REPETITION AND GROUPING:
AN ANALYSIS OF PHILIP GLASS'S _STRUNG OUT_

by

NICOLE DENISE WALKER

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Department of music

The University of British Columbia
Vancouver, Canada

Date October 9, 2003
Abstract

Repetition is a ubiquitous compositional technique in Philip Glass's music. Repetition of specific gestures is used to mark regularly recurring structural points, which in turn affects the way a listener groups musical structures. The intent of this paper is to discuss grouping theories that have specific application to minimalist music, and to attempt to refine certain aspects of these theories, specifically those engaging the various functions of events within groups in terms of their roles as beginnings, middles and endings.

Glass's *Strung Out* will be the principal analytical subject. Further implications of grouping functions of pitches are discussed in the concluding chapter, where memory and anticipation are seen to play a role in the listening experience, as a listener attempts to understand and appreciate the piece as a whole.
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Introduction

"The best thing is to hear it all ways at once: that's the most fun." ¹

This statement, made by Philip Glass during an interview in 1976, was in response to a question of how one should “hear” a particular passage of his music. The concept of different hearings or interpretations of minimalist music was relevant then, and is still, nearly 30 years later, a topic worthy of further study. Since the 1964 performance of Terry Riley’s “In C,” which was supposedly the public’s first exposure to minimalism, the controversial musical movement has evolved significantly. Audiences have heard everything from primitive experimentation to large-scale orchestral and operatic productions. Attitudes towards the study of minimalism have varied widely as well, from initial stages of reactionary distrust and disregard to a conviction that it was the perfect solution to the purported over-complexity and intellectualization of serial music.

There has also, however, been a great deal of critical, theoretical analysis on the subject of minimalist music. Theorists have attempted to understand the structure of this music and, perhaps more importantly, how it manages to enthrall listeners and sustain interest and engagement despite its use of incessant repetition. Analytic work to date has instigated much discussion about principles of grouping: how a listener might approach the “hearing” of a minimalist work as a whole by understanding the relationships that exist between its composite parts. The intent of this paper is to discuss elements of

grouping theories that have specific application to minimalist music and to attempt to refine certain aspects of these theories – specifically relating to the various functions of events within groups in terms of their roles as beginnings, middles and endings – using the music of Philip Glass as its subject.²

Early analysts of minimalist music were at a disadvantage because, as with any “new” music form, there was yet no historical evidence with which to substantiate precise definitions of the stylistic elements involved. In 1988, Dan Warburton wrote an article entitled “A Working Terminology for Minimal Music” in which he acknowledged a need for “presenting a more precise terminology suitable to the analytical requirements of future students.”³ Warburton asserted that, until that time, academics had given minimalist music little critical attention due to the growing popularity of the minimalist movement in the rock-music world, which caused “the handful of academics who had shown interest [to] beat a hasty retreat.”⁴ One academic who had shown interest seven years prior was Wes York, with his detailed analysis of one of Glass’s earlier compositions, Two Pages.⁵ York introduced some of his own terminology, in a sense predating Warburton’s attempt at doing so, in order to better elucidate his arguments. He also raised a critical point about “hearing” the music, which has motivated the theme of this present paper.

² The theories discussed herein do not necessarily pertain exclusively to minimalist music, but can be applied to other types of music as well.
⁴ Ibid., 136.
York used the terms "diminution" and "expansion," which were not new to analysis at that time but still relatively non-specific in their applications. He refers his readers to measure 42 of Two Pages and identifies in this measure two "gestures," labeled here as A and B:

![Figure 0.1. Measure 42 of Two Pages.](image)

He writes the following in his analysis:

A subtle junction is thus made between the gestures labeled A and B. A question arises. Does one hear:

![Alternative musical examples](image)

or

The answer, of course, is that one can hear either or both. The middle G-C can be understood as the end of a subtractive process or as the initiation of the process of building the new tag.⁶

He answers his own question "what does one hear?" by allowing multiple possibilities, implying that there is not one single correct hearing. He then goes on to show, however, that the aforementioned ambiguity is in fact "clarified" by the material in the following measure which substantiates the second of his two proposed hearings. By addressing the fact that subsequent material somehow validates, in retrospect, the interpretation of an

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⁶ Ibid., 73. The musical examples are from York's own transcription of the Shandar recording (#83515), 1975.
ambiguous passage, York is suggesting that the way in which any passage is “heard” can be influenced by the music that follows it. Not only does this undermine his original premise that one can, in fact, hear “either” of the two possibilities, it also weakens his position that it is even possible to hear “both” at the same time. Of course, recognizing an ambiguity in X implies that a listener is to some degree hearing different groupings at one time, but it is by listening to the music that follows X that the listener is able to determine which hearing might be most appropriate. Real-time listening is a very different experience than out-of-time, retrospective analysis, and hearing more than one interpretation at once seems, to me, to be more possible in theory than in practice.

Warburton was also concerned with making sense of the music in real-time rather than solely from an analysis of the score. He writes, “in an analysis of a minimalist composition, events are deemed to be significant because they are heard to be significant, and not the other way around.” It is from this perspective that the following paper will proceed: that interpretation of minimalist works must derive from aural recognition.

Others writers and theorists have broached this subject with similar concerns, and the pervasive argument seems to be that a new mode of listening is required if a better understanding of this music is to be achieved. This involves a recognition of, or submission to, the fact that the goal-oriented tradition of 18th and 19th century Western music had been replaced by a more static, “uneventful” aesthetic in the music of the minimalists. The primary cause of this shift was the compositional use of repetition. In the introduction to his book “Minimalists,” K. Robert Schwarz writes:

In traditional Western classical music, repetition is used within the context of a dramatic, directionalized form. But in Minimalism, repetition is used to create what Glass has called 'intentionless music' which replaces goal-oriented directionality with absolute stasis. Like so much non-Western music, minimalist pieces do not drive toward climaxes, do not build up patterns of tension and release, and do not provide emotional catharses. They demand a new kind of listening, one lacking in 'traditional concepts of recollection and anticipation' as Glass has put it. In minimalism, you will not find the contrasts – loud and soft, fast and slow, bombastic or lyrical – that are the substance of Western classical music. In fact, minimalism challenges our perception of time itself, since the music changes almost imperceptibly over minutes or even hours.

“Recollection and anticipation” are both instinctual and essential to the listening process. Perhaps our traditional concepts of listening should be left behind, but there needs to be, in turn, a substitute or replacement strategy which will allow us to use our innate senses of recollection of anticipation to their fullest potential. Grouping theory, which will be discussed further in Ch.1, deals with relationships between parts, raising questions about why listeners tend to group certain musical units together and others not. This process of grouping is impossible without the use of memory for recognition of similarity and differences between units, and the use of anticipation for predicting continuity or variability. Both of these actions affect how repetition is perceived, how units are grouped together, and how we determine what is the “beginning, middle, and end” of a recognized group. A brief summary of grouping theory and the views of its main proponents will be followed by an analysis of an early work by Philip Glass in an effort to show how different compositional uses of repetition affect our perception of music, and thus our understanding of it.

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CHAPTER I: Grouping Theory

1.1 Background

Theories of grouping in music are based largely on Gestalt theory in the field of psychology. The essence of Gestalt theory is that “the whole is more than the sum of its parts” which, in musical terms, translates to the idea that “the relationship between the notes is more significant than the individual notes themselves.” A piece of music is, in some respects, simply a series of pitches or sound events. It is the organization of these events that determines how a piece sounds, which in turn determines how it is perceived by a listener. Composer intent does not necessarily factor into the equation: a composer can intend for two or more notes to “go together,” but the contextual factors engaging those two notes will influence whether or not they are perceived as a group. The identification of these factors has been the work of many theorists, but perhaps the most prominent in the field is that of Fred Lerdahl and Ray Jackendoff who developed what they call a theory of musical cognition.

1.2 Literature Review: Lerdahl and Jackendoff

Lerdahl and Jackendoff co-authored the book “A Generative Theory of Tonal Music” in 1983, which proved to be a landmark publication in the music academic world. Several articles pre-dated the release of this work, all of which revolve around the idea of heard structure, which they define as “all the structure a listener unconsciously infers when he

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listens to and understands a piece." In an article published in 1977 they postulated that
an educated listener brings a certain amount of unconscious knowledge to a piece of
music, referred to as “musical intuition,” which “allows him to organize musical sounds
into coherent patterns.” This process of organization is understood by Lerdahl and
Jackendoff to be instinctive, something a listener does naturally rather than through
contrived or conscious effort. They do not go so far as to suggest that principles of
grouping are universally agreed upon and understood by all, only that within the
musically educated population there are certain more natural ways of hearing which can
be observed, and therefore classified. They write:

The “educated listener” is an idealization. Rarely do two people hear the
same piece in precisely the same way or with the same degree of richness.
Nonetheless, while it is conceivable to hear a piece any way one wants to,
there is normally substantial agreement on what are the most natural ways
to hear a piece. Our theory is concerned not with the particular instances
of hearing, which are always subject to a degree of variability, but with the
idealized underlying competence which the educated listener brings to
bear in understanding tonal pieces.

While allowing for individual variances, they assert that certain musical situations will,
by virtue of their context, elicit a similar response from most people. These are referred
to in their writings as “preferred” ways of hearing, which will be discussed in more detail
in the following synopsis of their theory.

11 Fred Lerdahl and Ray Jackendoff, “Toward a Formal Theory of Tonal Music,” Journal of Music Theory
21/1 (1977): 111-171, at 111. Lerdahl and Jackendoff define an educated listener as “not necessarily a
trained musician, but a listener who is aurally familiar with the musical idiom in question”.
12 Lerdahl and Jackendoff, “Toward a Formal Theory,” 111-112.
1.3 Lerdahl and Jackendoff’s Theory: a brief summary

Modeling their theory after the Chomskian model of linguistic theory, Lerdahl and Jackendoff developed a system of rules to form a musical grammar.13 Their aim was to generate a set of structural descriptions for pieces of tonal music. They posit that it should be, and assert that it is, possible to provide a structural description for series of musical events through the use of diagrams and reductions, and that these diagrams can be determined by following a set of rules. These rules are based on intuitive understandings or “preferences” – derived from the musical intuitions described above – and should, ideally, allow for multiple hearings of a piece of music: “if a piece can convincingly be heard in several ways, the theory should give it a different structural description for each way of hearing it.”14 Their aim, therefore, was not to create a prescriptive grammar, one that would dictate how music should be heard, rather to find a detailed and precise way of describing the factors that determine how music is heard, and ultimately to better understand how that translates to our understanding of it.

Lerdahl and Jackendoff’s theory states that heard musical structures are hierarchical. They define hierarchy as “an organization composed of discrete elements related in such a way that one element may subsume or contain other elements.”15 They describe four types of hierarchical structures: grouping structure, metrical structure, time-span reduction, and prolongational reduction. They give a brief description of each of these domains in their article in 1983 “An Overview of Hierarchical Structures”:

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14 Lerdahl and Jackendoff, “Toward a Formal Theory,” 113.
Grouping structure describes the listener's segmentation of the music into units of various sizes, metrical structure describes the hierarchy of beats that he attributes to the music, time-span reduction establishes the relative structural importance of pitch-events within the heard rhythmic units of a piece, and prolongational reduction develops a hierarchy of pitch stability in terms of perceived patterns of tension and relaxation.\textsuperscript{16}

Each area of analysis is related in the sense that, although dealing with different musical situations, they all serve the same function: identifying events that are structurally more or less significant than other events. They also have in common the fact that "the processes of organization are essentially the same at all hierarchic levels."\textsuperscript{17} The acknowledgment of a hierarchical system is to show that the preference rules work on multiple structural levels, and not, as might be presumed, to give a hierarchical ranking to the different preferences themselves. This is a critical point in terms of the application of their theory: where one or more preference rule may apply to a situation, there is no larger "rule" to dictate which should be considered more credible. When preference rules work together, it strengthens a specific hearing of a musical passage; however, when the rules conflict and two or more possible hearings are supported by different rules, each hearing is seen to be as acceptable as the other. "Thus the grammar marks not the categorical correctness or incorrectness of an analysis but rather its relative viability."\textsuperscript{18}

Lerdahl and Jackendoff's work responds to a large body of scholarship related to structural perception. The portion of their theory that is most directly applicable to a discussion on grouping theory is that which deals with the preference rules themselves.

\textsuperscript{16} Ibid.
\textsuperscript{17} Lerdahl and Jackendoff, "Toward a Formal Theory," 116.
\textsuperscript{18} Lerdahl and Jackendoff, "An Overview," 232.
The grouping preference rules relate to three categories – *articulation of boundaries*, *parallelism in structure*, and *symmetry* – which are described below:

*Group boundaries* are articulated by such factors as distance between attack points, rests, slurs written into the music, change in register, change in texture, change in dynamics, and change in timbre. A further articulatory device is the harmonic cadence, which from the phrase level upward normally signifies the ending of groups.

*Parallelism in structure* involves some kind of repetition or similarity in the music, such as a motive, a sequence, a section, and so forth. The similarity is particularly crucial at the beginning of groups; for even if they diverge later on, they are still perceived as parallel. In tonal music, parallelism is the major factor in all large-scale grouping.

Related to parallelism is the principle of *symmetry*, which states that the ideal subdivision of any group is into equal parts.\(^\text{19}\)

### 1.4 Responses to Lerdahl and Jackendoff’s Theory

Although Lerdahl and Jackendoff’s theory was ground-breaking for its time and has remained influential to the present day, it is not without its critics. Eric Clarke, in his evaluation of *A Generative Theory of Tonal Music*, writes that the thing that made Lerdahl and Jackendoff’s theory so unique – that it was flexible enough to accommodate several different interpretations of any piece of music – is the very thing that prevents it from being truly conclusive. As was mentioned in the above synopsis, in situations where there are conflicting interpretations and two preference rules may apply to a single situation with different results, there is no rule dictated by the theory stating which should be the *preferred* preference rule. Clarke calls this “theoretical spinelessness”\(^\text{20}\) and

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\(^\text{19}\) Lerdahl and Jackendoff, “Toward a Formal Theory,” 118.
suggests that there needs to be a means of determining a single, definite interpretation
that is a "correct" way of hearing, to which other possibilities may be relative.

Another of Clarke's criticisms of the theory is that it presents a "static and non-processual
view of musical structure."21 He writes:

All their generative principles assume that the whole of a musical structure
is entirely, and simultaneously, available as an information source at any
moment. This is, of course, very far from the real situation, in which
structural information becomes available over time in a continuous
unfolding process.22

As with any analytical approach to music, the element of real-time hearing risks being
neglected, or under-valued. However, Lerdahl and Jackendoff made concession for this
potential weakness in their theory when they stated that "the theory provides structural
descriptions only for the final state of a listener's understanding of a piece."23 This was
qualified by the comment: "We do not disparage theories of real-time processing; they
are an essential part of a complete psychological theory. But, methodologically, it
appears crucial to characterize mental structures before asking how they are computed
over time."24 The listening experience is of course fundamental to their theory, but we
need to be reminded of the underlying Gestalt principle: that any musical process
occurring in time must first be recognized as a series of individual events, each with its
own distinct musical content, and each having its own role to play in structural
organization.

22 Ibid.
24 Ibid., footnote 2 on page 230.
Other writers have expanded upon certain elements of Lerdahl and Jackendoff’s theory. Such is the case with Irene Deliege in her article published in 1987, “Grouping Conditions in Listening to Music: An Approach to Lerdahl and Jackendoff’s Grouping Preference Rules.” Deliege, like Clarke, was dissatisfied with Lerdahl and Jackendoff’s treatment of conflicting rules. She set up two experiments which were intended to test the preference rules by using a variety of musical sources, comparing preferences of both musicians and non-musicians, and asking whether the rules were “of equal perceptual salience.” Her findings did not conclusively discount the validity of the preference rules as proposed by Lerdahl and Jackendoff, but they did introduce some new ideas worthy of note in this context: first, that musical training is a relevant factor in perception due to more coherent memory activity; second, that there does seem to be a hierarchical system governing the organization of the rules, what she calls “a relative salience scale,” which had not been addressed in Lerdahl and Jackendoff’s writings; and third, the idea that the concept of “preference” is subjective and allows for individual creativity.

The first of these observations addresses memory as a factor in the grouping process. She writes that “the way one hears music is crucially dependent upon what one can remember of past events.” This issue will be particularly relevant in the analyses later in this thesis. Her third observation, however, which I will address further in Chapter 4, introduces something new: the idea that an individual is an active participant in the

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26 Ibid., 325.
27 Ibid., 355-6, 357 and 330 respectively.
28 Ibid., 356.
listening process. Deliege asserts that the act of grouping, which involves making decisions about which preference rules to apply to any given musical situation, requires an act of conscious choice by the listener. Because listening is a real-time experience, these choices are being made in continuous fashion over the duration of the music. With every musical event heard in succession, there needs to be an element of active engagement on the part of the listener in order to draw correlative relationships between the events as they happen. Whether it be “the choice in the cases of conflict between rules, or the omission or addition as well of segmentations as chosen by the listener,”\(^{29}\) individual creativity is a factor in perceptual organization. She equates this to an act of composition on the part of the perceiver, and writes that “organization and preferential selection... cannot be considered a passive process.”\(^ {30}\)

This is something that minimalist composers have addressed in reference to their own music. Steve Reich has often commented that the listener is as much an active participant in a performance as the performer is, and Philip Glass writes of the relationship between the performance and the audience member, stating that “the power of the work is directly proportional to the degree to which we succeed in personalizing it.”\(^ {31}\) This idea is perhaps best summarized by the quote presented in Deliege’s article: “listening is not just hearing, just like looking is not just seeing.”\(^ {32}\)

\(^{29}\) Ibid., 330.
\(^{30}\) Ibid.
1.5 Other Contributions to Grouping Theory

There have been numerous articles written on the subject of grouping in music. Two of note are James Tenney and Larry Polansky’s “Temporal Gestalt Perception in Music” and, more recently, David Lefkowitz and Kristin Taavola’s “Segmentation in Music: Generalizing a Piece-Sensitive Approach.”

Tenney and Polansky’s article attempts to formulate gestalt theory specifically in temporal terms, as originally gestalt thinking was limited to visual/spatial elements. They draw the analogy between time in a historical sense and time in a musical sense being grouped into units:

For the historian, time is not the undifferentiated “continuum” of the theoretical physicist, but a hierarchically ordered network of moments, incidents, episodes, periods, epochs, eras, etc. – i.e., time-spans whose conceptual “boundaries” are determined by the nature of the events or processes occurring within them... Similarly for the musician, a piece of music does not consist merely of an inarticulate stream of elementary sounds, but a hierarchically ordered network of sounds, motives, phrases, passages, sections, movements, etc. – i.e., time-spans whose perceptual boundaries are largely determined by the nature of the sounds and sound-configurations occurring within them.

A time-span is labeled “TG” for temporal gestalt-unit and is defined as a distinct span of time that is “both internally cohesive and externally segregated from comparable time-spans immediately preceding and following it.” They claimed, at that time, that little had been written on the perception of TG’s in the current literature and they therefore sought to explore in more detail how perceptual boundaries are determined by a listener.

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36 Ibid.
They also asked to what extent the factors involved in temporal gestalt perception are 
objective, "bearing some measurable relation to the acoustical properties of the sounds 
themselves," and if in fact there are such objective factors, "is their effect strong enough 
that one might be able to predict where the TG boundaries will be perceived, if one 
knows the nature of the sound-events that will occur?"\textsuperscript{37}

In investigating the first of these concerns, Tenney and Polansky found that \textit{proximity} and 
\textit{similarity} could be sited as the most important factors in TG perception.\textsuperscript{38} Not unlike 
Lerdahl and Jackendoff's grouping preference rules, these factors utilize elements of 
duration and content in determining the relationship between successive parts:

In the ongoing process of perception in time, TG-boundaries are 
determined by successive \textit{TG-initiations}. This obviously applies to the 
beginning of a TG, but also to the \textit{end} of it, since the perception that it has 
ended is determined (in the monophonic case, at least) by the perception 
that a \textit{new} TG at that same hierarchical level has \textit{begun}.
\textsuperscript{39}

This reiterates the necessity for real-time hearing in the act of group perception, where 
\textit{beginnings} and \textit{endings} of TG's are seen as interdependent counterparts of the same 
process of recognition during the passage of time. What marks the initiation of a new 
event is \textit{difference}. Grouping from this perspective is heard as consequence of relative 
difference between events, "whether this is a difference in starting-times, or pitch, or 
intensity, or any other attribute of sound," but it is not the difference per se that is of 
importance, but "rather the \textit{relative differences} (in \textit{any} parameter) that seem to be

\begin{flushright}
\textsuperscript{37} Ibid., 206 \\
\textsuperscript{38} Ibid., 208. \\
\textsuperscript{39} Ibid., 208. Tenney and Polansky's model was limited, in the same way that Lerdahl and Jackendoff's 
theory was, to music in the monophonic medium.
\end{flushright}
crucial.” Therefore groups are determined not by the extent of the disparity from one to another but by the instigation of difference relative to a previously heard event, which is an entirely time-dependent phenomenon.

A second concern for Tenney and Polansky is the predictability of TG’s. They discuss the “decision-delay” which refers to the time between the “moment of initiation of a TG and the moment at which this TG-initiation can be perceptually determined or known.” This is more in the field of perception and cognitive psychology than the purely musical conception of group recognition, but it raises some important issues about the function of memory in the grouping process as well as a listener’s ability or inclination to predict continuation of an established pattern. The essence of their argument is that with repeated hearings, and increased familiarity, a listener’s “decision-delay” becomes smaller, often to the point of non-existence, which results in the prediction of a TG before it has in fact been heard. Their model suggests that “the primary function of both memory and anticipation is to diminish the delay between the moment of occurrence of a TG and the moment of recognition of its gestalt boundaries, and eventually to bring these into synchrony.” This imposes a new perspective on the listening process as it pertains to grouping: when a musical segment is repeated, the event that begins the segment will be heard, increasingly so with each repetition, as a beginning event and will be considered such in future contexts. This means that a listener is likely to impose grouping functions onto a segment of music from the hearing of a single event, before the rest of the segment has even been heard.

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40 Ibid., 211.
41 Ibid., 236.
42 Ibid.
Lefkowitz and Taavola approached their research from a perspective similar to that of Tenney and Polansky. Their aim was to observe principles of grouping during the listening process, using concepts of continuity and discontinuity to find a "musically-responsive weighting of different parameters' effect on perceptual grouping."43 They claim that their theory is "a tool for thinking in music – listening, performing, analyzing, and composing: it breaks music up into analyzable chunks, it helps evaluate the way Domains interact with each other, and it provides new ways of thinking about music in general."44 Grouping in this context is defined as the act of segmentation, or "the process of parsing a composition into meaningful parts."45 Segmentation is said to occur "where the rate of change becomes smaller or larger," an idea which is articulated in their Segmentation Algorithm as "change in the rate of change."46 Ultimately, they derived the dictum "the strength of a group is defined by the strength of its boundaries," which places a greater emphasis on the beginning of an event rather than the "internal cohesion" of a segment. This, as in Tenney and Polansky's treatment of TG-initiations, brings the focus of the grouping process to the single initiative event more than to the content of the group itself. In the "further implications" segment of their article, Lefkowitz and Taavola write:

The concept of "change in the rate of change" – vis-à-vis psychological perception – raises some provocative and important points. It is well understood in the psychology of perception that if a stimulus is unchanging, it will tend to disappear from conscious awareness, whether actually (as in the case of an unchanging visual stimulus projected onto a specific point on the retina, for example), or effectually (as in the case of air conditioner noise in an office building). But if we substitute for the word "stimulus" an entire Domain, it quickly becomes clear that one can

44 Ibid., 172.
46 Ibid.
develop a novel and powerful theoretical approach towards a great deal of music.  

Their segmentation algorithm was very much intended to be used in a real-time setting, what they refer to as an “as-flow” rather than an “out-of-time” approach to music. It treats music, they claim, “as something to be perceived by human beings in time” and shows a concern for the actuality of the listening process.

1.6 Grouping Theory and Minimalism

None of the above-mentioned theories was designed specifically for the treatment of minimalist music, yet each contributes in a substantial way to this particular field of study. Lerdahl and Jackendoff use the term “tonal music” in their writings, but claim that “a theory about a particular type of music is, ideally, a subset of a theory of all music.” They state that their theory of tonal music was intended with a larger perspective in mind, and that “while many of [the] specific rules are applicable only to tonal music, the basic components of the theory are designed to accommodate music of different traditions and historical periods.” Minimalism is generally considered to be essentially “tonal” in character, but perhaps this is by virtue of the fact that the alternative classification would be the “atonal” idiom, to which minimalism clearly does not belong. The harmonies themselves are, characteristically, static, non-chromatic, and tend to stay within the typical “tonal” range of available chords. Yet the term “tonal music” implies more than just harmony. In that term is imbedded a multiplicity of assumptions about the function

48 Ibid., 171.
49 Ibid., 220.
50 Lerdahl and Jackendoff, “Toward a Formal Theory,” 112.
51 Ibid.
of the harmonies, perhaps most significant being the cadential motion V-I signifying closure. The “educated listener” as described by Lerdahl and Jackendoff is likely to be familiar with the idiomatic nature of tonal structures, and is therefore likely to approach listening, and consequently grouping, from this perspective. With this in mind, the specifics of the theories discussed above become less relevant than the essential principles of grouping that can be extracted from them where minimalist music is concerned.

Lefkowitz and Taavola purport that their theory is inclusive of both tonal and non-tonal music, indicating that it is applicable to a wide range of musical styles.52 They refer specifically to minimalism in their discussion of change, stating that some of Philip Glass’s music (Akhnaten is the example given in their text) represents an extreme instance where “pitch patterns are repeated unchangingly at great length.”53 In listening to this music, the “unchanging stimulus would, according to the psychology of perception, tend to disappear from conscious awareness” and the listener “would likely attend to other Domains to appreciate the composition.”54 The “other Domains” would be those parts of the composition that a listener could focus on, for example shifts in timbre, or rhythmical, metrical and hypermetrical interactions.55 The question is raised by Lefkowitz and Taavola, “what remains in minimalist music, when the repetitive patterning is removed from conscious awareness?”56 And the answer given is that it may

53 Ibid., 193.
54 Ibid.
55 Ibid.
56 Ibid.
be either a great deal or very little, depending on what other musical elements are at work in any given composition.

Minimalism has always been criticized for its excessive use of repetition. However, it would do this music a great disservice to assimilate all repetitive structures into one unyielding analytical category. What I hope to achieve with the following analysis is a more comprehensive look at different compositional uses of repetition and their effects on hearing, both at the micro level dealing with individual grouping functions of pitches, and the macro level where groups themselves are seen to function as indicators of larger group structures. Glass's proposition that the best way to hear music is "all ways at once" not only assumes multiple ways of hearing, but also that they can be assimilated into one overriding listening experience. Perhaps on a theoretical level this is possible, but grouping theory – as a broad construct comprised of the principles taken from the above mentioned theories – suggests that there are other factors involved that prevent one from simply hearing music all ways at once. These factors are, specifically:

a) preferred, or "natural" ways of hearing based on the principles of articulation of boundaries, parallelism in structure, and symmetry as outlined by Lerdahl and Jackendoff and by Tenney and Polansky's notions of proximity and similarity;

b) the idea that the moment of initiation, or beginning of a group is an essential cue for grouping, one strongly affected by repetition and by diminishing "decision delay" induced by familiarity or by introducing change in the form of relative difference; and

c) the real-time listening experience, which varies with such subjective aptitudes as memory, anticipation, and individual creativity.

These three points will be discussed in the following chapters as they relate to the issue of listening to and grouping musical structures as they are heard.
CHAPTER II: Event-by-event Grouping in Philip Glass’s *Strung Out*

2.1 A Brief History

Glass’s earliest acknowledged works date back to the mid-1960’s, a time when music was undergoing a great deal of change. John Cage had already become an important figure in the music world, having influence on ideologies in both popular and academic circles, and La Monte Young and Terry Riley had begun preparing the way for what would ultimately be known as the “minimalist movement” with their repetitive, harmonically static compositions.

Glass’s signature technique in his early period was what he called “additive process,” which has been attributed to his involvement with Ravi Shankar and his interest in Indian music. He once, perhaps naively, compared the division of time in Western and Indian traditions, implying that the two systems differ fundamentally in their approach to grouping.57 This comparison is often used to support the idea that his compositional style is derived primarily from an attitude that “all the notes are equal;” an idea that is in direct contrast to Western views of hierarchy. Glass defines “additive process” in the following way:

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. An simple figure can expand and then contract in many different ways, maintaining the same general melodic configuration but,

57 In *Music by Philip Glass*, he writes, “In Western music we divide time – as if you were to take a length of time and slice it they way you slice a loaf of bread; in Indian music (and all the non-Western music with which I am familiar), you take small units, or “beats,” and string them together to make up larger time values” (p. 17).
because of the addition (or subtraction) of one note, it takes on a very different rhythmic shape.\textsuperscript{58}

This compositional technique was not, however, used exclusively in his early works, nor was it employed consistently with strict adherence to his own definition. Keith Potter writes that “works immediately pre-dating \textit{1+1}, such as \textit{Strung Out}, clearly also use a kind of additive process, but this is looser, more intuitive.”\textsuperscript{59} He goes on to suggest that Glass’s technique was only indebted to Indian music on a superficial level, and was more his own personal manifestation of a compositional ideal:

The kind of additive processes which Glass made the basis of his own music are not, however, to be found in Indian practice; even the rigorous application of these is not a direct borrowing but an extrapolation of the composer’s own from the Indian approach to rhythm.\textsuperscript{60}

In the following analysis of \textit{Strung Out}, I will explore Glass’s use of additive technique, discussing how repetition affects the way pitches are perceived by a listener, and how that perception impacts grouping decisions.

\section*{2.2 The Piece}

\textit{Strung Out} is said to be a “first step” in Glass’s progression towards a more systematic method of composition, utilizing an “intuitive” rather than rigorous approach to additive processes as described above.\textsuperscript{61} Composed in 1967, \textit{Strung Out} is scored for solo amplified violin. The violinist must read printed manuscript pages that are “strung” around the performance area, and “manoeuver round the space thus becom[ing] part of

\footnotesize
\begin{itemize}
  \item \textsuperscript{58} Philip Glass, \textit{Music by Philip Glass} (New York: Dunvagen Music Publishers, Inc., 1987), 58.
  \item \textsuperscript{59} Keith Potter, \textit{Four Musical Minimalists} (Cambridge: Cambridge University Press, 2000), 272.
  \item \textsuperscript{60} Ibid., 273.
  \item \textsuperscript{61} Schwarz, \textit{Minimalists}, 120.
\end{itemize}

\small
the event." The music presents a steady stream of eighth notes (this continuity is broken only twice for short periods of time) and the pitch content is gradually increased so that the full diatonic collection within the span of a single octave is eventually heard. The pitch content gradually increases to fill in the span between D4 and E5 with all pitches from the C major diatonic collection. The example below indicates the order in which the pitches enter:

![Figure 2.1. Order of pitches in Strung Out.](image)

Being a monophonic work, it is exemplary for the application of grouping theory principles. There are no notated barlines, although pitches are beamed together in discrete groups ranging in size from three to fifty-two notes. The pitches are further organized into smaller units of two, three, or four by slurs, such that slurs are always contained within beamed segments. The performer is instructed to play the piece "mechanically," perhaps implying that the series of pitches is meant to be presented more methodically than emotionally. This would result in the hearing of these pitches more as a "progression of sounds" than an artistic rendering of a piece of music.

Potter claims that "for the listener, Strung Out is disconcerting. It is hard to get much out of such simple music, and in particular to concentrate on its progress, when what appears logical on a note-to-note level cannot be 'read' on a note-to-note level as it unfolds, when rigour is implied but not offered." A closer examination of the unfolding of Strung Out

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62 Potter, *Four Musical*, 278.
63 Ibid., 279-280.
will allow for a more comprehensive discussion about grouping principles as they apply specifically to this piece.

2.3 Analytical Terms

Before beginning the analysis, it is important first to define the relevant terminology. For the purposes of this paper, the following grouping-related terms and their meanings will be employed:

- **event** – a pitched sound or silence that has a definite beginning and end

- **figure** – a series of two or more events that are grouped together having a clear beginning event and often but not necessarily having a distinct middle and an end event (equivalent to Tenney and Polansky’s concept of a “TG”)

- **unit/group** – any collection of events that are related but do not necessarily constitute a figure

- **beginning** – the initiation of a figure, marked by an event that is contrasting enough to the preceding event that it is heard as change

- **secondary beginning** – an event with characteristics of a beginning but does not necessarily function as the initiation of a figure; often not distinguishable from a true beginning in a real-time listening situation, but requires retrospective analysis to be identified in light of subsequent musical material

- **middle** – the content of a figure after its beginning and before its end (middle pitches are also called continuing pitches)

- **end** – the last event in a figure, indicated either by grouping principles that imply closure or by the fact that it is immediately followed by a beginning

- **repetition** – the re-enactment of an event or figure

In general, Glass’s figures tend to be easily identifiable due to their minimal pitch content, and are often repeated in immediate succession by either exact repetition or varied repetition. In this piece, varied repetition is more frequently employed through the use of additive and subtractive processes (where a figure is first presented and then
repeated with one note either added or subtracted). The essential difference between these two types of repetition is the resultant length of the figure: with exact repetition, the repeated figure has the same duration as the original, hence the same number of pulses; with varied repetition, the duration of the figure is altered with each presentation. Variation also affects the listener’s perception of pulse.

This introduces the issue of perceived meter, which is directly related to how pulses are heard and organized. Meter is a difficult term to describe, but will be used broadly in this context as Christopher Hasty has defined it, as a measurement of duration.³⁴ Closely connected to meter is rhythm, what Hasty calls a process of articulation:

> All things we call rhythmic are articulated; what is, in fact, utterly homogeneous or lacking internal distinctions cannot be rhythmic. And yet, the articulated parts or phases must be continuously connected – they must flow together as a whole, diversified but unbroken.³⁵

Therefore any event that is said to function as a beginning has, by definition, some articulatory capacity, and consequently plays a role in the process of establishing meter through rhythmic articulation.

Also of importance in this analysis are concepts of projection and durational potential, both terms used by Hasty in his discussion of meter. Closely related terms, they jointly refer to the process involved in grouping that has to do with expectancy. In his own words:

> projective potential is the potential for a present event’s duration to be reproduced for a successor... [I]t is not the potential that there will be a successor, but rather the potential of a past and completed durational

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³⁵ Ibid., 67.
quantity being taken as especially relevant for the becoming of a present event.66

This is to say that the expectation of a duration, or span of time delineated by clearly articulated group boundaries, is as essential to the process of perception as is the expectation of a repeated series of pitches.

Other terms such as memory, anticipation, hearing, and real-time listening have no exceptional definitions, but will be used in the manner in which they were discussed in Chapter 1.

2.4 Analysis

The opening of Strung Out uses only five pitches: E4, G4, C5, D5 and E5. The printed score shows various series of these pitches grouped with beams, and sub-grouped within these beamed figures with slurs. The first five pitches are notated in this way:

![Figure 2.2. First five pitches in Strung Out.](image)

The beam visually isolates these pitches as a distinct unit, and the slurs suggest a 2 + 3 grouping structure within this unit. From the perspective of a listener, there are several reasons why one might be inclined to classify them as a figure upon first hearing:

1. Harmonically, four of the five pitches outline a CEG triad, implicating C major as a potentially functional key, with the D as a passing tone. The figure could be seen to begin on the mediant, skip to the dominant, leap to the octave mediant, then descend in stepwise motion to the tonic. This stepwise descent alludes to a closural formula, suggesting C5 as an end.

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66 Ibid., 84.
2. Although all notes express the same duration, the tendency would be to hear the E4 and E5 as rhythmically accented, thus acting as points of beginning – the E4 as a sound event after silence (relative difference), and the E5 as a repetition of the opening pitch (an octave higher). E5 is also a contour peak and leap accent, thus ending a series of upwards leaps and initiating downward step motion in contrast.

3. A performer may be influenced by the notation to play these five pitches as though they were belonging to a group, perhaps stressing the E4 to mark the beginning and trailing off at the end of the EDC descent in an effort to “shape the phrase.” If the performer chose to change bow direction on the E5 to demarcate the slurs, an accent would be perceptible on this pitch which would strengthen the hearing of these five pitches in the 2+3 structure implied by the notation.

But without knowing what follows the C5 at the end of this five-note pattern, it would be difficult to say with any certainty that any of the above arguments were enough to identify this pitch sequence as a coherent group. In other words, there is no musical reason to consider the C5 a point of ending unless there is, directly following it, a subsequent point of beginning. There are still a number of possible options following the C5 that a listener might expect based on the presentation of these five pitches.

For example, it would not be surprising to hear the descending step motion continue to B4 in this way:

![Figure 2.3](image)  
**Figure 2.3.** First option: C5 followed by B4.

This would weaken the hearing of a C major tonality in favour of E minor, negating the possibility of hearing C5 as an “end” point for purely harmonic reasons. The addition of

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67 For all figures in this analysis, a dotted beam or slur indicates a note or slur that is not literally present in the work but suggested for theoretical purposes.
a note to the second group of slurred pitches would not detract from hearing E4 and E5 as slightly accented (for reasons mentioned above) but would significantly challenge the notion of a "five note figure," as B is a logical extension of the falling E-D-C motion and would therefore naturally be included in the grouping.

Even breaking the stepwise pattern with a downward leap (Fig. 2.4) or changing direction with an upward step (Fig. 2.5) would give sufficient cause not to hear C5 as an ending:

![Figure 2.4. Second option: C5 followed by A4.](image1)

![Figure 2.5. Third Option: C5 followed by D5.](image2)

In the first instance, the continuity of direction to a relatively inconsequential pitch would encourage a listener to hear the A4 as an extension of a general downward trend, which may in all likelihood continue. In the second case, stepwise motion is preserved, and the D5 might be heard as a return to the previous D5 with C5 acting as an embellishing pitch. In both instances, the sixth pitch presented would be part of an overall gesture (downward motion and stepwise motion respectively) and thus be reasonably conceived as belonging to the immediately preceding notes in the sense of a group.

Moreover, in figs. 2.3, 2.4 and 2.5, there is a suggestion of a quarter note pulse that works against hearing the C5 as an ending. Because of the emphasis on the E5, the first two pitches can be seen as a distinctive, separable unit. Identifying these two pitches as a group followed by two more of equal duration and with an equally clear beginning point,
it might be assumed that the duration of the first group will be repeated in the second. Hence a listener might anticipate to hear continuation, and would instinctively consider the \(<E_5 D_5> \) dyad as a group in itself. The notated slurs contradict this reading, but, for a listener, the repeated series of quarter note dyads appears strong enough to imply that the C5 might be functioning as a beginning of a new event:

![Quarter note pulse implicating C5 as an ending.](image)

**Figure 2.6.** Quarter note pulse implicating C5 as an ending.

What these examples show is that at this point in the piece, E4 and E5 have clear beginning functions, but C5 is not yet given a definitive role in terms of its contribution to the grouping structure. What does serve to clarify the function of this pitch is the appearance of the two pitches that actually follow:

![C5 followed by the \(<E_4, G_4>\) dyad.](image)

**Figure 2.7.** C5 followed by the \(<E_4, G_4>\) dyad.

Although it is a downward leap, which, as discussed in relation to Fig. 2.4, might be seen as a continuation of general downward motion, there is one essential difference in this instance: E4 is not an inconsequential pitch. It is the opening pitch of the piece, so this event brings a registral return to the first substantial point of beginning. And it is the first time a pitch has been repeated thus far in the work, which suggests the possibility of

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68 I refer here to Hasty’s discussion of repetition in which he defines *projective potential* as “the potential for a present event’s duration to be reproduced for a successor” (in “Meter as Rhythm,” p. 84).
repetition in the form of parallelism. Followed by this new beginning, the C5 can now be definitively realized as an ending and the five notes can be grouped together as a distinct musical figure.

Once a figure has been identified, a listener may intuitively begin to build a set of associations about its constituent pitches and their respective grouping functions. In this particular figure:

![Figure 2.8](image.png)

**Figure 2.8.** First five pitches of *Strung Out* identified as a “figure”.

E4 serves as a *beginning* pitch; G4 can be seen as a *continuing* pitch or an *ending* pitch, depending on interpretation; E5 is a *secondary beginning* pitch, because it has beginning characteristics but does not yet clearly function as the initiation of a figure in the same way that E4 does; D5 is a *continuing* pitch; and C5 is the *ending* pitch that concludes the figure. Once a particular grouping function has been assigned to a pitch, it is then possible to compare future presentations of that pitch to the original in terms of the role it plays in grouping processes. When a pitch’s grouping function is repeated, it reaffirms the hearing of that pitch in a particular role, and increases the likelihood that a listener will begin to expect it to perform the same function in future events; when a pitch’s grouping function is changed, it creates ambiguity and allows for new grouping possibilities, consequently challenging previous expectations a listener might have had about how it will function in future events.
Hasty’s ideas on projection and prediction are particularly relevant here. In the chapter entitled “Meter as projection” in *Meter as Rhythm*, his primary claim is this:

Two immediately successive events begun with sound will necessarily result in projection if the first event is mensurally determinate and the duration of the second sound is not greater than that of the first event.\(^{69}\)

To apply this statement to the analysis at hand, if a listener is presented with a figure of determinate duration and the event which immediately follows begins with sound and does not exceed that duration, the tendency will be for the listener to predict – or expect to hear – the same duration in the second event. Hasty goes on to say that this act of prediction is “involuntary” and that “we will feel the becoming of this more or less determinate duration whether we choose to or not.”\(^{70}\) As discussed earlier, *expectation* is an inextricable component of repetitive music. Further analysis of *Strung Out* will show how specific applications of grouping principles affect our perception of repetition where the individual grouping function of pitches is concerned.

The five-note figure that begins the piece will be referred to henceforth as X. As shown above in Fig. 2.6, the pitches immediately following X are the same pitches that began it, the <E₄, G₄> dyad. Upon hearing these two pitches for the second time, a listener is aware that repetition is happening but is unsure of the extent to which it will be made manifest. A natural assumption would be that X, having been clearly defined at the outset of the piece and begun again in immediate succession, will be repeated without variance, in *exact repetition*. Lerdahl and Jackendoff’s preference rules relating to parallelism and symmetry can be applied here, as can Hasty’s theory of projection where

\(^{69}\) Hasty, *Meter as Rhythm*, 92.

\(^{70}\) Ibid.
hearing the repeated <E4, G4> will initiate a sense of expectancy. This is what follows:

\[
\begin{array}{c}
\text{X} \\
\begin{array}{cccc}
\text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} \\
& & & \\
\end{array}
\end{array}
\]

**Figure 2.9.** Four notes following figure X.

Upon hearing this third presentation of the <E4, G4> dyad, it is clear that the original five-note figure is not being repeated. But it is still possible for the durational potential to be realized, if the next event were to be, for example, a C5:

\[
\begin{array}{c}
\text{X} \\
\begin{array}{cccc}
\text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} & \text{\textbackslash G\textbackslash A\textbackslash F\textbackslash E} \\
& & & \text{\textbackslash C\textbackslash A\textbackslash G\textbackslash E} \\
\end{array}
\end{array}
\]

**Figure 2.10.** C5 as a possible pitch to follow the second <E4, G4> dyad.

In this instance, the repeated figure retains the beginning- and end-functioning pitches of E4 and C5 respectively, and there is still a strong 2+3 division with secondary beginning points on the third eighth beat in each case. Even though the internal pitches of each figure are different, the missing E5 and D5 in this example, there is still enough criteria met to confirm expectations of repetition: the grouping function of structurally significant pitches remains the same, strengthening their role as beginning and end points, and the durational potential of the first figure is confirmed in the second.

However, the C5 is not heard at this point. Instead, the presented series of pitches is as follows:
Unlike the hypothesized example above, here projection of this five-note group is denied and grouping functions are less stable. Up to this point in the piece, each repeated pitch has retained its originally assigned function: E4 and E5 are beginnings and C5 and G4 are endings, with the latter of each pair being the weaker of the two. In X, D5 was assigned a continuing function, but here it is followed by a beginning E4 which forcibly qualifies it as an ending. Expectations established in X work against the hearing of this D5 as an ending. Based on the repeated grouping functions of every other pitch, one would expect the D5 to perform the same function as it did in the opening figure and continue, if not to a C5, then to another end-functioning pitch.

Once the end of this new figure (referred to as Y) is clarified, its beginning may become, in retrospect, somewhat unclear: would a listener hear the second E4 in this series of pitches as the beginning of the entire event understood as Y, or would the third E4 be a strong enough beginning be considered the initiation of a figure? The beginning function of E4 was only confirmed for X when it was heard in terms of beginning a repetition after the C5 (refer to Fig. 2.6). Here, the third E4 follows a G4 which, in X, was only a weak ending point, but there is at this time the first occurrence of an exact repetition with durational projection confirmed: the repetition of the <E4, G4> dyad. This may serve to re-define the beginning function of the E4, so that it can be considered a substantial beginning in multiple contexts and not just following a C5. With this occurrence, the
<E4, G4> dyad can be heard as a more independent figure than previously assumed, challenging the idea that it is part of a figure rather than a figure in itself.

There are, therefore, three ways of hearing this second series of pitches based on the expectations that are laid out in the initial figure X. In the following examples, B indicates the beginning of a figure and SB indicates a secondary beginning point within a figure.

![Figure 2.12. Hearing the second E4 as a beginning and the initiation of figure Y.](image)

![Figure 2.13. Hearing the repetition of <E4, G4, E5, D5> as figure Z.](image)

![Figure 2.14. Hearing three two-note figures following X.](image)

In Fig. 2.12, the E4 that follows C5 is heard as a beginning event and is presumed to be the initiation of a new figure. As it is the same event that initiated X, a listener might expect this E4 to signal the beginning of a repetition of X, or at least to begin a figure that will be related to X in some way. However, the entry
of the third E4 (following the G4) would also be heard as a beginning due to its functional precedence, placing an accent on this third beat of figure Y and qualifying as a secondary beginning because it has beginning characteristics but is still heard to be contained within an existing figure. When the third E4 is heard this way, it retrospectively affects one’s hearing of X by giving new functions to past events, specifically hearing the E5 in X as an accented pitch, thus dividing the figure into a 2+3 structure. Y could then be heard as a figure that is related to X through similar beginning functions and in terms of its additive build-up into a 2+4 structure which might be heard as the augmentation of X’s 2+3 structure through additive technique.

In Fig. 2.13, a listener would hear the same beginning functions on the second and third E4’s as in 4a, but might, upon hearing the pitches that follow the third E4, recognize the repetition of <E4, G4, E5, D5> and hear it as having a stronger relationship to X than the events following the second E4. In this way, the dyad <E4, G4> (labeled Y in Fig. 2.13) might be heard as a separate figure, and the third E4 would be heard as the initiation of a figure (labeled Z) that is closely related to X with the same pitch content and ordering minus one pitch, perhaps through a subtractive process.

Fig. 2.14 shows clear beginning functions on the second and third E4’s, but allows for the hearing of these two events as initiations of two successive two-note figures, the repeated <E4, G4> dyad. A listener might hear this repetition as
an indication of a new pattern and expect continuation, which would be satisfied by the \(<E5, D5>\) (figure Z) is the same proportion thus fulfilling the durational proportion established by the two presentations of Y.

Each of the above hearings requires a re-assignment of grouping function to one or more of a figure’s boundary events. In Fig. 2.12, E4 is heard twice as a beginning-functioning event but then, on third hearing, acts in a more continuing role with only secondary beginning characteristics. In Fig. 2.13 it is the G4 that changes function, as in X and Z it acts as a continuing pitch, but functions as an ending event in Y. And in Fig. 2.14, both the G4 and E5 have various functions: the G4 for the same reason as in 4b, and the E5 because it acts as a beginning in Z whereas it was only a continuing pitch in X.

Where Lerdahl and Jackendoff’s preference rules are concerned, perhaps figure Fig. 2.14 is the strongest candidate for a valid hearing. The three-time reiteration of the beginning function of E4 does several things: it clearly articulates group boundaries in regular fashion, it creates a sense of parallelism by repetition, and it produces symmetry in successive figures, first in pitch content and then through the confirmation of durational potential. One important result is the establishment of a regular beat pattern, in this case a temporary quarter note pulse:
2.5 Conclusions

Up to this point, grouping analysis has been applied to this piece on a note-to-note basis, treating each new event as it relates to closely surrounding events. Ambiguities arise when grouping functions of events change, as shown in figure 4a where the listener is required to “think back” and re-assess the specific function of an event in light of subsequent material. Any act of reassessment requires the use of memory to compare how an event functioned in previous contexts with its current role. In that example, the memory required was short term, where such relative pitch associations can be considered a natural part of the listening experience. However, as more of the piece is heard, the listener is required to consider larger portions of material at once, thus making connections between events that are further apart in time. This puts greater demands on memory and necessitates more engagement from a listener in order to understand the larger structural organization of the music. The analysis in the following chapter will address grouping theory principles as they pertain to large scale grouping constructs found in *Strung Out*. 
CHAPTER III: Figure-level Grouping in *Strung Out*

### 3.1 Large-scale Grouping

As noted earlier, Lerdahl and Jackendoff’s theory deals with different hierarchical levels:

> The most fundamental characteristic of musical groups is that they are heard in a hierarchical fashion. A motive is heard as part of a theme, a theme as part of a theme-group, and a section as part of a piece.\(^7\)

In the present analytical context, hierarchy is similarly heard. An event is part of a figure, and a figure is part of a larger group. Accordingly, in the way that an event can function as the beginning, middle or end of a figure, a figure itself can function as the beginning, middle or end of a larger group. Figures are often repeated in the same way that events are, either successive or non-successive, and can be analyzed using the same strategies and grouping principles applied in the previous analysis. Consequently, they can be classified in terms of the role they play in the grouping process in the same way that events are, as *beginning*, *middle*, and *ending* figures. A *beginning figure* therefore is a figure that marks the initiation of a section, differentiated from a previous section by some element of contrast. By identifying the grouping functions of figures, the larger structural organization of a work becomes clearer, and multiple hearings of overall structure become more relevant as a listener takes such relationships into account.

### 3.2 Analysis

The minimal pitch content of *Strung Out* gives the impression of being highly repetitive, but closer examination reveals that there is in fact very little exact repetition of figures.

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So much of the apparent group repetition is in fact only similar pitch content following an unvarying point of initiation – the pitch E4, which continually recurs as a beginning event. When a larger segment of the work is heard, the very local type of analysis described above does not adequately describe larger-scale structure. This is to say that when a listener is only a few notes into the piece, the relationships between those notes are in flux, and figures are not yet established; whereas after several minutes of listening, established figures become more prominent by their repetition, and larger-scale grouping structures become apparent.

Since the first 308 individual events all belong to the pitch set \{E4, G4, C5, D5, E5\}, the probability of repeating figures is, even by purely accidental means, quite high. But patterning, or purposeful grouping, results when particular figures are identified, recognized, and heard to function with regularity. These figures can then be said to function as beginning and ending figures at the larger level.

Consider the recurrences of figure X in the first section of *Strung Out* shown in Fig. 3.1. None of these is immediately successive or separated by the same duration. There is no apparent pattern that can be attributed to either rules of symmetrical positioning or the fulfillment of durational potential. Let us consider recurrences of X: what factors contribute to the recognition of X and its repetitions? How relevant is it to an overall understanding of the piece?
Figure 3.1. Recurrences of figure X in the first section of Strung Out.
Since the first section of the piece establishes that E4 functions consistently as a beginning event, a listener will likely begin to attribute this function to every instance of E4 unless given evidence to the contrary. The difficulty in hearing grouping structure in *Strung Out* comes down to the fact that while each presentation of E4 initiates *something*, that something is different every time. The durations between each instance of E4 are variable in both length and content, so that the first time the exact sequence of pitches following it is heard again is the second instance of X, labeled X₂ in figure 5. And the examples below show that a different series of events follows each presentation of E4 after the initial figure X:

![Musical notation images of E4 presentations]

*Figure 3.2.* Four different series of events following E4.

One might discount this problem by asserting that X₂ is significant because it is the first instance of a recognizable series of events since the onset of the piece. But this assertion is true only to the extent that the listener is able to discern the relations between X and X₂ at this point. Now, if figure X had repeated immediately, where *parallelism* and *proximity* could contribute to grouping decisions, a listener would hear the relationship
between the two figures much more strongly. But that is not the case. Successive presentations of X seem to have no distinctive pattern that a listener might recognize and identify as being structurally significant. In instances where a figure repeats with metric regularity, a listener will tend to expect successive presentations of that figure to function as a group beginning, thus relying on it as a structural indicator of future groups. Here, there is no such regularity, hence a listener is less likely to expect another occurrence of X at a predictable instance.

Accordingly, the question might be asked, why consider the second presentation of X – or any subsequent presentation of X for that matter – as significant at all to large-scale structure? At this hierarchical level, it appears that this figure, acting as a beginning figure for groups of varying proportions, does not yet have substantial importance. As more of Strung Out is heard however, this particular figure will attain new meaning in light of other grouping structures that become evident.

X is not the only relevant figure in this piece that might be heard to contribute to an overall sense of form. In this first section (refer to Fig. 3.1), other pitches start to acquire beginning status, creating new figures in the process. Observe the series of pitches contained between the first two presentations of X:

![Figure 3.3](image.png)

*Figure 3.3.* The series of pitches contained between the first two presentations of X.
As mentioned in the previous chapter, each E4 initiates a different series of events that are uniquely related to X. The beginning function of E4 remains stable, but at the same time E5 begins to function as a significant point of beginning as well. Fig. 2.14 showed the second E5 as a strong beginning, contributing to a series of repeated two-note figures following X and creating a temporary quarter note pulse. A listener, expecting this pulse to continue, may hear the next two notes <E4, G4> as another dyad in a series and group them together. This is supported by the established beginning function of the E4 coupled with the fact that <E4, G4> is already a recognized figure in itself. In grouping these together, the quarter-note pulse becomes a stronger influence, encouraging a listener to hear the next two pitches, C5 and E5, as a figure. This hearing might be weakened by the fact that C5 has only been heard as an ending pitch thus far in the piece and is not a strong candidate for a beginning event, but the quarter-note pulse is likely to be a stronger factor in this particular situation.

Continuing on, however, a listener would soon become aware of another more salient repetition, the immediate succession of the four-note figure <E5, D5, C5, D5>. Hearing this repetition would re-clarify E5 as a beginning, causing the re-evaluation of the preceding E5 as shown in fig 3.4:

![Figure 3.4. Repetition of E5 as a beginning.](image)

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The result of this hearing is a weakening of the quarter-note pulse by the addition of the C5 (indicated with a *) which essentially becomes the ending of the three-note figure corresponding to the notated slur. What is then created, by the repetition of the four-note figure, is a half note pulse where E5 indicates the beat.

Thus far, each instance of E5 as a beginning event has been followed by D5. Hearing this dyad again will indicate to a listener that it is likely the beginning of another figure. And with a four-note figure so recent in a listeners memory, it might be assumed that the next hearing of <E5, D5> will initiate yet another four-note figure, thus continuing the established half-note pulse. Fig. 3.5 shows a grouping analysis of this first segment of music where X returns at the end as a recognized figure. Below it, Fig. 3.6 presents an alternate hearing in light of the newly established beginning function of E5:

![Figure 3.5. Grouping analysis of the first section of Strung Out.](image)

![Figure 3.6. Alternate hearing of X.](image)
The different functional possibilities of both E4 and E5 bring a certain amount of ambiguity to this passage. In Fig. 3.6, the argument for hearing beginning functions on both presentations of E5 seems clear, especially since the resultant three-note figure <E4, G4, C5> has already been identified as a relevant group of pitches. This hearing, however, weakens the significance of the repetition of X by diminishing the strong beginning function of E4. From this perspective, this first re-hearing of X is structurally ambivalent because it may no longer be heard to function as a beginning figure in the same way that it did at the onset of the piece. Here, it is simply part of a larger process of structural organization in which pitches are beginning, perhaps, to lose their established status and take on new grouping roles.

The third presentation of X is aurally more prominent than the second, due to a renewed beginning function of E4 in preceding material. The repetition of the five-note figure <E4, G4, C5, E5, D5> reinforces E4 as a beginning event and also suggests that E5 might, in retrospect, be considered a secondary beginning as shown in Fig. 3.7:

This new figure resembles X in that it has the same pitch content including the same opening dyad <E4, G4>, and X fulfills the durational potential created by its repetition. However, the 2+3 structure in X is reversed in this figure as a 3+2 sub-grouping. This contributes to the uncertainty of the function of E5, where E5 as a beginning pitch is
weakened in this new figure when compared retrospectively to X. When X is heard, it not only clarifies the function of E4 as a structural beginning but also confirms E5 as a continuing or secondary beginning event for the characteristic subfigure <E5, D5, C5>. In either case, the potential for E5 to have multiple functions is explored in this segment of music. Similarly, the grouping function of X can be said to vary as well, from acting as a strong beginning figure to an increasingly unclear participant in larger grouping processes.

Another pitch that changes function over time is C5. After the third presentation of X, C5 follows an <E4, G4> dyad as it has done several times already (see Fig. 3.8). A listener is likely to hear these three pitches as a group based on precedence as shown in figs. 3.4 and 3.7, and also based on the fact that C5 has consistently functioned as an ending event thus far in the piece.

However, this hearing is soon negated with the appearance of the next series of pitches:

The three-time repetition of <C5, D5, E5, D5> strongly suggests a beginning function for C5, which is as yet unprecedented. This exact figure is repeated several times in close
proximity in the next few lines of music, solidifying it in the ear of the listener as a recognizable group. Between the fourth and fifth presentations of X (X₄ to X₅ in Fig. 3.1) this same figure appears four times in immediate succession, the first time any group has repeated with such regularity. Despite the temporary change in function of C₅ however, its original ending function is still maintained throughout this section. Each presentation of X exhibits C₅ as an ending event, as does the now commonly heard figure <E₄, G₄, C₅>. Therefore the pitch itself functions in various ways, sometimes initiating a figure and sometimes ending one, preventing a listener from necessarily expecting this event to function a certain way at any time. This is in sharp contrast to the E₄ which, at this point in the piece, is only ever heard to function as a beginning event. Even though this series of pitches beginning on C₅ is aurally recognizable – perhaps more so than X due to its successive repetitions – it does not serve to begin a relevant structural segment and therefore is not likely to be considered a beginning figure. It will more commonly be heard as a continuing figure between presentations of X because the beginning function of C₅ is not consistent enough to override the beginning function of E₄.

This ambiguity of pitch function is most clearly exhibited in the section of music preceding X₇ where figures are presented in such a way that both beginning and ending functions are unclear as they tend to overlap. For example, one could hear a beginning accent on C₅, initiation the figure <C₅, D₅, E₅, D₅> each time it is heard (see Fig. 3.10).
Figure 3.10. Successive repetitions of <C5, D5, E5, D5> placing beginning accent on C5.

However, it would be just as possible for a listener to group this same series of pitches into other four-note figures with different beginning events, specifically D5 and E5 resulting in figures <D5, C5, D5, E5> (Fig. 3.11), <D5, E5, D5, C5> (Fig. 3.12), and <E5, D5, C5, D5> (Fig. 3.13) respectively.

Figure 3.11. Successive repetitions of <D5, C5, D5, E5> placing beginning accent on D5.

Figure 3.12. Successive repetitions of <D5, E5, D5, C5> placing beginning accent on D5.

Figure 3.13. Successive repetitions of <E5, D5, C5, D5> placing beginning accent on E5.
One has to wonder if any of the above possible hearings would be more effective than any other in terms of making this section of music more comprehensible. Here, the beginning function of C5 seems as inconsequential as the potential hearing of D5 of E5 as beginning points; each simply draws the ear away from the lower register so that when E4 is presented again it is heard as a familiar “return.” Thus this seventh presentation of X is structurally significant because it represents a return of a (relatively) unambiguous figure after an extended series of ambiguous pitches.

After eight presentations of X, each separated by different durations and different pitch material, C5 and E5 emerge as multi-functioning pitches. E4 however retains its beginning function, even in instances where X does not necessarily act as a beginning figure. After X₈, the music changes altogether and E4 is not heard for a substantial length of time. Instead, a new segment begins in which new pitches are gradually introduced and the range of the piece increases accordingly. The systematic accretion of events culminates in the presentation of all pitches from D₄ to E₅ in stepwise motion on the last page of the score. During this time, E₄ is re-introduced simply as one of this series of new pitches. It appears in the following context on page 5, clearly functioning as an ending event:

![Figure 3.14](image)

**Figure 3.14.** Re-introduction of E₄ as an ending event.

It is doubtful that this pitch will be heard as the same E₄ that began the piece. Its prescribed beginning function is no longer valid, nor can it be said to indicate a beginning.
figure. In this way, a listener must treat it as a new event, where old associations are irrelevant if they are even heard at all. When this pitch does attain structural relevance again is at the Da Capo where, after seven pages of this “new” material, X is finally heard again as a true repeat. Only at this point can X be considered structurally significant on a larger scale, where it functions as a beginning of an entire segment.

3.3 Conclusions: Overall Form

The piece can now be seen as having two main sections, A and B, where A is characterized by a minimal pitch collection with emphasis on E4 as a beginning event, and B is a long, drawn-out progression with multiple beginning points in which all remaining diatonic pitches are eventually introduced. Figures are presented in such a way that they can be grouped into larger segments, each having its own distinct pitch-functions contained therein. A listener will eventually stop trying to assimilate each hearing of a pitch into a specified role and begin to hear the overall structure, using large-scale repetition as a cue for segment grouping.
CHAPTER IV: Discussion

4.1 Post-Analysis Summary

*Strung Out* suggests several refinements of grouping theory:

1. Beginning events and figures tend to be stronger group indicators than middles and ends

2. A pitch can be perceived as having multiple possible grouping functions at once, depending on how surrounding material is interpreted by a listener

3. A pitch’s grouping function is often identified retrospectively after the repetition of that pitch in an immediately successive figure

4. The repetition of a pitch or figure may confirm a previously assigned grouping function and encourage the expectation that it will function similarly in future contexts

5. The regular repetition of figures encourages the expectation of continuation, especially when a pulse is implied by regularly occurring beginning accents

Points 4 and 5 clarify how repetition affects the perception of grouping function. As an example, consider the events with pitch C5 in *Strung Out*: the grouping function of the first ones seems ambiguous, but as the C5 is restated within a repeated figure, it becomes more clearly associated with a beginning function, increasingly validating the preference of the listener to hear it in that way.

*Strung Out* also shows how grouping function and meter are more closely bound than Lerdahl and Jackendoff’s formalism suggest. According to William Benjamin, Lerdahl and Jackendoff were the first to have made a clear distinction between *grouping* and *meter*, where grouping “is an organization of events (which have duration) without
reference to accent, while [meter] is an organization of (durationless) time points based, in some part, on a perception of accent."^{72} Pulse is the result of accented time points at regular intervals. Successive exact repetitions produce a stable pulse, and the more times a figure is repeated, the stronger the underlying sense of pulse created. In *Strung Out*, the various recognizable figures tend to be different lengths, and are seldom repeated successively with enough frequency to maintain a pulse for any significant duration. Therefore, pitches are not consistently assigned specific functions, preventing a listener from predicting, or *expecting* to hear, repetition based on the recognition of beginning events. Paradoxically, the one thing a listener might be able to predict about future pitches or figures in this music is that they are likely to function in an unpredictable manner.

### 4.2 A Contrasting Example

In Glass's later music, this is not the case. Indeed it is often criticized for excessive repetition, a compositional aesthetic manifested in pieces that have been described as "needle-stuck-in-the-groove music."^{73} Take, for example, *Opening* from *Glassworks*, Glass's first recording project with CBS (1981) which was "designed to introduce his music to a broader public."^{74} *Opening* is the first of six pieces on the recording, and is scored for solo piano. Although it is not monophonic in texture like *Strung Out*, *Opening* lends itself well to grouping theory analysis as it can neatly be separated into three voices, each voice working in conjunction with the others to create an almost single-

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^{74} Schwarz, *Minimalists*, 150.
layered work. A brief analysis of this piece will show how repetition is used in a very
different way than in *Strung Out*, and to a different aural effect.

The Dunvagen score shows a two-page work divided into six distinct sections with repeat
signs, and with the indication “D. C. Twice” at the end. Immediately upon presentation
one is aware that repetition is an essential element in this piece. Unlike *Strung Out*, there
are measured bar lines and regular note groupings in much more standard notation. In
this two-hand piano arrangement, there are three discernable “voices” which will be
referred to here as *v*1, *v*2, and *v*3. These are indicated accordingly in Fig. 4.1, which
shows the first two measures of the piece:

![Musical notation](image)

**Figure 4.1.** First two measures of *Opening*.

Each voice maintains a consistent rhythm throughout, where *v*1 plays triplet eighth notes,
*v*2 straight eighths, and *v*3 whole notes. The hierarchical construct is clear, both visually
and aurally, and the relationship between voices remains constant throughout as
individual registers never cross.

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75 Dunvagen Music Publishers was Glass's own publishing company.
Each voice contains figures of different lengths that are repeated in immediate succession. Using the first measure as a model, Fig. 4.2 shows the figuration in \( v1 \) and \( v2 \) that create patterns of repetition:

![Figure 4.2. Repetition in voices 1 and 2 in measure 1.](image.png)

These two voices are related in a ratio of 2:1, where two cycles of \( v2 \) are contained within one cycle of \( v1 \). The pulses that are generated in each voice are a half-note pulse and quarter-note pulse respectively. \( v3 \) is always a whole note which is sometimes tied to the following whole note but is usually rearticulated on the first beat of each measure. These patterns repeat with the onset of each new measure, and measures are organized into groups of four by the notated repeat signs (see Fig. 4.3). All of the existing cycles have common points of initiation such that beginning events in each voice occur simultaneously, thus reinforcing the sense of beginning at regular intervals. The overall form can be described as a series of four-measure groups, each having this same composite organization, articulating a steady and unvarying pulse. Once established, this pattern is maintained for the duration of the work. The result is a piece comprised of a series of repetitions that consistently satisfies a listener's expectations of continuation.

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76 There is one exception to this, five measures from the end \( v3 \) is notated as two half notes.
Figure 4.3. Mm. 1-16 of Opening with notated repeat signs.
In this piece, repetition is used for the purpose of creating and maintaining a system, a compositional procedure that is intended to be clearly heard and understood by a listener. As in many of Glass’s other later works, grouping functions of both events and figures have very little ambiguity. There is no need for reassessment: the surface level grouping decisions of any small portion suffices for the entire work. This would seem to negate the underlying Gestalt principle behind grouping theory in music which is, as stated before, that “the relationship between the notes is more significant than the individual notes themselves.” In Opening, it seems of little value to make connections between the parts as they are heard, as the relationships never change, and therefore cannot be said to initiate novelty in any significant way. The amount of predictability associated with a piece increases with each instance of confirmed expectations. And as discussed above, expectations are confirmed when a pattern that has been initiated by repetition is continued such that either the exact content of the figure is reproduced or its durational potential is fulfilled. This is perhaps where the idea of minimalism as a goal-less art form derives, where the music is heard to have no projected purpose, no suspense, and therefore no sense of resolution at its end. In contrast, multiplicity of grouping function in Strung Out encourages a listener actively to draw connections between events and figures.

4.3 Repetition and The Whole

John Rahn writes that “the telos of repetition always seeks a whole.”77 The whole in this sense might be defined as “a totality of discrete elements joined through a system of

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relations or transformations.” In considering Strung Out as a whole by this definition, it must be thought of not simply as a by-product of its component parts, but rather as the purposeful result of ever-changing relationships among those parts. Because of the nature of music as an aural medium, this whole is not perceivable except as the chronological unfolding of its parts. Therefore the order in which the parts are presented has direct bearing on one’s conception of the whole. It has already been shown the extent to which this is true where grouping theory is concerned, where the function of each event is clarified by its relationship to both past and future events. However, the purpose of this analysis, as previously stated, is not simply to acknowledge where repetitions exists and how a listener might group related events, but to explore how such grouping efforts affect one’s hearing of the music. In the following discussion, I will synthesize various writings by musicians and theorists concerning the perception of repetition in an attempt to better understand how a listener might hear a piece like Strung Out.

Edward T. Cone, in his book Musical Form and Musical Performance, claims that “in general, there is no such thing as true redundancy in music.” He writes that we, as listeners, should “welcome the opportunity for re-examination of musical material” so that fluctuating relationships between musical parts might be put into context as they are

78 Christopher Hasty, Meter as Rhythm (New York: Oxford University Press, 1997), 67.
80 Edward T. Cone, Musical Form and Musical Performance (New York and London: W. W. Norton & Company, 1968), 46. Cone defines redundancy in this context as a repetition where “each additional statement adds nothing new” (pp. 48-9) and is referring to the repetition of large musical sections, as in the ABA form of a Trio.
heard. Cone's general assertion that repetition is always meaningful implies that whether it be event, figure, or section, any component of a piece of music is a unique entity and should be heard as such. This hearing, however, is purely contextual. If, for example, two events that are identical were to be removed from their musical context, they would in fact be identical events and nothing more. Their relationship to each other is meaningless beyond simply identifying them as the same entity, what Peter Kivy calls "a token of the same type." Only in context of the actual music in time, where they are related to other events that come before and after, do these same tokens attain individual meaning. One must thus take the listener's memory into account, without which such relationships would not be heard. In Rahn's formulation, "recognition conditions cognition." That is, the function one attributes to an event depends on how well one recognizes it.

For example, in Strung Out, recurrences of X will be heard as significant only if they are recognized as X by a listener. Fig. 4.3 shows the fourth and fifth presentations of X. The figure of <C5, D5, E5, D5> is first presented and then repeated immediately a total of three more times. The next series of pitches begins what appears to be a fourth restatement of this figure, but this repetition is truncated, and followed by the <C5, D5> dyad circled in Fig. 4.4:

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81 Ibid., 48-9.
83 Rahn, Repetition, 51.
A stable pattern is established by repetition and then, contrary to a listener's expectations, is momentarily denied. However, the series of events that follows constitutes another complete presentation of this figure, suggesting what would have been the continuation of the pattern. The "non-figure" in this series of repeated figures might be misconstrued as belonging to the series in a listener's effort to hear consistency where it appears that it should exist. A listener's sense of anticipation can, in effect, determine how he hears a situation such that it conforms to the way it is expected to perform.

In the same way that we have a predisposition, or common tendency, to look for order in a series of events (as per Lerdahl and Jackendoff's theory) we also have the capacity to create order in instances where we want it to exist, where it has failed to meet our expectations. This can occur by adding or omitting events, as Deliege has described, or by simply altering, in our memories, the span of time presented by a series of events to make it fit into a more desirable mental construct. Kramer claims that "in the process of experiencing and then remembering lengths of time, we alter them." This would

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86 Kramer, The Time of Music, 327.
account for instances where a figure is perceived to be part of a repetition even though, as in the case above, it clearly does not belong in the patterned series.\footnote{For an interesting discussion on the perception of repetition, see Kivy, \textit{Music Alone}, chapter \textit{XVIII} entitled “The Fine Art of Repetition,” section vii (pp. 349-54) in which he discusses pattern recognition in a Persian carpet.}

Repetition relates not only to the internal workings of a piece of music, but also the re-hearing of the piece in its entirety. Cone writes that “one test of a good composition is that repeated hearings build up in the listener an illusion of inevitability that is heightened by increased familiarity.”\footnote{Cone, \textit{Musical Form}, 55.} He discusses \textit{suspense} as it relates both to theatrical drama and to music:

Suspense here means, not wondering what will happen, but waiting for what we know must happen. It affords us not only agony but also pleasure, or perhaps the two in an inextricably paradoxical marriage. Applying the principle to music, we can understand why, no matter how many times we hear the \textit{Eroica}, the moment before the recapitulation never loses its effect. Indeed, the better we know the piece, the more inevitable, and therefore the more satisfying, the resolution seems to us.\footnote{Ibid., 54-5.}

The anticipation of inevitability is a strong factor when it comes to “making sense” of, or understanding musical form. In encountering \textit{Strung Out} for the first time, a listener is obliged to wonder at each turn what might happen next. Even given the existing structural cues where figures and groups can be discerned during the listening process, the overall sense of direction is unclear. After one or two hearings, a listener might have had the opportunity for reflection and can, if not remember the exact sequence of events, at least anticipate certain significant events, like the entrances of new pitches, and the pending return of beginning material at the Da Capo. Such large-scale organizational cues allow a listener to have a sense of “what is coming” so that when it arrives, there is a
certain feeling of satisfaction when those anticipated occurrences are realized. This serves to substantiate a listener’s involvement with a piece, which in turn creates a positive sense of engagement.

Engagement is directly linked to a pleasurable experience. A listener who is not enjoying the experience is less likely to feel compelled to actively draw connections between events and thus less likely to appreciate the complexities therein. Without any sense of purpose to be found in relationships between parts, the whole cannot, realistically, be understood as having meaning at all. One study on pleasingness has shown that music perceived to be “too complex” rates lower on a scale of pleasingness amongst participants because they felt they lacked understanding. But with repetition, the music became more familiar, hence less complex, and therefore more pleasurable to listen to. In other words, the more a listener hears a piece of music considered to be complex – which may be due to ambiguities and components of the piece that are not immediately understood – the more these complexities become manageable and the greater the listener’s resultant appreciation of the work. In Strung Out, increased familiarity might facilitate a better understanding of the processes involved in the work, so that a listener might be able to anticipate certain pivotal events and feel a sense of accomplishment upon realization. The implication of this way of thinking is that a listener is unlikely to have a sense of ultimate understanding of the work after one hearing, leaving open the possibility for multiple hearings and therefore a potentially deeper sense of understanding of the work as a whole. As Cone puts it, “the most convincing performance is one that

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absorbs the listener so deeply into the flow of the music that, even though he may know perfectly everything that lies ahead, he can still savor each moment as if for the first time.”

4.4 Conclusions

Repetitive structures have been discussed by Rahn in terms of their application to the real world around us:

Repetition is transformation, too, and all transformation rests on the possibility of repetition, of repeatable qualities and patterns. The world is not a world, a life is not a life, if it makes no sense at all. Sense is dependent on repetition, without which nothing can be recognized.  

Repetition in *Strung Out* is, on both small and large scale, only one of the elements that contribute to perceived grouping structures. It is embedded amongst a variety of other processes, all of which combine and work together to create a surprisingly complex composition under the guise of apparent simplicity. Potter writes that the structural properties of *Strung Out*, which “can be readily followed by any intelligent listener, show that, even at this early stage, Glass is composing with a clear overall and audible design.” The fundamental characteristic of this design is that it is repetitive without being predictable; it utilizes compositional methods that appear to be strategic but are in actuality only suggestive of rigorous technique, or “intuitive” as Schwarz would say. And as a result, it encourages continual engagement from a listener in order to fully appreciate the extent of its complexity.

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91 Cone, *Musical Form*, 55.
92 Rahn, “Repetition,” 53.
The commentary in this paper has provided only a fragment of insight into the concept of understanding a piece of music. But perhaps it has contributed to the field of thought in which grouping structures – which are determined by different compositional uses of repetition – are seen to affect the way in which a listener hears a piece of music. This in turn shapes the way a listener thinks about the music, and consequently claims to understand it. Lerdahl and Jackendoff write:

> When a listener has construed a grouping structure for a piece, he has gone a long way toward “making sense” of the piece: he knows what the units are, and which units belong together and which do not. This knowledge in turn becomes an important input for his constructing other, more complicated kinds of musical structure. Thus grouping can be viewed as the most basic component of musical understanding.  

Glass himself has said of his early work in particular, “what was radical wasn’t the language of the music but the way you were invited to hear it.” Lerdahl and Jackendoff’s “educated listener,” trained to hear connections between events, will always instinctively try to find ways of relating figures as they are perceived. In passages where no apparent relations exist, a listener will continually re-evaluate grouping functions of pitches as the information is received in order to make sense of the music. This is the essence of engagement with a piece of music: a continual process of perception, assessment, and reassessment of grouping functions over time.

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