

2015

Gestalt Principles in Ligeti's Piano Etude "Desordre"

David William Batchelor
University of South Carolina

Follow this and additional works at: <https://scholarcommons.sc.edu/etd>



Part of the [Composition Commons](#)

Recommended Citation

Batchelor, D. W.(2015). *Gestalt Principles in Ligeti's Piano Etude "Desordre"*. (Doctoral dissertation). Retrieved from <https://scholarcommons.sc.edu/etd/3634>

This Open Access Dissertation is brought to you by Scholar Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact digres@mailbox.sc.edu.

GESTALT PRINCIPLES IN LIGETI'S PIANO ETUDE "DÉSORDRE"

by

David William Batchelor

Bachelor of Music
University of Houston, 2006

Master of Music
Brigham Young University, 2010

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Musical Arts in

Composition

School of Music

University of South Carolina

2015

Accepted by:

Jesse Jones, Major Professor

Reginald Bain, Committee Member

John Fitz Rogers, Committee Member

Fang Man, Committee Member

Lacy Ford, Senior Vice Provost and Dean of Graduate Studies

© Copyright by David William Batchelor, 2015
All Rights Reserved.

DEDICATION

To Kristin, with all my heart. We did it.

ACKNOWLEDGEMENTS

To God, who was with me throughout the creation of this document; to my wife, who kept our life running smoothly and loved me with great patience; to Dr. Reginald Bain, for his help in the refinement of this document; to Dr. J. Daniel Jenkins, for introducing me to Gestalt theory; to the other members of my dissertation committee, Dr. John Fitz Rogers, Dr. Jesse Jones, and Dr. Fang Man, for their support and time; to Schott Music International, for granting permission to use excerpts from the score in this document; to the University of South Carolina, for a great education.

ABSTRACT

This document is a study of how Gestalt principles of organization are at work in “Désordre” (1985), the first etude in the first book of piano etudes by György Ligeti (1923–2006). After explaining how Gestalt principles can be applied to the analysis of music, the study presents an analysis of the etude in four main parts. The first part identifies elements of the composition that help the listener define boundaries between phrases, phrase groups, and sections. The second part discusses how foreground and background layers are articulated. The third part discusses the polytempo illusion. The fourth and final part identifies elements that contribute to large-scale unity in the composition. Finally, some pedagogical applications for teaching composition are briefly addressed.

TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENTS.....	iv
ABSTRACT	v
LIST OF FIGURES	viii
LIST OF EXAMPLES	ix
CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: GESTALT PRINCIPLES OF PERCEPTION	4
2.1 HISTORICAL BACKGROUND	4
2.2 PROXIMITY	7
2.3 PROXIMITY IN MUSIC.....	8
2.4 SIMILARITY	9
2.5 SIMILARITY IN MUSIC	10
2.6 SUBLIMINAL PERCEPTIONS AND LARGE-SCALE GROUPING.....	12
2.7 FIGURE/GROUND ARTICULATION	14
2.8 FIGURE/GROUND ARTICULATION IN MUSIC.....	15
2.9 COMMON REGION	17
2.10 COMMON REGION IN MUSIC	18
2.11 CONTINUITY	19
2.12 CONTINUITY IN MUSIC.....	19

CHAPTER 3: A GESTALT-BASED ANALYSIS OF “DÉSORDRE”	21
3.1 FORMAL OVERVIEW.....	21
3.2 PHRASES, PHRASE GROUPS, AND SECTIONS.....	25
3.3 ARTICULATION OF FOREGROUND AND BACKGROUND LAYERS.....	32
3.4 PERCEPTION AND THE POLYTEMPO ILLUSION	34
3.5 PERCEPTION OF LARGE-SCALE UNITY.....	42
3.6 PEDAGOGICAL APPLICATIONS IN THE COMPOSITION STUDIO.....	44
BIBLIOGRAPHY	48
APPENDIX A: GESTALT PRINCIPLES OF PERCEPTION SUMMARY	51

LIST OF FIGURES

Figure 2.1 Preliminary example of perceptual grouping	6
Figure 2.2 Grouping by proximity	7
Figure 2.3 Perception of columns because of proximity	8
Figure 2.4 Comparison of resultant groupings from proximity and similarity	9
Figure 2.5 Development of motivic complexity	11
Figure 2.6 Logo demonstrating subliminal grouping	12
Figure 2.7 Grouping by figure/ground articulation.....	15
Figure 2.8 Grouping by common region against proximity	18
Figure 2.9 Grouping by continuity.....	19
Figure 3.1 Visual representation of the form of “Désordre”	24
Figure 3.2 Figures occluding a ground	33

LIST OF EXAMPLES

Example 2.1 Grouping by proximity to demonstrate the trill threshold	9
Example 2.2 Motivic development by varying degrees of similarity	10
Example 2.3 Melodic assimilation into the accompaniment	16
Example 2.4 Role reversal of melody and accompaniment.....	17
Example 2.5 Continuity causes disjunct bass notes to group as a line	20
Example 3.1 Initial LH and RH phrase groups of “Désordre.”	22
Example 3.2 Header repetitions in the first two phrases	27
Example 3.3 Comparison of phrases to demonstrate perceived <i>accelerando</i>	29
Example 3.4 Boundary delineations at the climax.....	31
Example 3.5 Occlusion of the background layer	35
Example 3.6 Perception of accents as syncopations against a traditional 4/4 meter	37
Example 3.7 Perception of tempo phasing with elementary pulses eliminated.....	37
Example 3.8 Moment when phasing is difficult to track aurally.....	38
Example 3.9 Constancy of the eighth-note pulse.....	42
Example 3.10 Foreground occlusion of the background layer	43
Example 3.11 Hypothetical composition lesson: student’s original	46
Example 3.12 Hypothetical composition lesson: teacher’s question.....	46
Example 3.13 Hypothetical composition lesson: teacher’s suggested revision.....	47

CHAPTER 1

INTRODUCTION

György Sándor Ligeti was born on May 28, 1923 in Romania, and died on June 12, 2006 in Germany. Between 1985 and 2001, he wrote three books of etudes for piano. “Désordre” is the first of the six etudes in Book One. It was written in 1985.

During this time period, Ligeti’s music underwent dramatic stylistic changes. Ligeti also expanded his compositional technique in reaction to a number of outside influences, including African music, the player piano studies of Conlon Nancarrow, and the music of American jazz artists Thelonius Monk and Bill Evans.¹ Perhaps the most influential source of inspiration for this particular etude was sub-Saharan African Banda Linda music. Polyrhythm and a complex balance between order and disorder characterize both Ligeti’s etude and this African music. In the foreword to Simha Arom’s book *African Polyphony and Polyrhythm*, Ligeti wrote:

Undoubtedly my interest in the music Arom has recorded stems also from the proximity I feel exists between it and my own way of thinking with regards to composition: that is, the creation of structures which are both remarkably simple and highly complex. The formal simplicity of sub-Saharan African music with its unchanging repetition of periods of equal length, like the uniform pearls of a necklace, is in sharp contrast to the inner structure of these periods which, because of simultaneous superpositioning of different rhythmic patterns, possesses an extraordinary degree of complexity... What we can witness in this music is a wonderful combination of order and disorder, which in turn merges together producing a sense of order on a higher level.²

¹ György Ligeti, liner notes to *György Ligeti, Edition 3: Works for Piano (Etudes and Musica Ricercata)*, Sony Classical (DDD 62309), 1997, Pierre-Laurent Aimard, piano.

² Simha Arom, *African Polyphony and Polyrhythm: Music Structure and Methodology* (Cambridge: Cambridge University Press, 1991), foreword by Ligeti, xvii.

The analysis of this etude is based upon principles of perception as found in Gestalt theory. Chapter 2 introduces the reader to these principles and recounts their early development in the field of psychology. Some theoretical background is required to understand the principles at work in the author's analysis. As such, Chapter 2 introduces the reader to the Gestalt principles of proximity, similarity, figure/ground articulation, common region, and continuity. Visual and musical examples demonstrate how these principles may be used as analytical tools.

The Chapter 3 analysis identifies which Gestalt principles are involved in the apprehension of formal divisions, compositional processes, and large-scale unity in "Désordre." After a brief discussion of the form, the analysis is presented in four main parts. The first part identifies elements of the composition that help the listener perceive boundaries between phrases, phrase groups, and sections. The second discusses which elements articulate foreground and background layers. The third shows which elements make the perception of polytempo possible. The fourth addresses elements that contribute to the perception of large-scale unity in the composition. Finally, some pedagogical applications for teaching composition are briefly addressed.

This work is essentially an extension of approaches represented by Leonard B. Meyer's *Emotion and Meaning in Music*³ and Eugene Narmour's *The Analysis and Cognition of Basic Melodic Structures*.⁴ This study is unique, however, in its application of a Gestalt-based approach to the etude as a whole. John Sloboda confirms the need for this type of approach:

³ Leonard B. Meyer, *Emotion and Meaning in Music* (Chicago: University of Chicago Press, 1956).

⁴ Eugene Narmour, *The Analysis and Cognition of Basic Melodic Structures: The Implication-realization Model* (Chicago: University of Chicago Press, 1990).

Cognitive psychology has...achieved its greatest successes in advancing the understanding of processes that span seconds rather than minutes or hours. For instance, a great deal is known about how human beings process words and a lot about how they process sentences, but almost nothing about how they process extended discourse, as found in books or plays. Similarly, music research has yielded immense dividends at the level of notes, chords and phrases, but very little at the level of complete works.⁵

It is also important to mention that the author has benefited from a large number of excellent analyses of “Désordre” including: Guthrie (1989), Kinzler (1991), Licata (1992), Tsong (2001), and especially Haapamaki (2012) and Uranker (1998). It is the author’s hope that the perceptual approach taken here will contribute to the understanding of Ligeti’s etude.

⁵ In Diana Deutsch, et al., “Psychology of Music,” *Grove Music Online, Oxford Music Online*, Oxford University Press, accessed February 4, 2015, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/42574pg1>.

CHAPTER 2

GESTALT PRINCIPLES OF PERCEPTION

This chapter provides the historical and theoretical foundation necessary for understanding the following chapter's Gestalt-based analysis of "Désordre." The principles of perception that are introduced are proximity, similarity, figure/ground articulation, common region, and continuity. (Other Gestalt principles are introduced in Chapter 3.) Part of this introduction is dedicated to explaining the role of subliminal perceptions in the apprehension of large-scale formal structures. Visual and musical examples accompany the definition of each Gestalt principle.

2.1 Historical Background

Gestalt theory began in the early 20th century as a formal branch of psychology. Its origins, however, may be traced back to the work of 19th-century psychologists Carl Stumpf and Christian von Ehrenfels.⁶ In 1883, Carl Stumpf published a theory about the relationship between the parts of a whole and the whole in his book *Tonpsychologie*.⁷ Stumpf described consonance in terms of a "perceptual fusion of the component tones into a single impression...."⁸ He noticed that there was something intrinsically different about the perception of a dyad. Ehrenfels took Stumpf's theory a step further with his investigations into why the mind was still able to recognize a melody after it was

⁶ Stephanie Sabar, "What's a Gestalt?" *Gestalt Review* 17, no. 1 (2013): 7, accessed March 11, 2015, <http://www.gisc.org/gestaltreview/documents/whatsagestalt.pdf>.

⁷ Carl Stumpf, *Tonpsychologie*, 2 vols. (Leipzig: Hierzel, 1883–90).

⁸ Deutsch, et al., "Psychology of Music."

transposed to a new key.⁹ In 1938, Ehrenfels's student Max Wertheimer, described the initial problem:

Psychology had said that experience is a compound of elements: we hear a melody and then, upon hearing it again, memory enables us to recognize it. But what is it that enables us to recognize the melody when it is played in a new key? The sum of the elements is different, yet the melody is the same; indeed, one is often not even aware that a transposition has been made.¹⁰

Ehrenfels concluded that something about the relationships between the tones of a melody remained the same upon transposition. Because of these relationships (i.e., the intervals between the pitches), the melody has a complex identity, which the mind can remember even after transposition. Conversely, the tones of the same melody presented in a different order would take on a new identity because of the altered relationships between the pitches. In the first few decades of the 20th century, Ehrenfels's students Wolfgang Köhler and Kurt Koffka developed his theories further. Their work eventually led to the formal acceptance of Gestalt theories into the discipline of psychology.

These founders of Gestalt theory identified certain “principles of perceptual organization” that seem to describe the ways that objects are perceived.¹¹ The principles, or laws as the founders called them,¹² correlate to “rules of the organization of perceptual senses.”¹³ Stephanie Sabar describes how these principles affect our perception of the visual world. Sabar explains that the founders of Gestalt theory learned that:

⁹ Christian von Ehrenfels, *Über Gestaltqualitäten* [On Gestalt Qualities] (Leipzig: Reissland, 1890), trans. Barry Smith in *Foundations of Gestalt Theory* (Munich: Philosophia, 1988), 83–85.

¹⁰ Max Wertheimer, “Gestalt Theory,” in *Source Book of Gestalt Psychology*, ed. Willis D. Ellis (New York: Harcourt, Brace, 1938), 4.

¹¹ Max Wertheimer, “Principles of Perceptual Organization,” in *Readings in Perception*, ed. David Beardslee and Michael Wertheimer (Princeton, NJ: Van Nostrand, 1958), 115–35.

¹² See Meyer, *Emotion and Meaning in Music*; Narmour, *Basic Melodic Structures*; and Narmour, *The Analysis and Cognition of Melodic Complexity: The Implication-realization Model* (Chicago: University of Chicago Press, 1992).

¹³ Dejan Todorovic, “Gestalt Principles,” *Scholarpedia.org*, 2008, accessed March 11, 2015, doi:10.4249/scholarpedia.5345.

...our eyes are not like a camera or a window. We do not see the world objectively. Rather, what we see is interpreted and given meaning by the observer....”¹⁴

The founders discovered that “perception involved more than just the stimuli that entered the eye.”¹⁵ When perceived, the stimuli become something more, or *different* as Köhler famously worded it: “The whole is different than the sum of the parts.”¹⁶ According to Gestalt theory, the mind groups stimuli into what Ehrenfels called Gestalts (*Gestalten*),¹⁷ or percepts of higher significance than the parts that caused them to form. The German word *Gestalt* means form or shape. When writing about Gestalt theory, English writers typically substitute the word “group” for *Gestalt* as the author does in this study.

Visual examples can demonstrate the concept of perceptual grouping. In Figure 2.1, letters of like case (upper vs. lower) tend to be grouped together. This is grouping by the principle of similarity.

G X a Q S B V e L F C

Figure 2.1. Preliminary example of perceptual grouping.

Other letters in the figure tend to group because of their proximity. The lowercase letters seem to act as spatial dividers between the uppercase letters, causing the following three groups of uppercase letters to form: GX, QSBV, and LFC.

¹⁴ Sabar, “What’s a Gestalt?”, 8.

¹⁵ Russell A. Dewey, “Psychology: An Introduction,” chap. 4, part 1, in *Psych Web* (psywww.com), accessed March 11, 2015, <http://www.intropsych.com/>.

¹⁶ Wolfgang Köhler, *The Task of Gestalt Psychology*, intro. Carroll C. Pratt (Princeton, NJ: Princeton University Press, 1969) 9–10. This quote is commonly mistranslated as “The whole is greater than the sum of the parts.” According to Pratt, Köhler disliked this translation.

¹⁷ Ehrenfels, *Gestaltqualitäten*, various pages. Note that *Gestalten* is the German plural form of *Gestalt*.

Similarity and proximity are two important principles of perception. Many other principles have been discovered and named. Others have yet to be discovered.¹⁸

Groupings can be explained using the principles of similarity and proximity. These principles are similarly applicable to the perception of music. For example, Alf Gabrielsson writes: “Melodies are usually dominated by small intervals (principle of proximity) and performed using the same timbre (similarity).”¹⁹

The following sections present detailed definitions of the principles of proximity, similarity, figure/ground articulation, common region, and continuity—first as they pertain to vision, and then as they pertain to musical experience. These are the main Gestalt principles that will be utilized in the Chapter 3 analysis.

2.2 Proximity

The principle of proximity states that elements tend to be grouped if they are near to each other.²⁰ In Figure 2.2, the dots nearest to one another tend to group, while others, such as the second and third dots, do not.



Figure 2.2 Grouping by proximity.²¹

In general, the first group the mind forms upon seeing stimuli is what Wertheimer calls the “natural grouping.”²² Different groupings may be forced into perception, but:

¹⁸ See Stephen E. Palmer, “Common Region: A New Principle of Perceptual Grouping,” *Cognitive Psychology* 24 (July 1992): 436–47.

¹⁹ In Deutsch, et al., “Psychology of Music.”

²⁰ See Todorovic, “Gestalt Principles,” and Palmer, *Vision Science*, 257–58.

²¹ The visual examples in this chapter are often based on the examples in Wertheimer’s “Laws of Organization.”

²² Wertheimer, “Laws of Organization in Perceptual Forms,” In *A Source Book of Gestalt Psychology*, ed. Willis D. Ellis, 71–88 (New York: Harcourt, Brace, 1938), accessed on March 10, 2015, <http://psychclassics.asu.edu/Wertheimer/Forms/forms.htm>.

...this cannot be maintained for long. The natural grouping soon returns as an overpowering “upset” of the artificial arrangement.²³

For example, in Figure 2.3, the natural grouping tends to yield a perception of four columns of dots, but four rows of dots can be forced into focus temporarily.

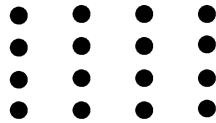


Figure 2.3 Perception of columns because of proximity.

2.3 Proximity in Music

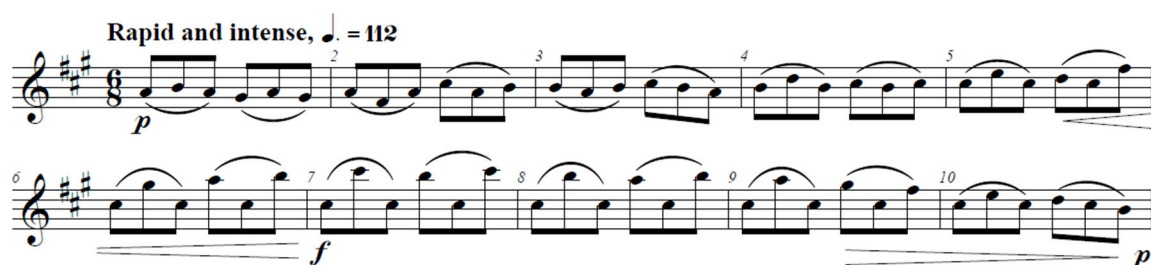
The perception of elements in pitch space appears to be determined at times by the principle of proximity. For example, a note of a melody that follows another by stepwise motion tends to group with it. As documented in the work of George Miller and George Heise,²⁴ the greater the distance between the tones, the greater the tendency to hear more than one line. Scott Lipscomb reports on their findings: “When two pitches are far enough apart, fission (a perceptual splitting apart) occurs. Likewise, when two pitches are close together, they tend to fuse.”²⁵ The author-composed melody in Example 2.1 demonstrates the effect of the so-called trill threshold.²⁶ The melody begins with conjunct motion. Starting in m. 5, with the leap of a P4, it widens into two separate strands. By the end of m. 10, when the intervals are again a third or smaller, its strands have merged back together.

²³ Wertheimer, “Laws of Organization.”

²⁴ George A. Miller and George A. Heise, “The Trill Threshold,” *Journal of the Acoustical Society of America* 22 (September 1950), 637–38.

²⁵ Scott D. Lipscomb, “The Cognitive Organization of Musical Sound,” in *Handbook of Music Psychology*, ed. Donald A. Hodges (San Antonio, TX: IMR Press, 1996), 148.

²⁶ The musical examples in this chapter were composed by the author for this paper.



Example 2.1 Grouping by proximity to demonstrate the trill threshold.

2.4 Similarity

The principle of similarity states that elements tend to be grouped if they are similar to each other.²⁷ The dots in Figure 2.4a²⁸ are homogeneously colored and spaced and give no tendency to group in one direction more than another.

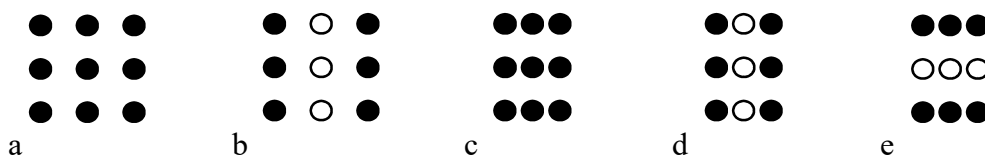


Figure 2.4. Comparison of resultant groupings from proximity and similarity.

In 2.4b where the spacing remains the same, the similar coloring between certain dots yields a grouping into columns. In 2.4c, proximity yields a natural grouping into three rows.²⁹ This same spacing in 2.4d, however, is less forceful. Here, the principles of similarity and proximity compete against one another, yielding two possible natural groupings between which the mind is able to switch back and forth with relative ease. In 2.4e, the principles work together to produce a natural grouping into rows. The figure

²⁷ See Todorovic, "Gestalt Principles," and Palmer, *Vision Science*, 258.

²⁸ The identifying letters a, b, c, d, and e are purposefully off center to avoid affecting the grouping.

²⁹ When the eye traces from 2.2b to 2.2c, the grouping from the first may temporarily affect the grouping in the second.

demonstrates how certain groupings can be made to dominate when two or more principles work toward the same grouping.

2.5 Similarity in Music

According to John Sloboda,

The most basic form of recognition is the experience of similarity. This simply requires that something heard is experienced as being identical to, or sharing important characteristics with, something heard before. Without the ability to recognize similarity between elements within a piece, the apprehension of form would be impossible.³⁰

In *A Generative Theory of Tonal Music* (1983), Fred Lerdahl and Ray Jackendoff further explain that similarity groupings made over the course of an entire piece form hierarchical relationships.³¹ Lipscomb summarizes their findings:

Initially, local patterns (e.g., motives and themes) are identified, then they are placed hierarchically within the context of the entire composition.³²

Motives are perceived as gaining complexity as the composer develops them. Example 2.2 demonstrates the development of motivic complexity.



Example 2.2 Motivic development by varying degrees of similarity.

³⁰ In Deutsch, et al., "Psychology of Music."

³¹ Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge: MIT Press, 1983), 13–17.

³² Lipscomb, "Cognitive Organization," 165.

Segments marked *a* indicate the motive that undergoes development in the example.

Because of transpositional and durational differences, motive *a'* shares close but inexact similarity with motive *a*. Motive *a''* adds another degree of variation through interval expansion. Motive *a'''* varies the pitch content for yet another degree of variation.

Motives *a'*, *a''*, and *a'''* all relate to motive *a* through close but inexact similarities. These slight variations enable grouping processes to form complex relationships between the motives. Each new variation of the original adds a level of complexity to the group.

Figure 2.5 represents the process (as it happens in time) by which motive *a* gains complexity.

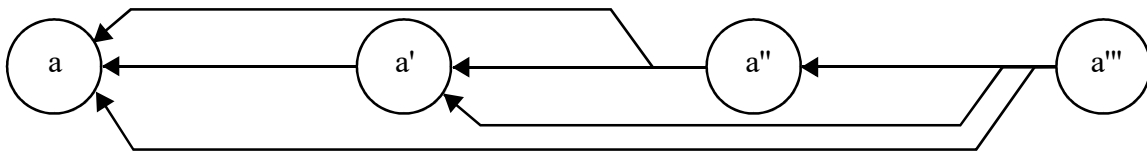


Figure 2.5 Development of motivic complexity.

Tracing from left to right in the figure shows the progression from motive *a* through *a'''*.

The arrows reflect how grouping processes continually compare new material with material heard earlier in order to determine the level of similarity they share. When variations are similar enough to the original, they can be grouped with it. In the melody of Example 2.2, each variation of the motive is compared with the original. As Figure 2.5 shows, the variations are also compared with each other. Each variation adds a level of complexity to the preceding motive. By the time the melody ends, three levels of complexity have been added to motive *a*, two to *a'*, and one to *a''*.

2.6 Subliminal Perceptions and Large-scale Grouping

The melodic analysis of Example 2.2 demonstrates how complex groupings can form over large spans of time. Some of these groupings may even occur subliminally without a listener being able to pinpoint exactly which structural elements are responsible for the perception. Stephen Palmer, in his book *Vision Science*,³³ addresses the issue of whether perceptions can be made below the threshold of awareness:

By far the most dramatic and important claim about unconscious perception in normal observers is for the existence of subliminal perception: the ability to register and process information that has been presented under conditions in which it is below the threshold of awareness.³⁴

Palmer supports this theory by documenting scientific research that provides strong evidence for it.³⁵

Figure 2.6 shows a visual example created by the author to demonstrate subliminal grouping.



Figure 2.6. Logo demonstrating subliminal grouping.

³³ Stephen E. Palmer, *Vision Science: Photons to Phenomenology* (Cambridge, MA: MIT Press, 1999).

³⁴ Ibid., 639. Palmer clarified the difference between the words subliminal and subconscious with the following explanation: “The term ‘subliminal’ is derived from the prefix *sub*, meaning ‘below,’ and the root *limen*, meaning ‘threshold’.”

³⁵ Ibid., 639–44.

In this logo, grouping immediately occurs between highly similar elements (e.g., triangles with triangles and circles with circles). Grouping also occurs because of two other factors that may be less obvious, and are perhaps only noticeable after a few seconds of scrutiny. Cohesion of the whole is strengthened by the arrangement of sun symbols into a circle. This larger circle groups by similarity with each smaller circle in the sun symbols. The second somewhat hidden ingredient of cohesion has to do with the central octagon in the word *Son*. While the surrounding sun symbols form a circle, the interior angles created by their connecting triangles form a large octagon. The smaller octagon in the word groups by similarity with the larger, slightly hidden octagon, giving the name of the company a second sense of cohesion to the figures surrounding it (the first being the triangles that form the letters *S* and *n*). The observer may not consciously notice the connection between the octagon and the surrounding symbols, and yet, because of the grouping influence of repetitious elements, the observer's mind may notice it anyway and the small octagon in the center will not seem entirely out of place.

Much of what contributes to a listener's perception of overall cohesiveness in a composition is a result of perceptions made below the threshold of awareness. In the 1982 article "Pattern, Poetry, and Power in the Music of Frederic Chopin," Douglas Hofstadter presents an analysis of Chopin's music in which he speaks of subliminal groupings that may be responsible for certain perceptions:

[Musical] phenomena perceived to be magical are always the outcome of complex patterns of nonmagical activities taking place at a level below perception.³⁶

³⁶ Douglas R. Hofstadter, *Metamagical Themas: Questing for the Essence of Mind and Pattern* (New York: Basic Books, 1985): 177–78. The article "Pattern, Poetry, and Power" is reprinted in the book.

The development of motivic complexity described in the discussion of Example 2.2, or the groupings discussed in the Figure 2.6 logo, may not all be conscious perceptions. Yet, the ease with which listeners and observers form groups when presented with some degree of repetition suggests that they do not need to consciously notice each degree of similarity in order to perceive unity. It is not necessary, for example, to consciously detect every motivic variation in the first movement of Beethoven's Symphony no. 5 to be able to walk away from a performance of it having felt that its structure had a strong sense of unity.

2.7 Figure/Ground Articulation

In 1923, Max Wertheimer described the requirements for the perception of a figure upon a ground:

When an object appears upon a homogeneous field there must be stimulus differentiation (inhomogeneity) in order that the object may be perceived. A perfectly homogeneous field appears as a total field [Ganzfeld] opposing subdivision, disintegration, etc. To effect a segregation within this field requires relatively strong differentiation between the object and its background.³⁷

The principle of figure/ground articulation states that an element surrounded by a dissimilar element tends to be grouped as a figure upon a ground if the surrounding element is large and homogenous enough to be perceived as distinct from the smaller element.³⁸ This is demonstrated in Figure 2.7, where three objects (figures) seem to lie upon a ground (the gray rectangular area). Dejan Todorovic describes the phenomenal characteristics of this principle this way:

³⁷ Wertheimer, "Laws of Organization." Brackets in original.

³⁸ Palmer names three additional requirements for the perception of figures upon grounds, but they do not appear to be immediately applicable to this analysis. See Palmer, *Vision Science*, 281–83.

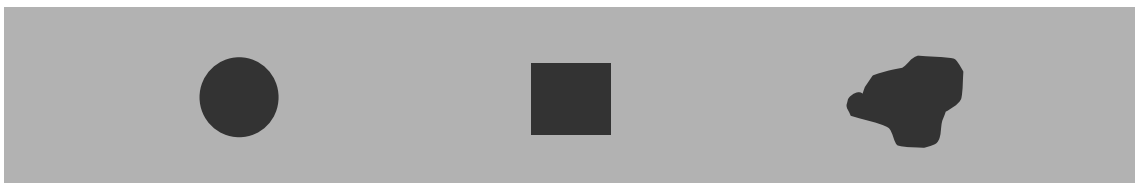


Figure 2.7. Grouping by figure/ground articulation.

The areas of the figure and the ground usually do not appear juxtaposed in a common plane, as in a mosaic, but rather as stratified in depth: there is a tendency to see the figure as positioned in front, and the ground at a further depth plane and continuing to extend behind the figure, as if occluded by it. Furthermore, the border separating the two segments is perceived as belonging to the figure rather than to the ground, and as delineating the figure's shape as its contour, whereas it is irrelevant to the shape of the ground.³⁹

In other words, the natural grouping suggests the figures are sitting on top of the gray area rather than suggesting they are holes or cutouts exposing a darker background.

2.8 Figure/Ground Articulation in Music

The perception of a melody over an accompaniment is an example of grouping according to the principle of figure/ground articulation. For example, Classical Alberti bass accompaniments can be thought of as backgrounds on which melodies can sit.

Lipscomb confirms the indispensability of figure/ground articulation in this kind of musical texture. He writes that the principles of perception:

...assist in the process of recognizing the most important events and abstracting them perceptually from a less significant background of activity. This is often referred to as a figure-ground relationship, an ability essential to musical hearing. How would it be possible to understand the intricacies of sonata form if we were incapable of abstracting the primary theme (figure) from its accompaniment (ground)?⁴⁰

Example 2.3 demonstrates how, if a melody takes on enough of the attributes of its accompaniment, the two will perceptually fuse together.

³⁹ Todorovic, "Gestalt Principles."

⁴⁰ Lipscomb, "Cognitive Organization," 145–46.

Andante rilassato, $\text{♩} = 100$

Piano *mp*

The musical score is written for piano in 4/4 time. It consists of 12 measures. The right hand (RH) plays a melody, and the left hand (LH) plays a drone accompaniment. The tempo is Andante rilassato, 100 beats per minute. The dynamics are marked *mp* (measures 1-10) and *f* (measures 11-12). The melody starts on a high note and descends into the range of the accompaniment by measure 10. The accompaniment is a constant eighth-note pattern. The melody is marked with slurs and accents.

Example 2.3 Melodic assimilation into the accompaniment.

This brief analysis of Example 2.3 will make it apparent that the principle of figure/ground articulation is less dependent on the similarity of elements than it is on their dissimilarity. Without enough dissimilarity, objects could not be distinguished as figures.

In the example above, the part played by the right hand (RH) begins by presenting a melody (figure) over a drone (ground) in the left hand (LH). To make this distinction, durational and registral differences work together to distinguish the separate layers. Two layers are perceived whose respective elements have been grouped by similarity.

The distinction between melody and accompaniment becomes impossible as this melody progresses. Measures 4 and 10 present situations in which the melody takes on the characteristics of its accompaniment, thereby fusing with it. First, the melody descends into the accompaniment's range, increasing the likelihood of grouping by

proximity. Then, it sheds its rhythmic distinctions and adopts those of the accompaniment, increasing the likelihood of grouping by durational similarity. The melody, in effect, transforms into the accompaniment and becomes part of it.

Example 2.4 demonstrates that the opposite is also possible.

Adagio comodo, $\text{♩} = 52$

Example 2.4 Role reversal of melody and accompaniment.

The melody in this example begins to take on accompanimental characteristics at m. 4 and fully assimilates as part of the accompaniment by the second beat of m. 5. At the transition from mm. 5–6, the LH accompanimental material eases into the character of a melody through a stepwise $\hat{7}$ to $\hat{1}$ resolution. From mm. 6–9, the LH material takes on all of the characteristics of the previous RH melody. At this point, the roles have reversed.

2.9 Common Region

The principle of common region, a relatively new principle of perception discovered by Palmer in 1992,⁴¹ states that elements within a closed region of space tend

⁴¹ See Palmer, “Common Region,” 436–47.

to be grouped together.⁴² In Figure 2.8a, the dots that are set closest together tend to group (proximity), i.e., the second with the third and the fourth with the fifth, leaving the outer two dots relatively ungrouped.



Figure 2.8. Grouping by common region against proximity.

In 2.8b, because of common regions delineated by rectangular boundaries, the dots group into three sets of two, even though proximity relationships remain the same from 2.8a to 2.8b.

2.10 Common Region in Music

A musical analogue for the principle of common region requires a listener to perceive boundaries. One way to create a boundary in music is to replace the pattern a listener is experiencing with a new one. When this happens, the listener perceives a boundary at the seam. According to the principle of common region, musical elements preceding the boundary tend to be perceived as belonging together. These elements group by similarity because they share the same pattern and because they fall within the same boundary. Earlier in this chapter, Sloboda was quoted as having said: “Without the ability to recognize similarity between elements within a piece, the apprehension of form would be impossible.”⁴³ It should be added that the perception of musical boundaries would not be possible without the ability to recognize dissimilarity between elements. The ability to notice dissimilarity makes the perception of boundaries possible. This concept has

⁴² Palmer, *Vision Science*, 260.

⁴³ In Deutsch, et al., “Psychology of Music.”

significant applications in the next chapter's analysis when it will be shown that Ligeti disrupts these grouping processes by blurring the edges of a significant boundary between sections.

2.11 Continuity

The principle of continuity, or good continuation,⁴⁴ states that elements that can be seen as smooth continuations of each other tend to be grouped together.⁴⁵ For example, Figure 2.9a tends to group as two intersecting lines. The natural grouping is not likely to be seen as two right angles whose vertices meet, as shown in 2.9b.



Figure 2.9 Grouping by continuity.

2.12 Continuity in Music

Notes of a melody moving in stepwise motion tend to group by proximity, but it is grouping by continuity that creates the perception of a single line. In reality, the notes are not connected at all. They are simply articulated moments in time. In fact, melodies, or musical lines, are often disjunct arpeggiations, moving across intervals of 3rds and 4ths, and as is often the case in bass lines, across 5ths or even 8ves. And yet, their individual notes are typically perceived as continuations of each other. Example 2.5 demonstrates a bass line that would yield such a perception.

⁴⁴ See Wertheimer, "Laws of Organization."

⁴⁵ Palmer, *Vision Science*, 259.



Example 2.5 Continuity causes disjunct bass notes to group as a line.

In his book *Explaining Music*, Leonard B. Meyer uses the word criticism synonymously with analysis, writing that “criticism attempts to understand and explain the choices made by the composer in a particular work.”⁴⁶ Many of Ligeti’s compositional choices may be understood in terms of the Gestalt principles of perception introduced in this chapter. The Chapter 3 analysis will apply these Gestalt principles to Ligeti’s “Désordre.”

⁴⁶ Leonard B. Meyer, *Explaining Music: Essays and Explorations* (Berkeley: University of California Press), 1973: 16–17.

CHAPTER 3

A GESTALT-BASED ANALYSIS OF “DÉSORDRE”

After a brief discussion of the form, the analysis in this chapter is presented in four parts. The first part identifies elements of the composition that help the listener define boundaries between phrases, phrase groups, and sections. The second discusses how foreground and background layers are articulated. The third discusses issues of perception and Ligeti’s single-performer polytempo illusion. The fourth identifies elements that contribute to large-scale unity in the composition. A summary of the Gestalt principles explained in Chapter 2 can be found in Appendix A for reference during this chapter’s analysis.

Prior to a performance of “Désordre” in Gütersloh, Germany on May 5, 1990, Ligeti said:

That which is eminently new in my piano etudes is the possibility of a single interpreter being able to produce the illusion of several simultaneous layers of different tempi.⁴⁷

In the analysis that follows, the author uses the term “perceived tempo” to refer to these individual layers of different tempos. This term will be used extensively in the formal overview in section 3.1 and in the discussion of Ligeti’s single-performer polytempo illusion in section 3.4.

3.1 Formal Overview.

Example 3.1 shows the first 20 measures of the piece.

⁴⁷ Ligeti, Erato.

Molto vivace, vigoroso, molto ritmico, $\text{♩} = 63$

*) Use the pedal sparingly throughout. Play the melody legato in both hands.

György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” LH mm. 1–20
 Copyright © 1986 by Schott Music GmbH & Co. KG
 All Rights Reserved.
 Used by permission of European American Music Distributors Company,
 sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.1 Initial LH and RH phrase groups of “Désordre.”

Circles in the example indicate beginnings of phrases. Three phrases in a particular hand constitute a phrase group. The process of repeating and transposing the two (LH and RH) phrase-group patterns defines much of this etude's structure.

Although this analysis will primarily focus on the perception of rhythm, it is important to notice that the original patterns shown in Example 3.1 consist of RH material that is presented exclusively on the white keys against LH material that is presented exclusively on the black keys. This quasi-bimodal tension is maintained throughout the etude (except for the last note) and is one of the many special features of "Désordre." Figure 3.1 provides a diagram of the etude's large-scale form to serve as a visual guide for analytical discussions that follow.

Analysts seem to generally agree that the etude is divided into three main sections.⁴⁸ For example, Mayron K. Tsong writes that the etude "follows a basic ternary structural pattern of A B A'."⁴⁹ Thus Figure 3.1 divides into three sections labeled: I, II, and III, respectively. Because of Ligeti's misalignment of barlines in the score (e.g., see Example 3.1, RH m. 4), the vertical pitch axis divides into RH (top) and LH (bottom) measures. The range of the pitch axis is C1–C8, where C4 is middle C. A horizontal dotted-line grid marks the location of each C: i.e., C1, C2, C3, etc. The dots in the figure indicate the beginnings of phrases. Line segments extending from these dots indicate the approximate phrase lengths. Phrase groups are indicated using rectangular boxes and each phrase group is numbered. Because the phrase-group lengths differ in each hand,

⁴⁸ See Sampo Elias Haapamaki, "Order in 'Désordre': Rhythmic and Melodic Structure in György Ligeti's Piano Etude No. 1," DMA diss. (Columbia University, 2012), 5; Mayron K. Tsong, "*Études pour piano, premier livre* of György Ligeti: Studies in Composition and Pianism," MM thesis (Rice University, 2001), 24; and Mark Uranker, "Ligeti's 'Désordre' from *Études pour piano—premier livre*: An Analysis and Performance Guide," MM thesis (California State University, Long Beach, 1998), 27.

⁴⁹ Tsong, "*Études pour piano*," 24.

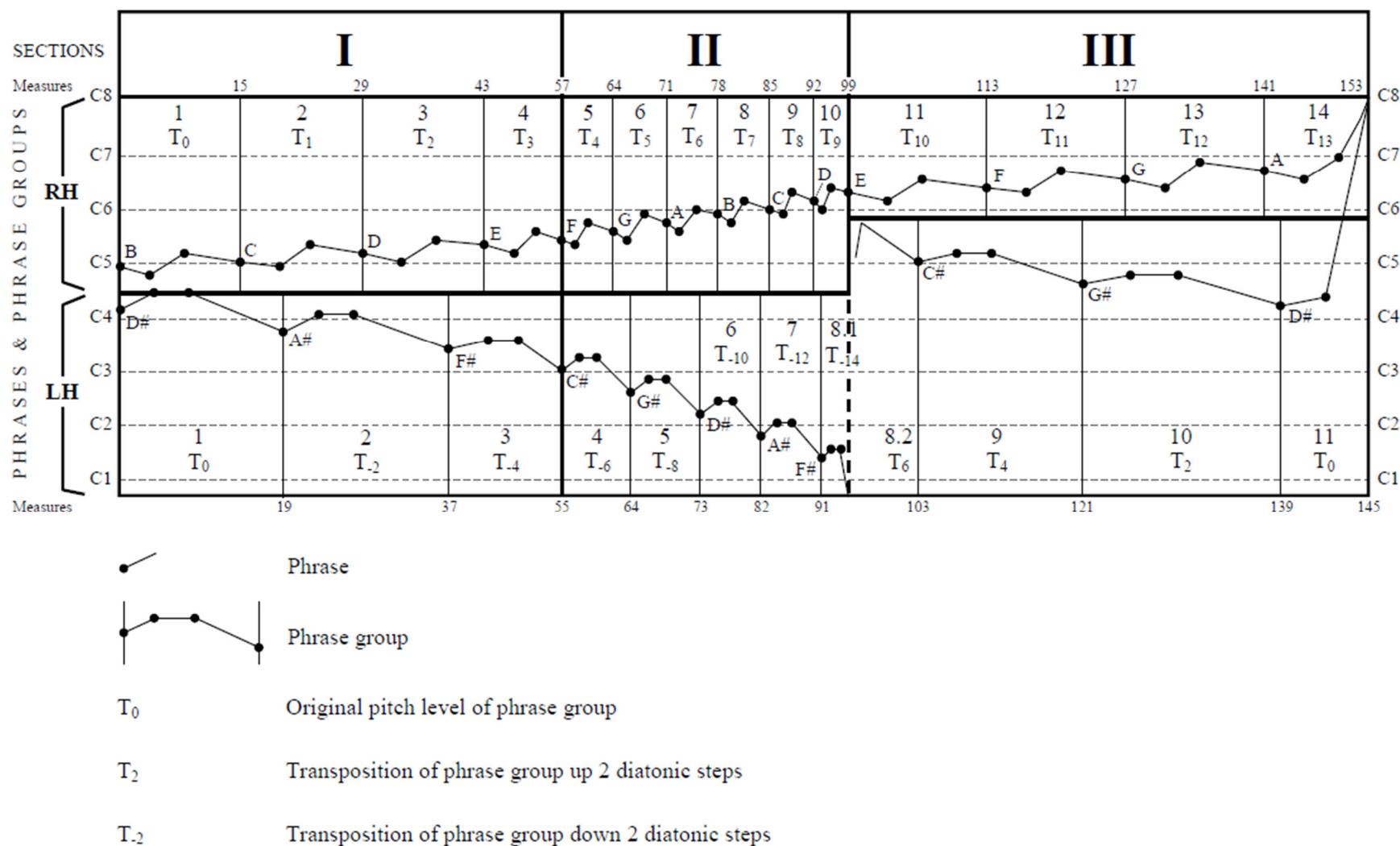


Figure 3.1 Visual representation of the form of “Désordre” (not to scale).

the RH contains 14 phrases, whereas the LH contains only 11. Each phrase group is related to the original pattern (Example 3.1) by diatonic transposition T_n , where n is an integer representing the transposition distance and direction, measured in steps along respective white-key and black-key collections, from the original pattern. For example, in the RH, T_0 represents the original white-key pattern beginning on B4, T_1 represents the pattern beginning on C5, T_2 represents the pattern on D5, and so on. In the LH, T_0 represents the original black-key pattern beginning on D#4, T_{-2} represents the pattern beginning on A#3, T_{-4} represents the same pattern beginning on F#3, and so on. The lines connecting the dots in Figure 3.1 are designed to visually highlight and track the movement of the RH and LH pitch materials over time. Figure 3.1 makes clear certain overall trends: e.g., the large-scale pitch ascent in the RH, and the large-scale descent in the LH, as well as a gradual registral widening between the hands.

Table 3.1 provides a formal overview and a bullet-point summary of the most important aurally perceivable characteristics in each section of the etude. The table also identifies three new subsections: Transition 1, Transition 2, and Ending. Familiarization with these characteristics will be helpful in the sections that follow. Like Figure 3.1, this table is designed to serve as an overview and guide for the analytical discussions that follow.

3.2 Phrases, Phrase Groups, and Sections

This analysis seeks to identify compositional elements that trigger grouping processes and enable the listener to distinguish between the following three components of formal delineation: (1) phrases, (2) phrase groups, and (3) sections.

Table 3.1 Aurally Perceivable Characteristics in “Désordre”

Section	Measures	Aurally Perceivable Characteristics
I	RH 1–56	<ul style="list-style-type: none"> - Melodies are doubled at the octave. - Phrase-group patterns are established. - The etude begins in the middle register of the piano, but the registral distance between the left and right hands gradually widens with the presentation of each successive phrase group. - Contraction of space between melodic notes (phrase contraction) creates the illusion of polytempo by breaking the synchronization of accents.
	Transition 1: RH 44–56	<ul style="list-style-type: none"> - More frequent phrase contractions lead to a perceived tempo acceleration.
II	RH 57–98	<ul style="list-style-type: none"> - Melodies are still doubled at the octave. - Phrase groups line up for the first (and last) time since the first measure. - Perceived tempos move approximately three times faster than at the beginning of Section I. - The widening of the registral distance between the hands continues from where it left off in Section I and the LH reaches the lowest black keys. - The polytempo illusion persists because of phrase misalignment.
	Transition 2: RH 88–98	<ul style="list-style-type: none"> - A second perceived tempo acceleration is achieved by phrase contraction, and builds to a maximum in preparation for the climax at m. 99.
III	RH 99–153	<ul style="list-style-type: none"> - Octave doublings discontinue in favor of 2nds, 3rds, 4ths, 5ths, 6ths, and 7ths, beginning in two-voices and then building to four-voices in the RH and three in the LH. - The LH shifts its pattern from the lowest register to a higher register one octave below the RH. - The perceived tempos abruptly revert to those from Section I. - Phrase expansion slows the perceived tempo of the LH, while the RH’s perceived tempo remains constant to the end.
	Ending : RH 115–52	<ul style="list-style-type: none"> - When the LH pattern returns to T_0, phrase expansion begins to drastically slow down the perceived tempo until it comes to a stop in the penultimate measure. - As the LH’s perceived tempo slows down, and the space between melodic notes increases, the eighth-note background layer begins to emerge as the main focal point, after which, it makes an upward run to C8.

The etude’s phrases are designed in a way that makes their boundaries clear to the listener. The phrase boundaries in “Désordre” are defined in two ways: header repetitions and ending elongations. Header repetitions, the author’s term, mark the beginnings of phrases. Example 3.2 shows the opening eight measures of the etude with header repetitions indicated using arrows.

Molto vivace, vigoroso, molto ritmico, $\text{♩} = 63$

György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” mm. 1–8
 Copyright © 1986 by Schott Music GmbH & Co. KG
 All Rights Reserved.
 Used by permission of European American Music Distributors Company,
 sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.2 Header repetitions in the first two phrases.

Rhythms that occur at the end of each phrase also stand out in the texture and help introduce the header repetitions. In mm. 4 and 8, Ligeti lengthens the final melodic duration of the phrase in both hands to fill the measure, as circled in the example. This elongation helps signal the end of the phrase, and functions as a kind of musical breath mark. When this breath precedes a header repetition, it allows the repetition to stand out of the texture. Header repetitions and ending elongations work together to define phrase boundaries that trigger elements within a phrase to group by common region (section 2.10). In this way, the listener is able to define the phrase.

Boundaries between phrase groups are likewise delineated in a clear manner. Because header repetitions and ending elongations occur in every phrase, in order to

make a distinction between phrases and phrase groups, additional elements must be added to delineate a more complex group to occur every three phrases. Ligeti does this by lengthening every third phrase, thus delaying the header repetition that follows.

Throughout the etude, every third phrase is lengthened in this way, establishing a large-scale pattern that affects the grouping structure, if only subliminally. As shown in section 2.6, highly similar elements are easily detected by the mind's subliminal processes.⁵⁰

Hartmuth Kinzler's 1991 analysis of "Désordre" concluded that Ligeti's sequencing of phrase group transposition patterns could be easily perceived:

The sequencing ensues without any exception and, taken for itself, together with the corresponding rhythmical procedures, is easily perceivable....⁵¹

Just as changes are needed to distinguish phrase groups from phrases, changes are needed to distinguish sections from phrase groups. In Figure 3.1, perceived "tempo changes" may be seen by comparing the width of the rectangular boxes that identify the phrase groups. In Section II, phrase groups progress at a faster rate than in the outer sections (I and III). It is not that the phrases in Section II have fewer melodic notes; rather, the space between them has been shortened, as it would be with standard tempo changes. However, perceived tempo changes do not suffice as a means to delineate the boundaries between the sections. If one takes a close look at the Section I phrase lengths as they approach the boundary of Section II, it is apparent that the phrase lengths slowly approach those found in Section II. Therefore, perceiving the boundary between Sections I and II based on these tempo changes alone can be difficult. This gradual speeding up of

⁵⁰ See Palmer, *Vision Science*, 258.

⁵¹ Hartmuth Kinzler, "György Ligeti: Decision and Automatism in 'Désordre,' 1re étude, premier livre," *Interface* 20 (1991): 102.

the texture subtly hides the section boundary in a manner not unlike camouflage.⁵² At this moment in the etude, Ligeti uses the principles of similarity and continuity as cloaking devices: that is, to deflect grouping processes, hiding much of the dissimilarity between the sections that would otherwise suggest a boundary to a listener. Ligeti does this by effecting a perceived *accelerando*. In Transitions 1 and 2 (Table 3.1), Ligeti contracts the space between melodic notes little by little in a way that makes them appear to speed up. In the Ending (Table 3.1), he does the opposite in the LH, creating the illusion of a *ritardando* where none is marked in the score. Example 3.3 shows the perceived *accelerando* in Transition 1 by comparing the second phrase of RH Phrase Group 1 (3.3a) with the same phrase of RH Phrase Group 4 (3.3b).

Example 3.3 consists of two musical staves, labeled 'a' and 'b'. Staff 'a' shows a melodic phrase starting at measure 5, with notes grouped in six eighth-note clusters. Below staff 'a', boxes indicate the duration of each cluster: 3 (short), 5 (long), 3 (short), 5 (long), 5 (long), 3 (short), and 7 (long). Staff 'b' shows a transposed version of the same phrase starting at measure 47, with notes grouped in five eighth-note clusters. Below staff 'b', boxes indicate the duration of each cluster: 2 (short), 4 (long), 2 (short), 4 (long), 4 (long), 2 (short), and 5 (long). Dashed lines connect corresponding notes between the two phrases. A box at the end of staff 'b' indicates 'Faster by 8 eighths'.

Example 3.3 Comparison of phrases to demonstrate perceived *accelerando*.

Note that Ligeti has placed accents on each melodic note to bring them out of the texture. The melody in Example 3.3b is a transposition (T_3) of the original shown in 3.3a. All of the notes of the original melody are present in the transposition. The differences between

⁵² See Palmer, *Vision Science*, 261, for an explanation of how camouflage “foils” grouping processes.

the melodies have to do with the number of eighth notes between the accents. In every case, there are fewer eighths between accents in 3.3b than in 3.3a. And yet, the rhythms in 3.3b do not seem altered, only accelerated. Ligeti achieves this effect of an apparent *accelerando* by contracting the space between accents in a way that maintains the rhythmic proportions from the original. In other words, every instance of a short-long or long-short rhythm in 3.3a is kept in 3.3b, as shown in the example. When the melody in 3.3b finishes 8 eighth notes sooner than its original, it appears to be faster.

As mentioned in Chapter 2, elements that can be heard as smooth continuations of each other tend to be grouped together. As a result of this phrase-length contraction process described above, a listener may hear Sections I and II as a contiguous group without a dividing boundary.

No such devices conceal the boundary between Sections II and III. In fact, just the opposite is true. Four powerful compositional devices work together to ensure that this boundary will be perceived. This moment in the music is shown in Example 3.4. The first compositional device is an abrupt shift in perceived tempo. The fast pace of Section II ends abruptly at the arrival of the RH's m. 99. It then reverts to the perceived tempo that had been present in most of Section I. The second device is an abrupt change in the LH's register. At the climax that overlaps the LH's mm. 96 and 97, the LH's descent to the bottom of the keyboard strikes the lowest black key at the triple *sforzando*, then rests for a few eighth notes as the pianist shifts the hand up four octaves to resume its normal activity. The third device is textural. At RH m. 99 where the music reaches a second climactic triple *sforzando*, Ligeti gives us a chord containing four pitches. Up until that point, no more than two pitches (excluding octave doublings) have been heard in a single

György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” LH mm. 91–100

Copyright © 1986 by Schott Music GmbH & Co. KG

All Rights Reserved.

Used by permission of European American Music Distributors Company,

sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.4 Boundary delineations at the climax.

RH chord. The fourth and final device is the discontinuation of the octave doubling of the two melodies that has been present since m. 1, as shown in Example 3.4. Instead, Ligeti employs other intervals in a coloristic manner. This change in the texture combines with the force of the first three devices (abrupt change in the perceived tempo, registral changes, and the introduction of chords) to suggest that a new section has arrived.

The Gestalt principle at work in the delineation of the boundary in Example 3.4 is similarity (section 2.5). However, it is important to keep in mind that while each section has a certain degree of similarity within itself, the perception of boundaries between sections is made possible because of dissimilarities. As discussed in section 2.10, similarity groups elements of a section together, but dissimilarity delineates boundaries.

The presence of musical boundaries helps articulate common regions and delineate which items belong to which section. Thus, the principles of similarity and common region can explain how a listener perceives musical elements as belonging to phrases, phrase groups, or sections.

3.3 Articulation of Foreground and Background Layers

In discussing the articulation of foreground and background layers in “Désordre,” Sampo Haapamaki writes:

...[the] basic sound elements in this composition are (1) two individual loud, accented and irregular melodic lines...in the *forte* foreground and (2) soft and regular eighth-note runs in the *piano* background.⁵³

Kinzler extends this idea:

In addition to the first and second planes [the melodies], a single-voiced eighth-note series appears in *piano*, which defines itself as a third plane by the contrast of the dynamics, the constant duration of the individual pitches, and by its single-voicedness, as a background to the foreground of the octaves plane.⁵⁴

Both authors seem to take for granted that the distinguishing characteristic is the dynamics. But other issues come into play as well, and these, together with the *forte*-to-*piano* differences, work to support a common objective. Kinzler touched upon one called the “octaves plane.” Doubling the two melodies at the octave reinforces the dynamic markings, which are further reinforced by the notated accents. Still more factors are at work. The eighth-note ascents, Ligeti’s “elementary pulses,” are fast and quasi-robotic in their ever-ascending stepwise motions.⁵⁵ The two melodies are slow and singable; Tsong says they are “reminiscent of a Hungarian folk melody.”⁵⁶ The contrast between the two

⁵³ Haapamaki, “Order in ‘Désordre,’” 6. Italics in the original.

⁵⁴ Kinzler, “Decision and Automatism,” 91.

⁵⁵ Ligeti, liner notes to *Ligeti: Piano Etudes, Book 1*, Erato (ECD 75555), 1990, Pierre-Laurent Aimard, piano.

⁵⁶ Tsong, “*Études pour piano*,” 24.

melodies and the eighth-note ascents is apparent from the outset as can be seen in Example 3.1.

Contrast delineates boundaries in this music. With respect to figure/ground articulation, boundaries are more commonly referred to as edges of a figure upon a ground. The use of accents, octave doublings, dynamic contrasts, and the decision to make the two melodies slow and singable over quick and mechanical eighth-note ascents delineates the edges of the melodic figure and distinguish it from its accompanimental ground. Ligeti could have made this distinction by fewer means, but doing so may have complicated the task of perceiving these melodic edges. He chose, instead, to take advantage of multiple methods to serve the same purpose. The tactic to employ many techniques to achieve the same goal was something Ligeti made use of when delineating the boundary between Sections II and III, as described earlier in this chapter.

Figure 3.2 represents something that begins in Transition 1 and culminates in Transition 2 (Table 3.1).



Figure 3.2 Figures occluding a ground.

The figure resembles Figure 2.7, which was used to explain the principle of figure/ground articulation. However, in Figure 3.2, the objects previously surrounded by the gray area are now so large that they almost cover it. And yet, even though the gray area does not

surround them, it still appears to be behind them. The principle of figure/ground articulation, which requires one area to surround another, no longer determines the grouping in this instance. Rather, the active principle is one not addressed in Chapter 2, that of occlusion.⁵⁷ If an object appears to occlude part of another, the first tends to be foregrounded. During Transition 2 (Table 3.1), Ligeti causes the figures (melodic accents) to occlude nearly all of the ground (eighth-note ascents). Example 3.5 compares the music a few measures before Transition 1 begins (LH mm. 37–40) with the music after the transition ends (LH mm. 54–57), and then with the tail end of Transition 2 when the ground virtually disappears (LH mm. 91–96).

Kinzler makes a similar observation regarding the occlusion of the background layer:

An ever present foreground plane is contrasted by a background plane, which—in changing proportion—gradually disappears and suddenly comes back in the middle of the piece.⁵⁸

At the start of Section III, the relationship between figures and their ground return to what they had been at the start of the etude, and perception is again influenced by figure/ground articulation.

3.4 Perception and the Polytempo Illusion

The topic of simultaneous layers of different tempos in “Désordre” is a complex one. Aside from the tempo specified in the score (63 whole-notes per minute—76 in Ligeti’s original), the two most obvious active tempo layers in “Désordre” are: (1) the perceived tempo of the RH; and (2) the perceived tempo of the LH. The following discussion will attempt to explain why each layer may legitimately be heard as a different tempo.

⁵⁷ Palmer, *Vision Science*, 236.

⁵⁸ Kinzler, “Decision and Automatism,” 122.



VS.



VS.



György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” LH mm. 37–40, 54–57, and 91–96

Copyright © 1986 by Schott Music GmbH & Co. KG

All Rights Reserved.

Used by permission of European American Music Distributors Company,

sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.5 Occlusion of the background layer.

As we saw in Chapter 2, visual illusions are an effective way to demonstrate how the mind can sometimes be tricked. For example, the phenomenon of apparent motion can convince the mind that a stationary object is in motion.⁵⁹ Vection, or as Palmer calls it, “induced self-motion,”⁶⁰ can convince a person that their body is in motion when it

⁵⁹ Palmer, *Vision Science*, 468.

⁶⁰ Ibid., 504–05.

actually is not. In order for these phenomena to take effect, the mind must receive the same stimuli it would receive if those experiences were real. Later in this chapter, the discussion will show that the correct stimuli for the perception of polytempo are present in the etude.

It should be noted that it would be highly unlikely for performers to execute a proper performance of the etude if they focus exclusively on these stratified perceived tempo layers. For example, Uranker explains that pianists should focus their attention on the eighth-note background layer.⁶¹ When a pianist focuses on this layer, Uranker says the accents feel more like syncopations than downbeats:

The rhythmic relationships in “Désordre” become much easier to hear, play, and comprehend if the pianist regards these relationships as a compound rhythm—not as two separate streams of music of ever-changing relationships.... It is much easier to feel the music as a downbeat with syncopation.⁶²

To show the view suggested by Uranker’s compound-rhythm approach, Example 3.6 gives the opening two melodies as notated using 4/4 measures. Notice how the LH’s rhythms in these measures all fit into a 4/4 framework, enabling the performer to keep a steady beat. A listener, on the other hand, has the option of ignoring the background eighth-note pulse through selective hearing. Example 3.7 shows this approach. The numbers between the staves indicate the offset interval in eighth notes. The example places a barline before every note in the two melodies to better visualize the offset. Notice that a distinct phasing becomes apparent. Because the phasing takes place at such a slow pace, a listener will have little trouble gauging the distance between offset accents. The LH will sound as though it lags behind the RH by greater and greater durations as

⁶¹ Uranker, “Ligeti’s ‘Désordre’,” 31.

⁶² Ibid.

Molto vivace, vigoroso, molto ritmico, ♩ = 63

Example 3.6 shows a musical score in 4/4 time, marked **Molto vivace, vigoroso, molto ritmico, ♩ = 63**. The score consists of three systems of piano accompaniment. The key signature is three sharps (F#, C#, G#). The melody is primarily composed of eighth and quarter notes, often beamed together. Measures 5 and 9 are marked with a '5' and a '9' respectively.

Example 3.6 Perception of accents as syncopations against a traditional 4/4 meter.

Molto vivace, vigoroso, molto ritmico, ♩ = 63

Example 3.7 shows a musical score in 4/4 time, marked **Molto vivace, vigoroso, molto ritmico, ♩ = 63**. The score consists of three systems of piano accompaniment. The key signature is three sharps (F#, C#, G#). The melody is primarily composed of eighth and quarter notes, often beamed together. Measures 1-9 are marked with a '1' and a '9' respectively. The score includes tempo phasing with elementary pulses eliminated, indicated by negative numbers (-1, -2, -3) below the notes.

Example 3.7 Perception of tempo phasing with elementary pulses eliminated.

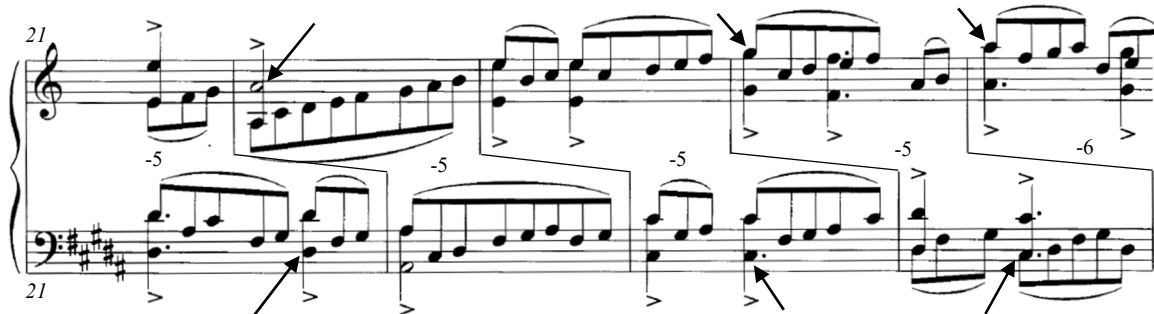
the music progresses.⁶³ Kinzler writes:

It is immediately evident that the shifting by 1 or 2 eighth notes in our model is perceived as an “after-striking.” But beginning at the shifting of 3 eighth notes, the “correct” relationship becomes insecure.... With further shiftings a “pre-striking” perception finally asserts itself.⁶⁴

By the time the phasing has brought the LH behind by three eighth notes, the phasing becomes difficult to track. As the LH falls further and further behind, Ligeti explains:

...the metric relationship is gradually blurred until we reach a point where we are unable to discern which hand leads and which lags behind. A state of order is in due course restored as the two successions of accents shift closer and closer to one another, eventually falling simultaneously in the two hands, at which point the cycle begins anew.⁶⁵

Example 3.8 shows a moment in Section I when the two melodies are so far apart that the offset will be difficult to track aurally.



György Ligeti *ÉTUDES POUR PIANO* No. 1 “Désordre,” LH mm. 21–24

Copyright © 1986 by Schott Music GmbH & Co. KG

All Rights Reserved.

Used by permission of European American Music Distributors Company,
sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.8 Moment when phasing is difficult to track aurally.

Arrows indicate accents that may cause a listener to lose track of the offset distance. For example, the first accent in LH m. 22 has fallen behind the first accent in RH m. 22 by a

⁶³ Ligeti, “On My *Études*,” 7.

⁶⁴ Kinzler, “Decision and Automatism,” 110.

⁶⁵ Ligeti, “On My *Études*,” 7.

distance of five eighth notes. However, because the last accent of LH m. 21 occurs after the first accent of RH m. 22, the LH accent in m. 21 will probably appear to be the accent that has fallen behind. The alignment of LH and RH accents at RH m. 24 may even convince a listener that a new phrase alignment has taken place.

At the beginning of the etude, the two melodies are easy to track, even when out of synchronization. At times, they sound as if they are in canon with each other.⁶⁶ This seems to be an intentional decision to ensure the listener has time to become accustomed to the necessity of tracking the offset between the two melodies. At one point in Uranker's analysis, he turned to the perspective of the listener and commented that:

...if the melody were more disparate and less tautly constructed, the point of the phasing might be lost on the listener.⁶⁷

There are at least four Gestalt principles that contribute to the perception of polytempo in "Désordre": similarity, proximity, figure/ground articulation, and synchrony. The principle of synchrony was not introduced in Chapter 2, but will be defined in a moment.⁶⁸

First, similarity between the rhythms of the two competing melodies helps the listener decide which notes should be heard as lagging behind others. For example, the canon-like imitation can almost be thought of as presenting a near copy of the RH melody in the LH, but slightly offset in time. Similarities between the two melodies are so strong that in no instance do the long-short, or short-long, rhythmic proportions of the

⁶⁶ See Haapamaki, "Order in 'Désordre'," 21, for a supporting discussion of canon-like qualities in the melodies of "Désordre."

⁶⁷ Uranker, "Ligeti's 'Désordre,'" 24.

⁶⁸ Palmer, *Vision Science*, 259–60.

melodies differ from one hand to the other. This is discussed in detail by Uranker⁶⁹ and Haapamaki.⁷⁰

Similarities are also present in the contours of the two melodies. Haapamaki further comments that they appear to be virtual copies of one another, but stated in different scalar collections, i.e., black-keys vs. white-keys. Thus, the melodies' similarities in both contour and rhythm will most likely convince the listener that the lines progress in canon with each other. Because of this, the mental task of tracking the distance of offset is greatly facilitated.

Second, proximity (section 2.3) is crucial to a listener's ability to track and compare the perceived tempo differences. As Example 3.8 demonstrates, the task of tracking the offset is considerably more difficult when the offset is large, especially because intermittent accents begin to compete. When the offset is only a factor of one or two eighth notes, however, it is easy to follow.

Third, while the principle of figure/ground articulation is not always necessary to enable the perception of polytempo, it is necessary in this etude. Without it, the two melodies would be indistinguishable from the busy eighth-note background. The melodies would likely be heard as irregular accents in reference to the eighth-note scalar ascents, which, according to Uranker, is how performers will probably have to perceive them.⁷¹ Without their "edges," the melodies could not be perceived as objects that one could track. Rather, they would assimilate into the homogeneity of the background accompaniment.

⁶⁹ Uranker, "Ligeti's 'Désordre,'" 9–12.

⁷⁰ Haapamaki, "Order in 'Désordre,'" 21.

⁷¹ Uranker, "Ligeti's 'Désordre,'" 31.

Fourth and finally, the principle of synchrony states that elements occurring at the same time tend to group. Because the two melodies begin in synchronization, the first instance of asynchrony (m. 5 where the barlines reflect this misalignment) is unsettling. A listener may expect (and even hope for) the synchronization to return. This desire could be thought of as a kind of magnetism. As the two melodies draw farther and farther apart, the magnetism will resist the direction of separation and try to hold them together, which can help a listener keep track of the offset. After a certain amount of time, Ligeti systematically increases the distance of separation, at which point the offset can no longer be tracked and the magnetism dissolves. But later, the magnetism returns when the accents grow nearer again. When this happens, a listener may experience the expectation that the synchronization will return and a certain degree of satisfaction will probably be felt when it does.⁷²

In sum, in order to ensure that the polytempo illusion is heard by the listener, Ligeti made use of at least four perceptual tools. (1) He wrote two melodies that are nearly exact replicas of one another. The contrast between them is mainly a result of their differing scalar collections (white-key vs. black-key). By doing this, Ligeti maintained contour and rhythm without oversaturating the texture with too much repetition.⁷³ (2) The phasing moves slow enough that a listener can track the offset. (3) Ligeti doubled each melodic note at the octave, reinforced the doublings with accents and dynamics, and included drastic contrasts between melody and accompaniment, ensuring that the “edges”

⁷² This bears a certain relation to Joseph Straus’s ideas of “pattern completion” in Stravinsky’s music. See Joseph Straus, “A Principle of Voice Leading in the Music of Stravinsky,” *Music Theory Spectrum* 4 (Spring 1982), 106–24.

⁷³ See Meyer, *Emotion and Meaning in Music*, 135–38, for a discussion of saturation and expectation in music.

could be perceived to distinguish his figures from his grounds. And finally (4), through the principle of synchrony, he created a magnetism that holds the phasing together for as long as possible.

3.5 Perception of Large-scale Unity

As described in Chapter 2, a listener has the ability to group compositional elements across large spans of music and even across entire compositions. To conclude the analytical portion of this study, three main elements will be discussed that contribute to the perception of large-scale unity in “Désordre”: (1) the unvaried phrase-group pattern, (2) the consistent texture, and (3) scalar ascents.

As shown in Example 3.1, once mm. 1–20 establish the original phrase-group pattern, this pattern is maintained throughout the etude, changing only in terms of rhythm and transposition. The constant presence of the original pattern acts as a cohesive element binding the three sections together through similarity.

Three elements of the texture remain constant throughout the composition. First, the eighth-note pulse never once lets up, even at the climax shown in Example 3.9.

The image shows a musical score for Example 3.9, which is a section from György Ligeti's Études pour piano No. 1 "Désordre". The score is for measures 97 through 100. It is written for piano and features a constant eighth-note pulse in the bass clef. The treble clef contains a complex melodic line with various dynamics and articulations. The key signature is three sharps (F#, C#, G#). The score includes markings for dynamics such as *sfff*, *mf*, *f*, *p*, and *sim.* (simulazione). There are also markings for articulation like accents and slurs. The measure numbers 97, 99, and 100 are indicated at the beginning of their respective staves.

György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” LH mm. 97–100
Copyright © 1986 by Schott Music GmbH & Co. KG
All Rights Reserved.
Used by permission of European American Music Distributors Company,
sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.9 Constancy of the eighth-note pulse.

When the LH rests for three eighth notes, the RH relentlessly maintains the pulse.

Second, melodic accents may be found in every measure of the etude. As shown in Example 3.10, this is even the case at the LH's mm. 91–96 when it appears that the background layer has overtaken the melodic foreground.



György Ligeti ÉTUDES POUR PIANO No. 1 “Désordre,” LH mm. 91–96

Copyright © 1986 by Schott Music GmbH & Co. KG

All Rights Reserved.

Used by permission of European American Music Distributors Company,
sole U.S. and Canadian Agent for Schott Music GmbH & Co. KG

Example 3.10 Foreground occlusion of the background layer.

As described earlier, just the opposite is true. Here, the two melodies of the foreground layer, which are now progressing at almost one accent per eighth, will likely be perceived as occluding the background. Third, the scalar ascents in the background layer become powerfully cohesive elements of the composition when compared to the composition-length scalar ascent present in the RH phrase groups, as shown in Figure 3.1. The figure labels the beginning pitch of every phrase group. Those in the RH combine to form a steady scalar ascent over the course of the entire etude.

It should be noted that despite the general registral descent of the LH phrase-group patterns over the course of the etude, its background scalar material consistently ascends. Because of this, it seems safe to assign greater hierarchical significance to the

idea of scalar ascent in “Désordre” than to the idea of scalar descent. Over the course of the etude, the small ascents seem to push little by little upward toward an eventual goal of C8, the highest note on the piano. The music seems to be pulled upward by a kind of upside-down musical gravity leading to the upper register of the piano. C8 on the piano seems like the natural destination for the music, not A0. In a sense, it is as if the scalar ascents point toward, or rather foreshadow, the ending. Scalar ascents, presented gradually or quickly, seem to be one of the pillars of the structure of the composition and are powerful contributors to the overall sense of unity in it.

3.6 Pedagogical Applications in the Composition Studio

It is the author’s hope that these Gestalt principles have helped to clarify how Ligeti’s etude is organized, and that the techniques presented may also prove beneficial to other composers. Composers like Ligeti seem to exhibit an innate understanding of how listeners perceive their music. In 1989, James Guthrie, who appears to have been the first to formally analyze this etude, supplied clues that “Désordre” might have been inspired by perceptual phenomena:

The title page of the original manuscript contains descriptions of various rhythmic dimensions. These descriptions, scribbled in the margins, are discarded titles: “Étude polyrythmique,” “Pulsation,” “Stroboscope,” “Mouvement irrégulier,” “Contraction-Dilatation,” “Pulsation irrégulier,” “Déplacement,” and “Ordre-Désordre.”^{74 75}

One of these words (stroboscope) names a perceptual device used for creating illusions. A stroboscope is a mechanism that was used to make something moving fast appear to be moving slowly, in the same way people can blink their eyes quickly when staring at a

⁷⁴ Ligeti, *Études pour piano - premier livre*, facsimile edition 7428 (Mainz: Schott, 1986), cover.

⁷⁵ James Martin Guthrie, “*Études pour piano—premier livre*, by György Ligeti, and *The Song of Glory*, an Original Opera in One Act,” DMA diss. (Louisiana State University and Agricultural and Mechanical College, 1989).

slowly spinning bicycle wheel and perceive the spokes as moving backward, or even standing still. This has parallels in “Désordre.” Because of the spacing of the accents on top of the fast-moving eighth-note runs, the illusion is created that the irregular accents are actually slower melodies.

To the author’s knowledge, Ligeti never spoke of using Gestalt principles to guide his choices in this etude. However, his compositional techniques seem to suggest that he knew how listeners might perceive it. Just as a person can communicate with another without knowing how to analyze the speech in terms of Chomskian linguistics, Ligeti does not need to be consciously aware of the Gestalt principles behind his music.

This raises an interesting question. Could composers benefit from an understanding of Gestalt principles? Diana Deutsch ends her chapter in *The Psychology of Music* observing that:

In treatises on music theory, we encounter a number of rules that instruct the student in the art of composition. Among these are the “law of stepwise progression,” which states that melodic progression should be by steps (i.e., a half step or a whole step) rather than by skips (i.e., more than a whole step) because stepwise progression is considered to be in some way “stronger” or “more binding.” Another law prohibits the crossing of voices in counterpoint. What is left unspecified is why these precepts should be obeyed: It is assumed that the reader will either follow them uncritically or recognize their validity by introspection. The findings that we have been reviewing provide such laws with rational bases by demonstrating the perceptual effects that occur when they are violated. *This in turn enables musicians to make more informed compositional decisions.*⁷⁶

Just as it has been shown that “Désordre” may be explained in terms of Gestalt principles, the careful study of perceptual principles can improve a composer’s ability to structure musical ideas.

⁷⁶ Diana Deutsch, “Grouping Mechanisms in Music,” in *The Psychology of Music*, 2nd ed., ed. Diana Deutsch (San Diego: Academic Press, 1999), 342. Italics added.

Gestalt principles can also help teachers of composition explain to students why certain compositional choices seem to “work” and why others clearly do not. In a hypothetical composition lesson, assuming both the teacher and the student are familiar with Gestalt principles, Example 3.11 represents compositional material that the student brings to the teacher.



Example 3.11 Hypothetical composition lesson: student’s original.

The teacher might ask if the student’s intention was to have the first measure sound as notated in Example 3.12.



Example 3.12 Hypothetical composition lesson: teacher’s question.

If the student were to respond that the notes assigned to the LH were meant to be heard as a pedal-point ostinato, the teacher could point out that, according to the principle of proximity, the notes in m. 1 would probably fuse into a single line as shown in Example 3.12. The teacher might continue by drawing upon the principle of figure/ground

articulation, explaining that unless edges are properly articulated in order to distinguish the LH notes as a separate line, an ostinato would probably not be perceived until m. 2 when the notes finally cross the trill threshold and are no longer able to be grouped by proximity. The teacher then might suggest the revision shown in Example 3.13.

Exuberant, ♩ = 200

Piano

Example 3.13 Hypothetical composition lesson: teacher’s suggested revision.

Here the teacher would explain that, according to the principle of continuity, the presence of the ostinato prior to the entrance of the RH material would more likely cause a listener to hear the LH content as a line continuing through the RH notes. As is clearly evident in Example 3.13, the teacher could further suggest a uniform articulation in the LH material, which, according to the principle of similarity, would strengthen its distinction from the RH material, thereby better articulating the ostinato’s “edges.”

BIBLIOGRAPHY

- Arom, Simha. *African Polyphony and Polyrhythm: Musical Structure and Methodology*. Foreword by György Ligeti, xvii–xviii. Cambridge: Cambridge University Press, 1985.
- Deutsch, Diana. “Grouping Mechanisms in Music.” In *The Psychology of Music*, 2nd edition, edited by Diana Deutsch, 299–348. San Diego: Academic Press, 1999.
- Deutsch, Diana, et al. “Psychology of Music.” *Grove Music Online*. Oxford Music Online. Oxford University Press, accessed February 4, 2015, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/42574pg1>.
- Ehrenfels, Christian von. *Über Gestaltqualitäten* [On Gestalt Qualities]. Leipzig: Reisland, 1890. Translated by Barry Smith in *Foundations of Gestalt Theory*, 82–123. Munich: Philosophia, 1988.
- Guthrie, James Martin. “*Etudes pour piano—premier livre*, by György Ligeti, and *The Song of Glory*, an Original Opera in One Act.” DMA diss., Louisiana State University and Agricultural and Mechanical College, 1989.
- Haapamaki, Sampo Elias. “Order in *Désordre*: Rhythmic and Melodic Structure in György Ligeti’s Piano Etude No. 1.” DMA diss., Columbia University, 2012.
- Hanninen, Dora A. *A Theory of Music Analysis: On Segmentation and Associative Organization*. Rochester, NY: University of Rochester Press, 2012.
- Hartman, James Barclay. “A Gestalt Theory of Musical Perception.” PhD diss., Northwestern University, 1959.
- Hodges, Donald A. *Handbook of Music Psychology*. San Antonio, TX: IMR Press, 1996.
- Hofstadter, Douglas R. *Metamagical Themas: Questing for the Essence of Mind and Pattern*. New York: Basic Books, 1985.
- Howell, Peter, et al., eds. *Musical Structure and Cognition*. London: Academic Press, 1985.
- Kinzler, Hartmuth. “György Ligeti: Decision and Automatism in ‘Désordre,’ 1^{re} étude, premier livre.” *Interface* 20 (1991): 89–124.
- Koffka, Kurt. *Principles of Gestalt Psychology*. New York: Harcourt, 1935.

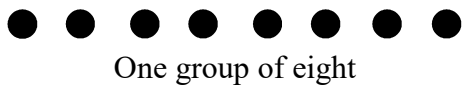
- Köhler, Wolfgang. *Gestalt Psychology*. New York: Liverlight, 1929.
- . *Gestalt Psychology: An Introduction to New Concepts in Modern Psychology*. New York: Liverlight, 1947. Köhler, Wolfgang. *The Task of Gestalt Psychology*. Princeton, NJ: Princeton University Press, 1969.
- Lerdahl, Fred, and Ray Jackendoff. *A Generative Theory of Tonal Music*. Cambridge: MIT Press, 1983.
- Licata, Thomas. “A Rhythmic Analysis of György Ligeti’s Piano Etude ‘Désordre’.” MM thesis, University of Maryland at College Park, 1992.
- . “On My *Études for Piano*,” *Sonus* 9 (Fall 1998): 4–7.
- . Liner notes to *György Ligeti, Edition 3: Works for Piano (Etudes and Musica Ricercata)*. Sony (DDD 62309), 1997. Pierre-Laurent Aimard, piano.
- . Liner notes to *Ligeti: Piano Etudes, Book 1*. Erato (ECD 75555), 1990. Pierre-Laurent Aimard, piano.
- Lipscomb, Scott D. “The Cognitive Organization of Musical Sound.” In *Handbook of Music Psychology* edited by Donald A. Hodges, 133–76. San Antonio, TX: IMR Press, 1996.
- Meyer, Leonard B. *Emotion and Meaning in Music*. Chicago: University of Chicago Press, 1956.
- . *Explaining Music: Essays and Explorations*. Berkeley: University of California Press, 1973.
- Miller, George A., and George A. Heise. “The Trill Threshold.” *Journal of the Acoustical Society of America* 22 (September 1950), 637–38.
- Narmour, Eugene. *The Analysis and Cognition of Basic Melodic Structures: The Implication-realization Model*. Chicago: University of Chicago Press, 1990.
- . *The Analysis and Cognition of Melodic Complexity: The Implication-realization Model*. Chicago: University of Chicago Press, 1992.
- Palmer, Stephen E. “Common Region: A New Principle of Perceptual Grouping.” *Cognitive Psychology* 24 (July 1992): 436–47.
- . “Hierarchical Structure in Perceptual Representation.” *Cognitive Psychology* 9, no. 4 (1977): 441–74.
- . *Vision Science: Photons to Phenomenology*. Cambridge, MA: MIT Press, 1999.
- Sabar, Stephanie. “What’s a Gestalt?” *Gestalt Review* 17, no. 1 (2013): 6–34, accessed March 11, 2015. <http://www.gisc.org/gestaltreview/documents/whatsagestalt.pdf>.

- Sloboda, John A. *The Musical Mind: The Cognitive Psychology of Music*. Oxford: Clarendon Press, 1985.
- Stumpf, Carl. *Tonpsychologie*. 2 vols. Leipzig: Hierzel, 1883–90.
- Todorovic, Dejan. “Gestalt Principles.” *Scholarpedia.org*, 2008, accessed March 11, 2015. doi:10.4249/scholarpedia.5345.
- Tsong, Mayron K. “*Études pour piano, premier livre* of György Ligeti: Studies in Composition and Pianism.” MM thesis, Rice University, 2001.
- Uranker, Mark. “Ligeti’s ‘Désordre’ from *Études pour piano—premier livre*: An Analysis and Performance Guide.” MM thesis, California State University, Long Beach, 1998.
- Wertheimer, Max. *Experimentelle Studien über das Sehen von Bewegung* [Experimental Studies on the Seeing of Motion]. Leipzig: J.A. Barth, 1912.
- . “Gestalt Theory.” In *A Source Book of Gestalt Psychology*. Edited by Willis D. Ellis, 1–11. New York: Harcourt, Brace, 1938.
- . “Laws of Organization in Perceptual Forms.” In *A Source Book of Gestalt Psychology*. Edited by Willis D. Ellis, 71–88. New York: Harcourt, Brace, 1938, accessed on March 10, 2015.
<http://psychclassics.asu.edu/Wertheimer/Forms/forms.htm>.
- . “Principles of Perceptual Organization.” In *Readings in Perception*, edited by David C. Beardslee and Michael Wertheimer, 115–35. Princeton, NJ: Van Nostrand, 1958.

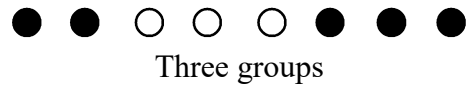
APPENDIX A

GESTALT PRINCIPLES OF PERCEPTION SUMMARY

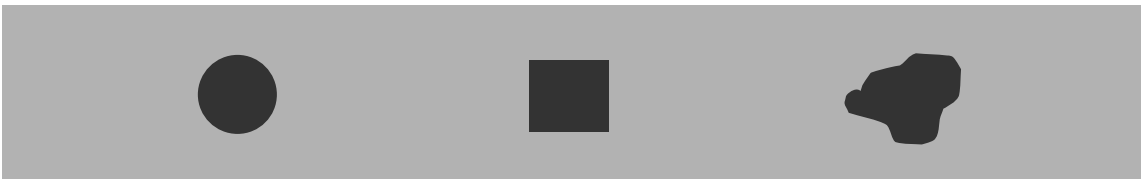
Proximity: Objects near to one another tend to be grouped.



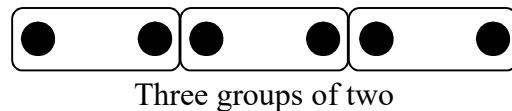
Similarity: Objects seen as similar to one another tend to be grouped together.



Figure/Ground Articulation: An area surrounded by a dissimilar area tends to be grouped as a figure upon a ground if the surrounding area is large and homogenous enough to be perceived as being distinct from the smaller area.



Common Region: Objects within the same boundaries tend to be grouped.



Continuity: Objects that can be seen as smooth continuations of each other tend to be grouped.

