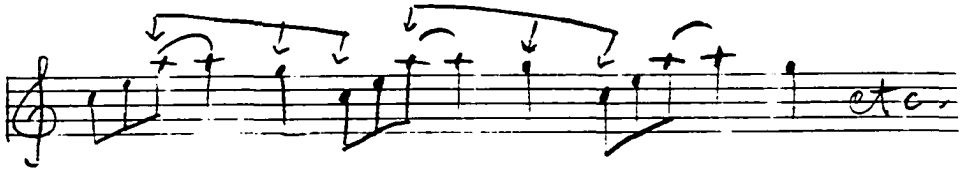
The next scene, "Trial 1," has two distinct sections (Theme in a, and Theme in f). The first one begins by using the pentatonic scale, C-D-E-G-A, from the opening numbers of

the opera, "Prologue" and "Knee Play 1." The Ascending Core-Motive is represented by the melodic movement C-E-A (Example 3.06).[4]

Example 3.06: Einstein, "Trial 1," reh. no. 3, flute.

This pattern receives an added note, G (starting with reh. no. 5). When repeated, this extended melodic-pattern results in pitches of the Descending Core-Motive in C, A-G-C (Example 3.07):

Example 3.07: Einstein. "Trial 1," reh. no. 5 (repeated), flute.



Another element with characteristics of the Ascending Core-Motive is the three-note ascending line of the soprano chorus-part: E-A-C (reh. no. 38h).

The second section of "Trial 1," starting at reh. no. 53 (Theme in f-D), is also based on a three-pitch ascending movement (Example 3.08).

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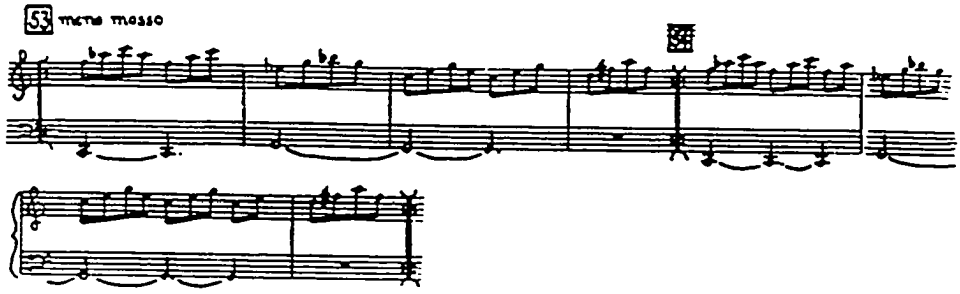
[4] The absence of the step-wise movement (which has been previously explored in Themes in C and A flat) is compensated for later on (starting with reh. no. 25a) with a series of step-wise (scale) movements.

Example 3.08: Einstein, "Trial," reh, no. 53-54.



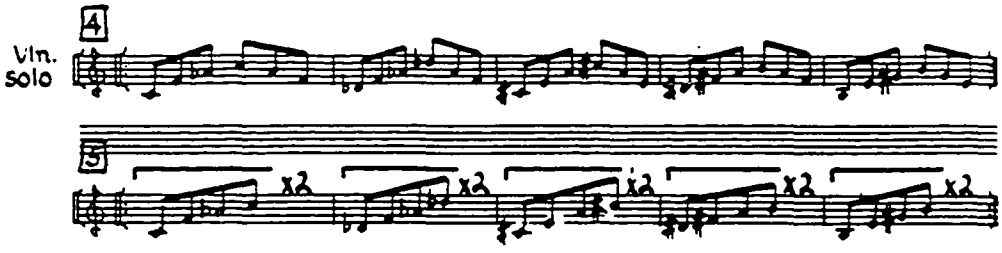
Two of the three pitches from the Original Descending Core-Motive form the bass line: C and G.[5] In addition, the origins of the melodic line in the right hand, F-E flat-C-D, can be traced back to "Train 1," reh. no. 2, where the Descending Core-Motive appears as: F-E flat-C-E flat.

The opening section of "Knee Play 2" (Theme in f-E) is constructed from arpeggiated chords only, based on the harmonic progressions already stated in "Train." The Ascending Core-Motive can be found in the arpeggiated figures (reh. nos. 4-13), which is based on the ascending movement at the beginning of each measure. Also, the first notes of each measure (within each cycle) form an Ascending Core-Motive, extended with one note: C-D flat-C sharp-D sharp-B, or <1230> (Example 3.09).

---

[5] Pitches C and A, very prominent in the bass line of the previous section of "Trial" (Theme in a, reh. nos. 20-43), are also derived from the Original Descending Core-Motive (A-G-C). The focus on pitches C and G in the bass line of the second section of "Trial" (pitches that are also derived from the Original Descending Core-Motive) seems to complement and reinforce the previous connection.

Example 3.09: Einstein, "Knee Play 2," reh. nos. 4 and 5.

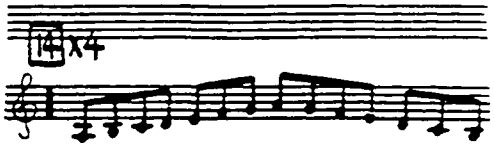


This emphasis on the above-mentioned pitches becomes obvious in reh. no. 8 (Example 3.10), where C-D flat-C sharp-D sharp-B are the only pitches of the melodic pattern:

Example 3.10: Einstein, "Knee Play 2," reh. no. 8.

In the second section of "Knee Play 2" (Theme in a), the arpeggiated movement has been contrasted with a step-wise movement, starting with reh. no. 14 (Example 3.11).

Example 3.11: Einstein, "Knee Play 2," reh. no. 14.

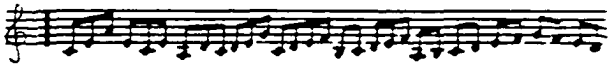


The use of the full-scale ascending and descending movements represents a substantial departure from the three-pitch movement of the Core Motive. However, the scale-wise movements have been introduced earlier, in "Trial," and the relationship to the Core Motive has been already established: the scale-wise movements are a result of an additive process,

used in "Trial," in which the Core Motive is gradually expanding (Example 3.12).

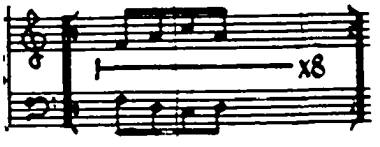
Example 3.12: Einstein, "Trial," reh. nos. 20 and 25c, violin.

Expanded by the additive process into:



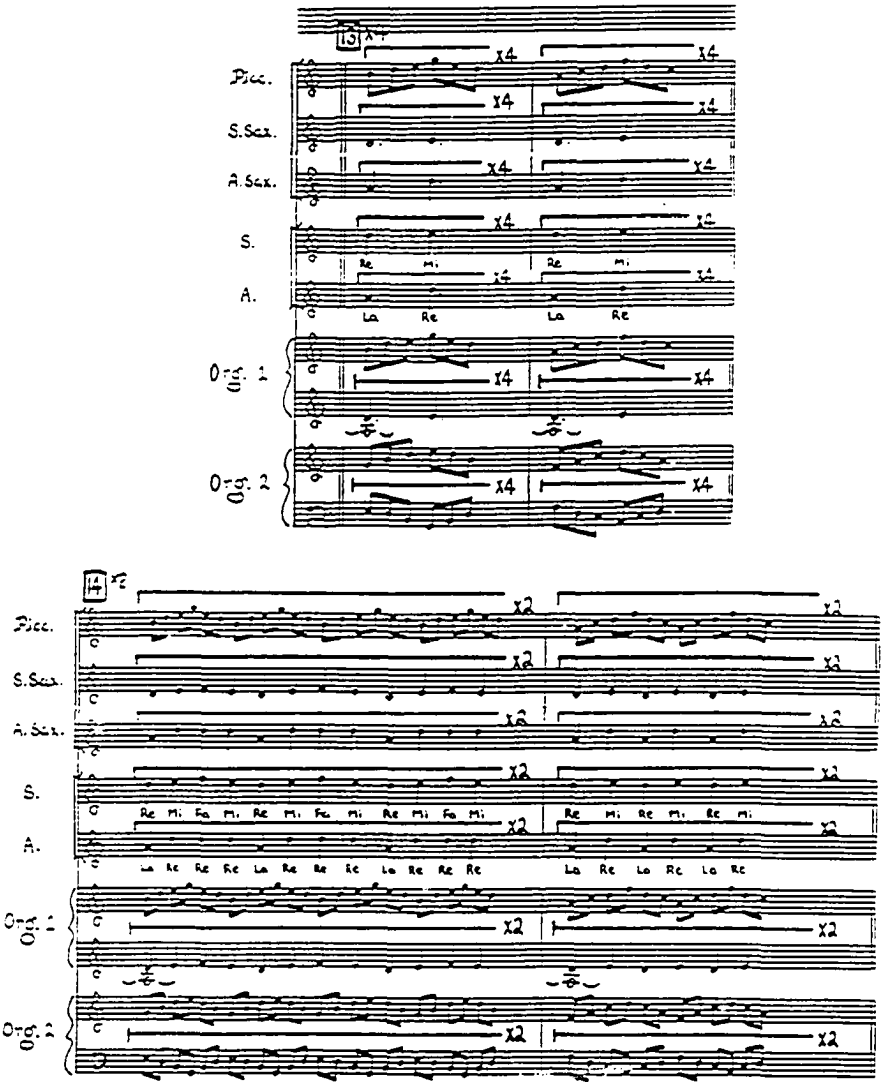
The Core Motive can also be found in "Dance 1" (Theme in d). The piccolo part and the right-hand parts of both organs begin each measure with a pattern consisting of three ascending notes, which are mirrored with a contrary motion in the bass line in organ 2 (Example 3.13).

Example 3.13: Einstein, "Dance 1," Core Motive.



At reh. no. 14 (Example 3.14), when a fourth note is added to the pattern (<012321> and its inversion, <321012>), the soprano part, which has previously been relentlessly repeating a two-note ascending melodic-movement, D-E, adds a third note, and the pattern (Ascending Core-Motive) continues as D-E-F:

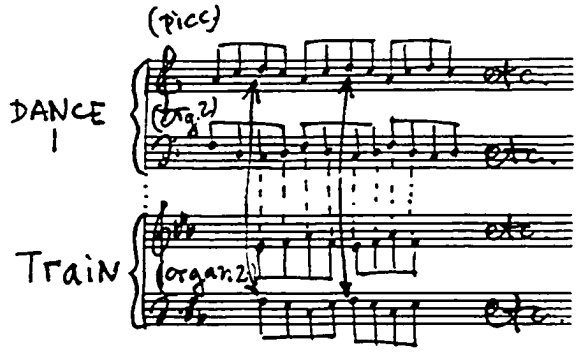
Example 3.14: Einstein, "Dance 1," reh. no. 13 and 14.



The intervallic structure of the top and bottom melodic-lines of reh. no. 1 in "Dance 1" has its origins in "Train 1" (reh. no. 2). This is possible to notice if the two melodic lines from "Dance 1" (reh. no. 1) are regarded not as short patterns of only four notes, but rather as melodies that are

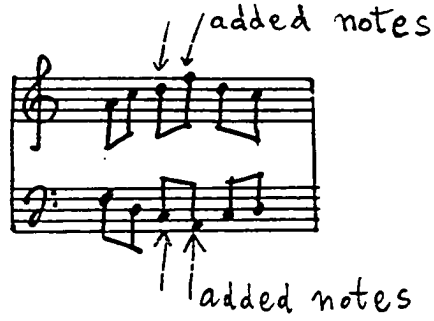
results of several repetitions of these patterns. Example 3.15 will show how the two melodic lines from "Dance 2" are the result of a double-counterpoint technique:

Example 3.15: Einstein, "Train 1" reh. no. 2, compared with "Dance 1," reh. no. 1.



The ending measure of "Dance 1" (reh. no. 50, m. 8) is derived from the above-described reh. no. 1. With two notes added to the original four-note motive, the two melodies of the double-counterpoint are transformed into a canon. In addition, these melodies are in contrary motion, mirroring each other in identical intervals (Example 3.16).

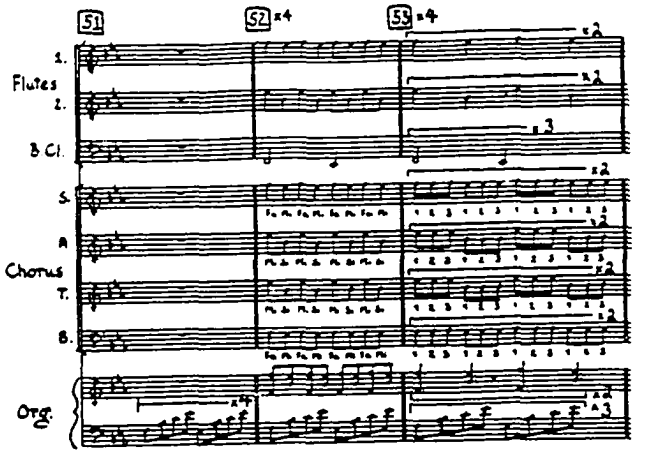
Example 3.16: Einstein, "Dance 1," reh. no. 50, m. 8, piccolo and the bass line of organ 2.



Musical numbers that follow "Dance 1" until the end of the opera are derived from the previously stated materials. In addition to some of the reappearances of the Core-Motive transformations that have already been described, several new transformations appear.

In "Night Train," the emphasis is placed on the Descending Core-Motive. A two-pitch pattern, F-E flat, is relentlessly repeated in the bass line (played by the organ and the bass clarinet) in almost every measure of the scene. This pattern represents a transposition of the first two notes of the Original Descending Core-Motive (A-G). Starting with reh. no. 52 (Example 3.17), this motive is exploited in the upper parts as well:

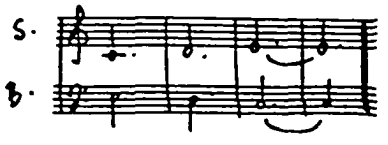
Example 3.17: Einstein, "Night Train," reh. nos. 52-53.



In "Knee Play 3," for the first time in the opera, the Original Ascending Core-Motive is mirrored by its inversion

(Example 3.18).

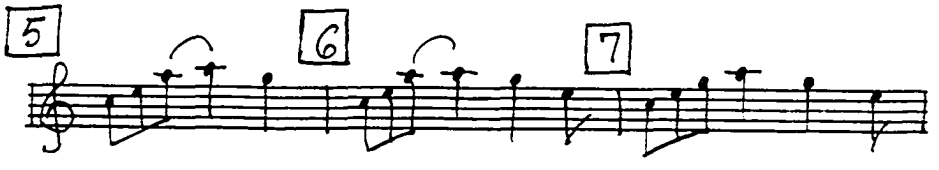
Example 3.18: Einstein, "Knee Play 3," reh. no. 14, soprano and bass.



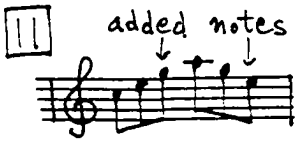
In "Trial/Prison," the Core Motive is an expansion of the Core-Motive from "Trial 1," by insertion of two added notes (Example 3.19).

Example 3.19: Einstein, "Trial/Prison," reh. nos. 5-7 and 11.

Gradual addition of notes:

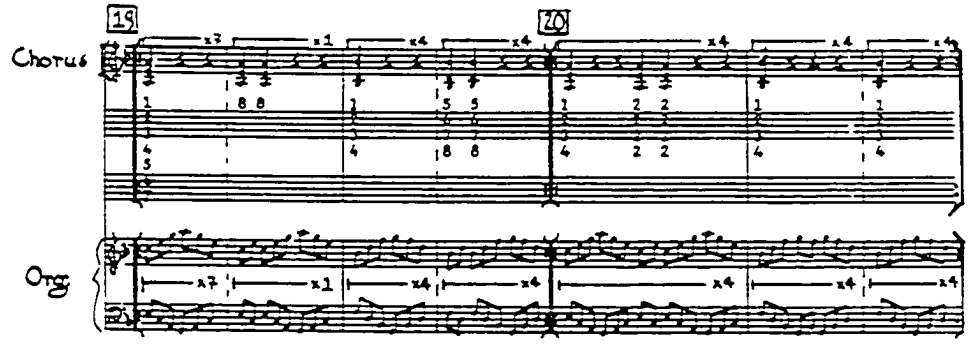


The final pattern:



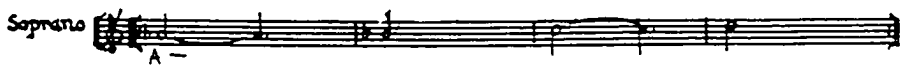
A two-pitch derivation of the Ascending Core-Motive, A-B flat (reh. nos. 12-24) has been relentlessly repeated in soprano, tenor, and bass parts (Example 3.20).

Example 3.20: Einstein, "Trial/Prison," reh. nos. 19 and 20.



In "Bed," the beginning of the soprano line represents a transposition of the Original Ascending Core-Motive (C-D-E), extended for an additional pitch: A flat-B flat-C (-D) (Example 3.21).

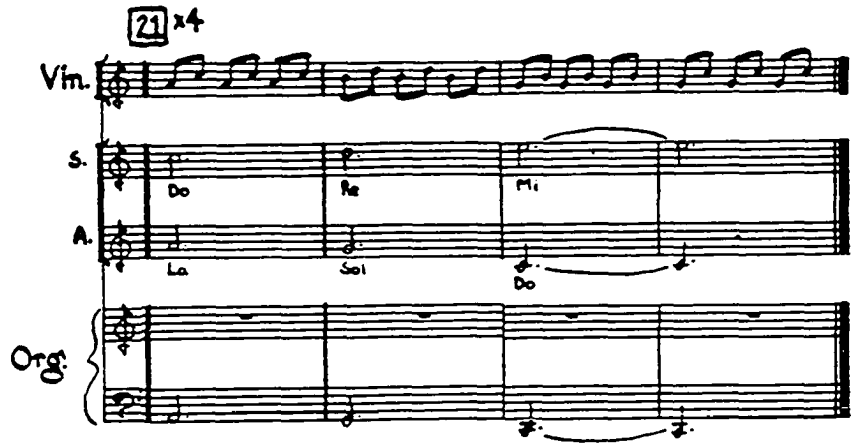
Example 3.21: Einstein, "Bed," reh. no. 15, soprano.



The step-wise Ascending Core-Motive appears in another transposition as well: F-G-A (reh. no. 38). Both transpositions appear several times.

Einstein ends with the Original Core-Motive ("Knee Play 5," reh. no. 21), stated in its original shape, and placed an octave higher (Example 3.22).

Example 3.22: Einstein, "Knee Play 5," reh. no. 21.



This ending functions not only as a "recapitulation" of the opening of the opera (Original Core-Motive) but it also shows that the macro form of the whole opera is circular.

Chapter 4

THE HARMONIC LANGUAGE

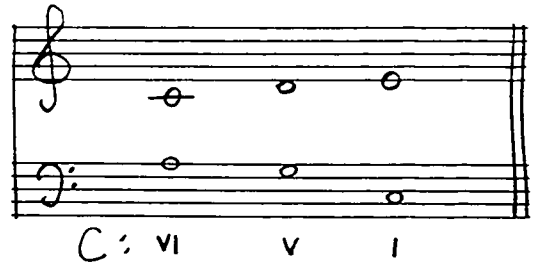
The harmonic language of Einstein on the Beach is tonal. Glass's tonality, however, often differs from traditional tonality. First, despite the use of the functional harmonies, his scales are often pentatonic (Theme in C, Theme in A flat, Theme in E flat). Second, Glass's chord progressions within large formal sections (a theme or even a whole scene) are often limited to repetition of a single chord progression ("Knee Play 1"). Third, despite the use of traditional voice leading, he often defies the classical rules (parallel fifths in Theme in f-E). Fourth, his vertical harmonies (chords) often defy classical rules as well. When his chords are not triads, they are: 1) consistently incomplete ("Knee Play 1"); 2) pentatonic subsets (Theme in A flat); or 3) diatonic subsets (Theme in d). Finally, Glass's dissonances do not serve the functional harmonies of the chords in which they appear--rather, they are non-chordal sonorities (Theme in d).

As mentioned earlier, in Chapter 2, each section of the opera can be associated with a tonal center and with corresponding musical themes. The number of chords used in each section of the opera is limited: it varies between a single chord (Theme in a, "Trial") and five chords (Theme in d, "Dance 1," or Theme in f-E). Whole sections of the opera

are often built from multiple repetitions of only a single chord progression. It is possible, therefore, to reduce the harmonic plan of each of the Einstein themes to a single chord progression. In this chapter, the harmonic language of Einstein will be discussed, with emphasis on particular themes of the opera, as well as on the harmonic macro-plan of the work.

The entire harmonic plan of Theme in C in "Knee Play 1" can be reduced to one progression (Example 4.01).

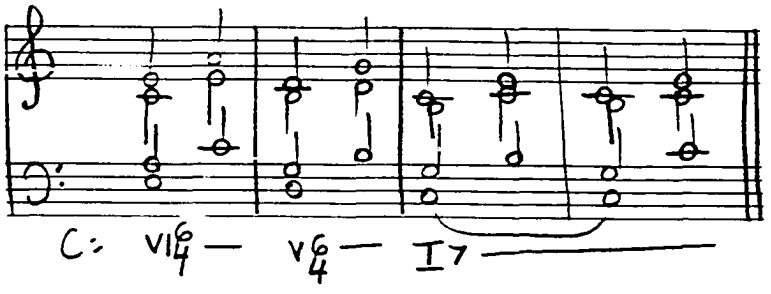
Example 4.01: "Knee Play 1," Theme in C, chord progression.



This progression contains a certain degree of ambiguity: 1) despite the use of a major-key cadence (C Major: VI, V, I), the pitch material does not form the major (or minor) scale, but the pentatonic scale, C-D-E-G-A; 2) each of the three chords is only a dyad (in the A-Minor and C-Major chords, the fifth is omitted, while in the G-Major chord the third is missing); and, 3) it is not clear whether this progression belongs entirely to the key of C Major, or is a modulation from A Minor to C Major. It will be shown in this chapter that such ambiguities are part of the harmonic language of the entire opera.

Subsequent appearances of Theme in C are based on the same chord progression (C Major: VI, V, I). Several differences that appear in the harmonic treatment of these chords in some of the repetitions are: 1) the use of the complete chords (triads); 2) the use of the inversions; and, 3) the use of a seventh chord (C Major: VI, V, I7). Example 4.02, from "Knee Play 3," illustrates all three of the above-mentioned modifications.

Example 4.02: "Knee Play 3," reh. no. 16, chord progression.

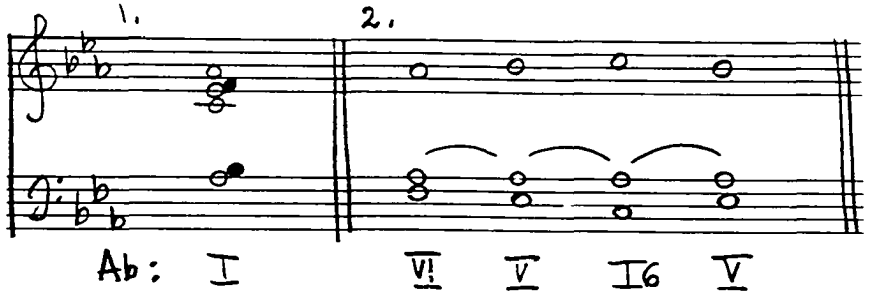


The use of the 6/4 chord is characteristic for the harmonic language of Einstein. The 6/4 chords (as in Example 4.02) do not resolve as cadential 6/4 chords; rather, the fourth between the bass and an upper voice is treated as a consonance.

The chord progression of the Theme in A flat is transposed from the chords of Theme in C (VI, V, I). This reflects the use of the corresponding melodic-material of the Original Core Motive (discussed in Chapter 3). In "Train," reh. no. 2, the chord progression reflects the melodic

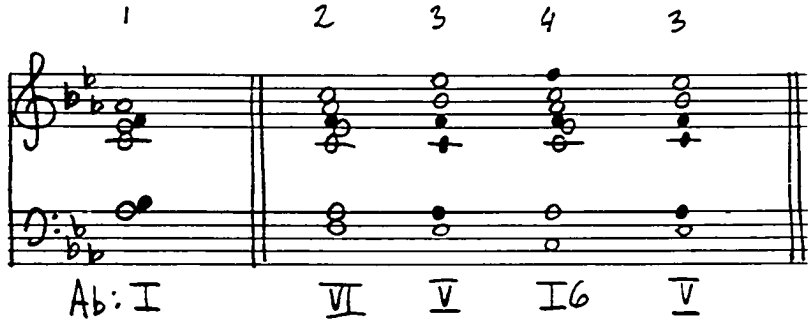
transposition of the Original Core Motive (in C Major) into the key of A-flat Major (Example 4.03).

Example 4.03: "Train," Theme in A flat, reh. nos. 1 and 2, chord progression.



In "Train," however, two new and significant elements have been added to this chord progression. First, due to the use of the cyclic-structure technique, the static harmony introduced at reh. no. 1 (A-flat Major: I) is superimposed on the chord progression introduced in reh. no. 2 (A-flat Major: VI, V, I, V). The overall effect is that of a pedal-chord, A-flat Major, over the chord progression. Second, in both reh. nos. 1 and 2, there are a number of pitches added to the above-identified triadic-chords. In Example 4.04, the added notes are represented by "black" note-heads, while the chord notes are "white."

Example 4.04: "Train," reh. no. 1 and 2, added notes.

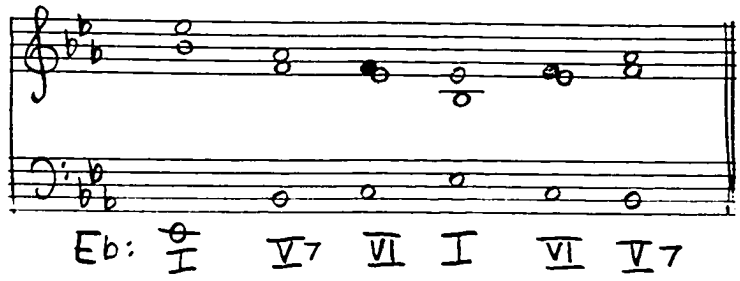


The chords in Example 4.04, numbered 1 to 4, represent different functional harmonies. However, chords 1 and 3 are built with the identical collection of pitches (pentatonic scale). Chords 2 and 4 are also built with an identical collection. This blend of different functional harmonies with the identical pitch collections represents yet another ambiguous feature of the harmonic language of Einstein.

Through the use of the additive process in Theme in A flat, the above described progression is rhythmically altered and sometimes is reduced to only one or two of its chords; the chords stay unchanged, and no other chords are introduced throughout the theme.

Theme in E flat is based on the same functional chords as the Themes in A flat and C: I, V, and VI (Example 4.05).

Example 4.05: "Train," Theme in E flat, reh. no. 53, chord progression.



Once again, due to the additive process, this pattern is extended, but the chords and their initial sequence (I, V7, VI, I, VI, V7, from reh. no. 53) are not changed.

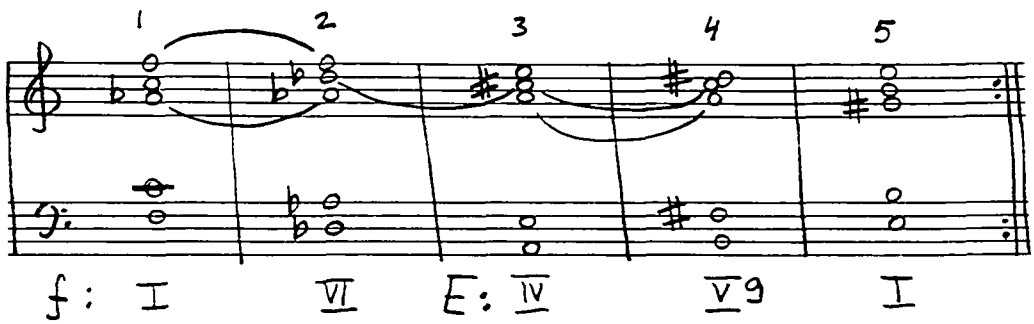
While the chords (I, V, and VI) have been transposed into the key of E-flat Major, the pitches of the Theme in A flat (pentatonic scale, A flat-B flat-C-E flat-F) have been retained in Theme in E flat; no additional pitches are introduced. By using the same pentatonic scale in the context of two different tonal centers (A flat and E flat), Glass further exploits the ambiguous relationships between the pentatonic scale (limited to only two complete triadic-chords) and functional harmonies of the heptatonic tonal system.

Glass's use of the pentatonic scale precludes a complete triad. Since the pitches G and D are not part of the pentatonic scale (E flat-F-A flat-B flat-C), the functional chords of the corresponding E-flat Major are incomplete: in E-flat Major and B-flat Major 7 chords, the third is omitted,

while the C-Minor Chord is missing its fifth. This also explains the non-resolution of the 7th (A flat), since its resolution (G) is not part of the pentatonic scale. An additional harmonic characteristic is the set-class equivalent between the V7 and VI chords, [0, 2, 5], made possible by the use of the non-harmonic note (F) in the C-Minor Chord.

Theme in f-E is harmonically unique within the harmonic context of Einstein. It is the only chord progression that contains a clearly defined chromatic modulation (Example 4.06).

Example 4.06: "Train," Theme in f-E, chord progression.

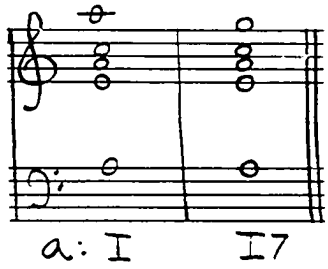


The last three chords of this progression are clearly defined as a cadence in E Major: IV, V9, I. The first two chords of the progression, F Minor and D-flat Major, are also unambiguously I and VI chords in F Minor. The transition from one key to another is facilitated by the use of the root-position chords, major third apart (chords 1-3), as well as by the consistent use of parallel fifths in the lower parts. The sudden modulation without a pivot chord is a tonal shift.

Since this five-chord progression is repeated a number of times, an additional tonal shift occurs between the last chord (E Major) and the first chord of each new repeat (F Minor). This constant shift between the two tonal centers, f and E, only a half-step apart, appears as yet another ambiguous feature of the harmonic language of Einstein.

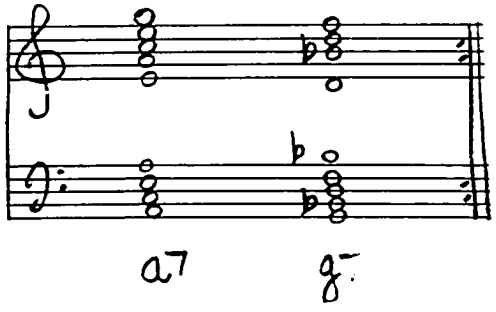
In the "Trial" scene, Theme in a is based on a single chord, A Minor, and its variant, A-Minor 7 (Example 4.07).

Example 4.07: "Trial," Theme in a, A Minor and A-Minor 7 chords.



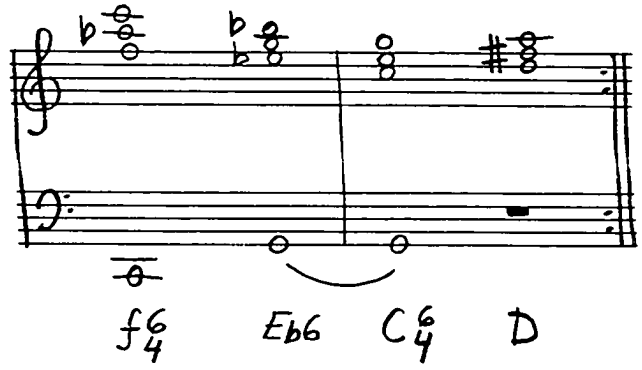
In "Trial/Prison," Theme in a consists of a constant alternation between the A-Minor 7 and G-Minor 7 chords (Example 4.08).

Example 4.08 "Trial/Prison," Theme in a, chord progression.



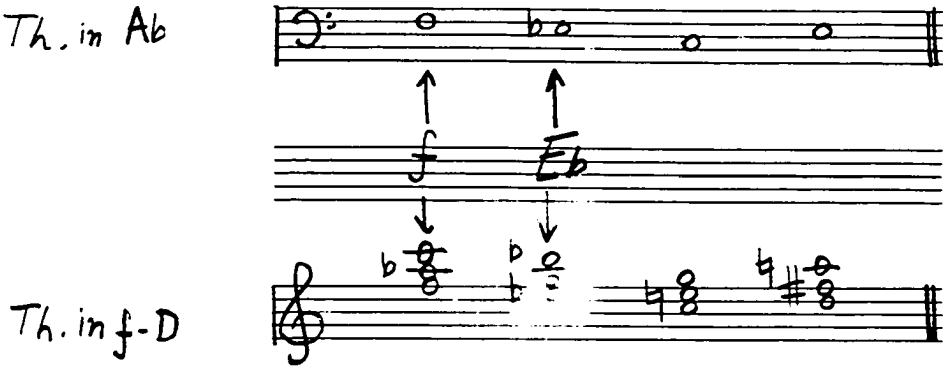
Theme in f-D has a progression of four chords: F-Minor 6/4, E-Flat Major 6, C-Major 6/4, D major (Example 4.09).

Example 4.09: Theme in f-D, chord progression.



The first two chords, F Minor and E-flat Major, correspond to the first two chords of the theme in A flat (as well as to Theme in C, transposed). Therefore, the beginning of this progression can be interpreted as derived from Theme in A flat (or Theme in C), as A-flat Major: VI, V. The resemblance to Theme in A flat goes even further, since the melodic pattern in the right hand, F-E flat-C-D (Example 4.10) corresponds in contour, as well as in the first three pitches, to the bass line of the Theme in A flat from "Train."

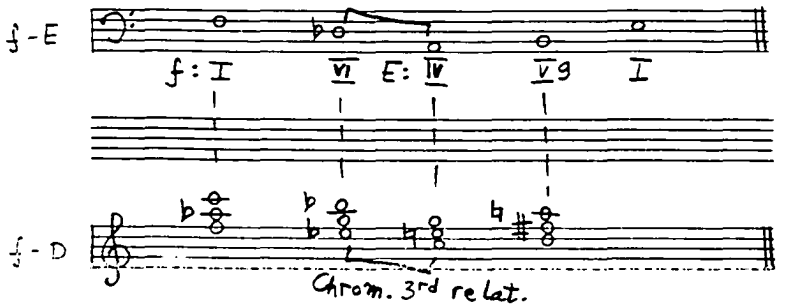
Example 4.10: Similarities between the themes in A flat and f-D.



The major difference in harmonic progressions of the Theme in A flat and the Theme in f-D is the use of C-Major and D-Major chords in Theme in f-D. The use of the C-Major chord strongly establishes the tonality of F Minor. The sequence of the initial three chords can be interpreted as: 1) F Minor: I6/4, VII6, V6/4; or, 2) arpeggiation of the V chord over three measures (V6/4 sus., V7, V). Regardless of which of the interpretations is considered more accurate (yet another ambiguity), the F-Minor tonality is unambiguous.

The fourth (and last) chord of the progression, a D-Major triad, represents a sudden tonal shift. D-Major stands apart from the other chords in its texture as well, since it appears without a low-register bass note. A second tonal shift occurs right after the D-Major chord, with the sudden return of the F-Minor (the beginning of a new repetition of the chord sequence). The D-Major chord, therefore, appears in the context of the F-Minor key, without any additional progressions that would lead to a modulating cadence. The possible origins of such harmonic treatment can be found in Theme in f-E, where a cadence to a new key has been completed (Example 4.11).

Example 4.11. Themes in f-E and f-D, chord-progression analogy.



Therefore, the ending of the Theme in f-D progression can be interpreted as a half cadence on the dominant of a new key, G Minor or G Major (Figure 4.01).

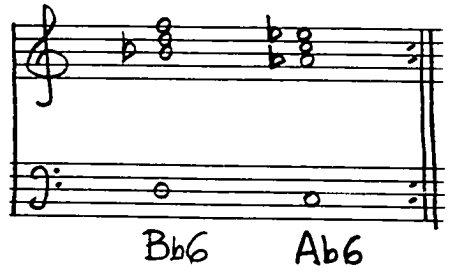
Figure 4.01: Theme in f-D, chord progression.

in F Minor:	I6/4	III6	V6/4	
chords:	F-Min.6/4	E-Flat Maj.6 (pivot chord)	C-Maj.6/4 (pivot chord)	D Maj.
in G Minor (G Major):		VI6	IV6/4	V

Theme in f-D appears three times in Einstein (in "Trial," "Trial/Prison," and "Bed"). Its first appearance, in "Trial," represents an exception, not only among the three appearances of Theme in f-D, but among all sections in Einstein: it is the only section of the opera that ends with a harmonic transition (leading into the next sectic[illegible]. In the entire score of Einstein, there are no other tra[illegible]ions or adjustments of

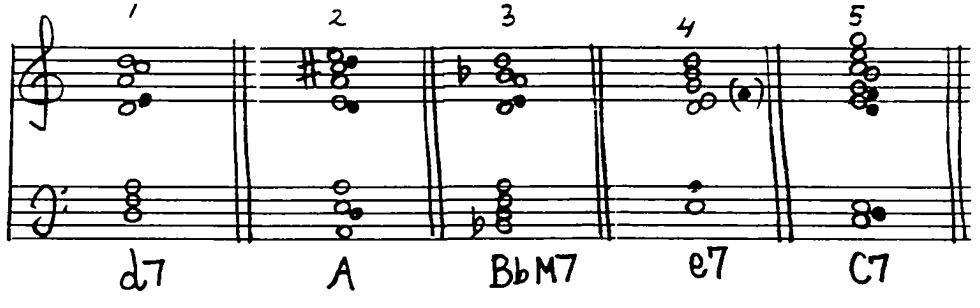
harmony. This harmonic transition at the end of "Trial" is based on two new chords, a B-flat Major 6 and A-flat Major 6. After the four-chord sequence (described earlier), the scene ends with introduction of these two new chords, repeated alternately (Example 4.12).

Example 4.12: "Trial," ending, reh. nos. 65-66, chord progression.



Theme in d appears only twice: as "Dance 1" and as "Dance 2." In "Dance 1," the harmonic progressions are based on exchanges between the D-Minor 7 chord and the following four chords: A major, B-flat Major 7, E-Minor 7, and C-Major 7 (Example 4.13).

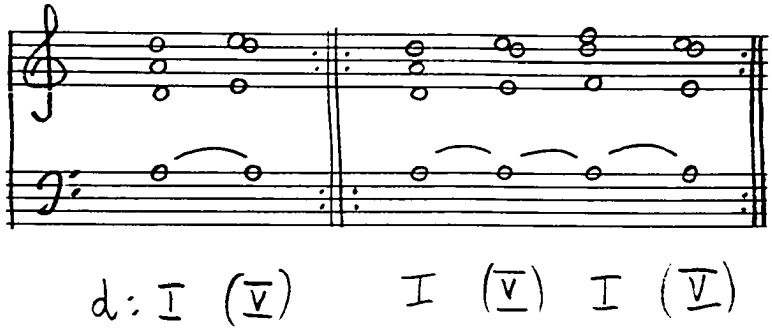
Example 4.13: "Dance 1," Theme in D, chords.



Despite their functional diversity, the above chords display an unusual sonic unity. All five chords include the

pitches D and E; chords 1-4 share D, E, and A; chords 1 and 3 share D, E, A, and F; chords 1 and 5 share C, D, and E; while chords 4 and 5 share E, G, B, and D. In addition, the above chords are superimposed over two ostinato figures that contain the pitches A and D, and a melodic line, made up of pitches D, E, and F (Example 4.14).

Example 4.14: "Dance 1," chord progressions of the ostinato figures.

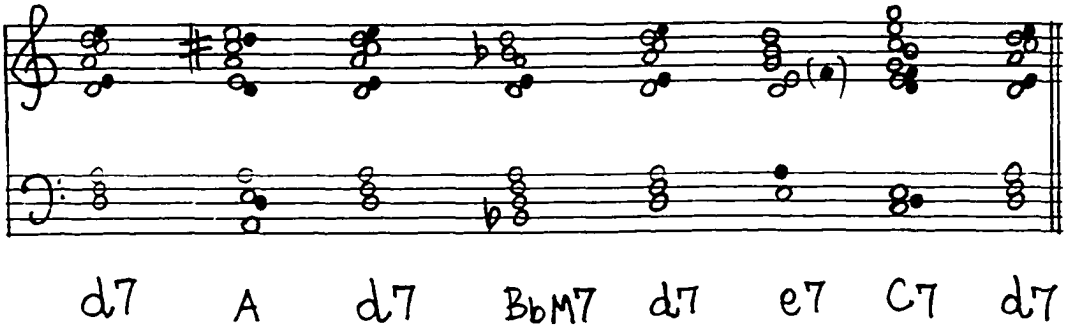


As in some other sections of Einstein (Theme in A flat, for example), the ostinato figure is retained throughout "Dance 1." The harmony of these patterns is based on the tonic chord of D Minor, the main key of the entire scene. Pitch E makes the harmony of this pattern somewhat ambiguous, since the exchange between D and E suggests an alternation between tonic and dominant harmonies.

The ostinato pattern is superimposed over all of the earlier mentioned chords of "Dance 1": D Minor 7, A Major, B-flat Major 7, E-Minor 7, and C-Major 7. Frequent clashes between the chord of the D-Minor pattern and the chords in A, B-flat, E, and C are always [illegible] by the return to the

initial chord, D-Minor 7 (Example 4.15).

Example 4.15: "Dance 1," different harmonies (including non-harmonic notes) and the resolutions into D-Minor 7 Chord.



In "Dance 2," the ostinato pattern is harmonically unchanged, and the chords are the same, except for the omission of the B-flat Major-7 chord.

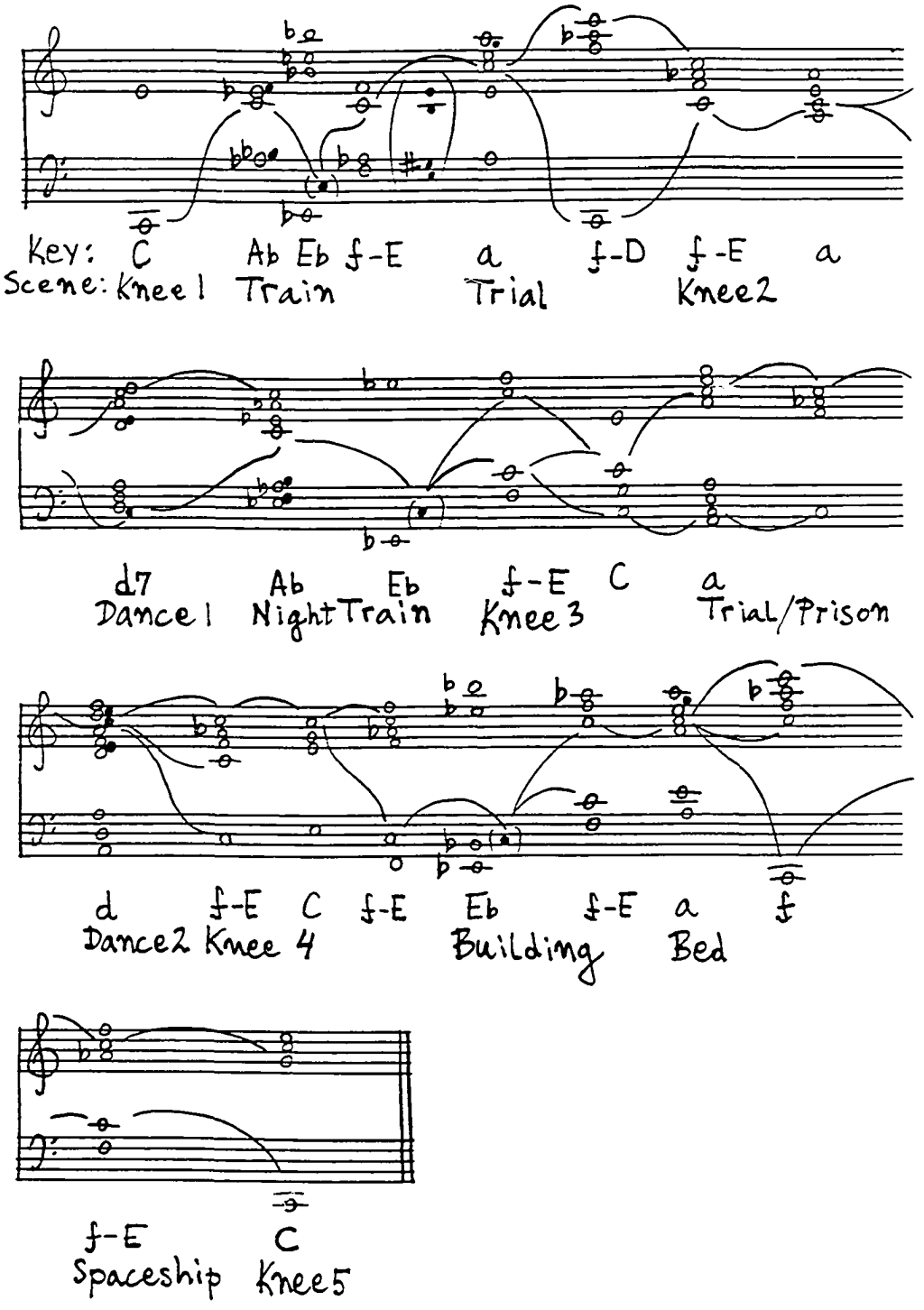
Harmonic Macro-Plan: Opera in C

A significant unifying element of Einstein is the prominence of pitch C, present in virtually all sections of the opera. In sections where C is not the tonic, it is always a part of the tonic chord.

In the previous discussion, the harmonic plan of each theme has been reduced to a single chord-progression. In the context of the macro form, a theme can ultimately be reduced

to its tonic. In Example 4.15, the harmonic plan of the entire opera is shown, with the tonic chords representing each of the themes of Einstein.

Example 4.15: Einstein, harmonic macro-plan.



The prominence of the pitch C is evident. Furthermore, C-Major tonality is used frequently, including at the opening and closing of the opera. Similar to the harmonic plan of "Dance 1," where the main chord (D-Minor 7) is used as an opening, closing, and in between the appearances of all other chords, the key of C Major is used as the main key of Einstein. Therefore, it is possible to characterize Einstein by its main tonal-center, as an opera in C.

Chapter 5

CONCLUSION

This analysis of Einstein has focused primarily on its pitch content, while other musical aspects such as meter, rhythm (including the additive-process techniques), timbre, and dynamics, were not examined.

The metrical/rhythmical aspect has been the primary focus of analyses of minimal music. Too often, analytical processes of minimal works have been limited to the rhythmical/metrical aspect, while the pitch content is given little analytic consideration. In this analysis, an attempt was made to examine a few aspects of the pitch content of Einstein, with special focus on those features that represent an original treatment of the pitch materials involved.

The use of themes and their reappearances within an opera is not a novelty. However, a radical approach, introduced with Glass's thematic organization on the macro-form level, is the total absence of any other materials but the themes. In Einstein, besides the seven different musical themes and their reappearances, there are no transitions, or any other subordinate sections. In other words, the work cannot be divided into "thematically" important and less important sections. The only possible hierarchy that can be found within the sections of Einstein is in the relationships among the themes themselves (Theme in C, as the opening and closing

theme, being the most prominent).

Another element that makes Einstein an exceptional work is its thematic unity, achieved with the systematic use of the melodic contours of the Core Motive. Attempts to unify the musical materials of an opera have been made ever since the Romantic period. However, what makes Einstein unique in this respect is the fact that unity has been achieved in a radical way that leaves no part of the opera without a connection to the Core Motive.

The above-described achievements of Einstein are, to a certain extent, of a technical nature: the consistent use of the themes and the Core Motive does not in itself guarantee a well balanced and original work. An additional element, that makes the pitch aspect of Einstein sound fresh and original, is the use of harmonically ambiguous materials. As has been shown in Chapter 4, very few of the apparently simple harmonic progressions are drawn from traditional harmonic formulas. In the cases where a traditional progression is used, as in Themes in C, A flat, and E flat (VI, V, I), the context in which these progressions appear is always non-traditional: 1) in all of the three themes, the use of the constant repetition and the use of the pentatonic modes within the functional harmonic-context; and, 2) in Themes in A flat and E flat, the ambiguous use of the added non-chordal notes. The blend between the functional harmonies and non-chordal sonorities is yet another achievement of this work. These harmonic

ambiguities represent the materials that are particularly suitable for repetition, since they never sound conclusive.

In this analysis, an attempt was made to examine the pitch content of Einstein, and to examine its organization and underlying rules, regardless of the repetitive techniques or other musical elements, such as the dynamics and timbre. What makes the listening process of Einstein exciting during almost five hours of constant music are not only the rhythmical processes, but the well integrated, diverse, yet highly unified themes, as well as the simple, yet ambiguous and original harmonic language. The pitch aspect of Einstein stands in itself as a well organized and original feature of this opera.

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