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Timbral Transformations in Kaija Saariaho's *From the Grammar of Dreams*

by

Karen J. Siegel

A dissertation submitted to the Graduate Faculty in Music in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

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This manuscript has been read and accepted for the Graduate Faculty in Music,
in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

Timbral Transformations in Kaija Saariaho's
From the Grammar of Dreams

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Adviser: Professor David Olan

This dissertation is a study of Kaija Saariaho's 1988 vocal work *From the Grammar of Dreams,* with a focus on timbre. It begins with background on Saariaho, and research on timbre in music theory and psychoacoustics (Chapters 1 and 2). Chapter 3 shows how Saariaho manipulates timbre to expressive and formal ends in *From the Grammar of Dreams*, including creating timbral tension and release, applying Robert Morris' Contour Theory in its analyses. Chapter 4 then explores how the timbral transformations interact with non-timbral musical elements. The conclusion (Chapter 5) puts the compositional techniques of this work in the context of Saariaho's evolving style, and explores possibilities for future research.

Acknowledgements

Thanks are due to Chester Music for allowing me to reprint many portions of *From the Grammar of Dreams* in my musical examples (*From the Grammar of Dreams*, Music by Kaija Anneli Saariaho, Copyright © 1988 Edition Wilhelm Hansen AS, Copenhagen; printed with permission). I very much appreciate Kaija Saariaho's taking the time to grant me an interview during her stay in New York in 2012.

My adviser, Professor David Olan, was instrumental in shaping this project, and I especially appreciated his help in the early stages of writing and analysis. I am also thankful for the guidance of Professor Joseph Straus, the first reader, in the later stages of the dissertation. I appreciate the feedback I have received from my colleagues and friends both inside and outside of the Graduate Center along the way.

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Chapter 1: Introduction

In 1983, the Finnish composer Kaija Saariaho wrote: "In my instrumental music writing I have already started to use the tone-noise axis as a timbre parameter in order to build musical form by regulating the degree of tension."[1] Saariaho's music from this decade reflects this focus on exploring the functional possibilities of timbre. I will explore how timbre takes on this formal importance, as well as expressive importance, in her 1988 vocal work *From the Grammar of Dreams*.

While much has been written about Saariaho's early electronic and electroacoustic works, there has been little scholarly interest in her acoustic works from this time in her career when she was intensively exploring timbral possibilities. But while electronics allow for sounds outside of those produced by the voice and acoustic instruments, these sounds are not by themselves the impetus for her focus on timbre. Saariaho has said that she does not use electronics unless there is a specific reason to include them in a certain work. As she explains, "The electronics are there because there is an expressive necessity for them to be there."[2]

From the Grammar of Dreams is an ideal acoustic work to examine from a timbral perspective because it was composed during the height of Saariaho's interest in using timbre as a primary element in overall compositional design.[3] At the time that Saariaho wrote *From the*

1. Kaija Saariaho, "Using the Computer in a Search for New Aspects of Timbre Organisation and Composition," *International Computer Music Conference Proceedings: Vol. 1983,* Ann Arbor (MI: Mpublishing, University of Michigan Library, 1983), http://hdl.handle.net/2027/spo.bbp2372.1983.021.
2. Kaija Saariaho and Tom Service, "Meet the Composer: Kaija Saariaho in Conversation with Tom Service," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 13.
3. Pirkko Moisala refers to this time in Saariaho's career as her "timbre period" (*Kaija Saariaho*, Chicago: University of Illinois Press, 2009, 36).

Grammar of Dreams in 1988, she was just starting to receive international recognition for her work. She had already made a name for herself among the community of composers at IRCAM, the center for computer music in Paris where she learned from composers of the spectral school and developed techniques for using the computer as a tool for composing instrumental music. From 1986 on, she continually received high-profile commissions and prizes from around the world.

Saariaho composed many orchestral works for major international orchestras in the 1990s. In the mid-1990s she turned her attention to composing for the voice, building up to her first opera *L'amour de loin* (*Love from Afar*), which premiered in 2000. Her works since the mid-1990s have used the voice prominently, while giving less formal importance to timbre and more importance to melodies and motives. She continued to compose operas and large vocal works through the first decade of the 21st century.

Saariaho has referred to the 1980s as a period in which she focused more on color than on melodic line.[4] Her vocal works from that period use the multitude of timbres that the voice is capable of creating, highlighting the functional importance of timbre, even in works for voices alone. By exploring Saariaho's use of timbral transformations in the vocal work *From the Grammar of Dreams*, I will address a need for scholarly attention to the role of timbre in an important acoustic vocal work.

1.1 Kaija Saariaho in the Literature:

The scholarly literature on Kaija Saariaho began, unusually, with a series of her own papers in the 1980's. The most significant of these is her 1987 article "Timbre and Harmony:

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4. Martin Anderson, "Doing it her way: Kaija Saariaho talks to Martin Anderson," liner notes from Sony SK 60817, ℗ and © 2001 Sony Music Entertainment, 11.

Interpolations of Timbral Structures."[5] She explains in this article how the contrast between sound and noise replaces traditional harmonic contrasts in her work, and she emphasizes the importance of texture and timbre to her compositional techniques. Saariaho also describes how she interpolates harmonic and timbral structures as a means of transforming from one structure to another, often with the assistance of the computer.[6]

Saariaho provides examples from her early work, such as *Vers le Blanc* (*Towards White*,[7] 1982, for orchestra), in which one extremely slow harmonic and timbral transformation consumes the entire form. Her use of extremes also applies to her use of what she calls the sound/noise axis. As Saariaho describes in this article, her work *Verblendungen* (*Dazzlings*,[8] 1982-84, for orchestra and tape) centers around a transformation of the tape part from noise to pure sound and an opposite transformation of the orchestral part from pure sound to noise. She

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5. Kaija Saariaho, "Timbre and Harmony: Interpolations of Timbral Structures," trans. by S. Welbourn, *Contemporary Music Review* 2/1 (1987). There are three other papers by Saariaho predating this one, all presented at conferences of the International Computer Music Association—a paper on *Vers le blanc* and *Verblendungen* that she drew on for her explanations in "Timbre and Harmony" (Kaija Saariaho, "Using the Computer in a Search for New Aspects of Timbre Organisation and Composition,"); a technical paper in which she explains how she uses the CHANT sound synthesis program (Kaija Saariaho, "Shaping a Compositional Network with Computer," in *Proceedings of the 1984 International Computer Music Conference* [San Francisco: International Computer Music Association, 1984]); and an article co-written with the IRCAM psychoacoustician Stephen McAdams (Stephen McAdams and Kaija Saariaho, "Qualities and Functions of Musical Timbre," in *Proceedings of the International Computer Music Conference, 1985* [San Francisco: International Computer Music Association, 1985]), in which they discuss aspects of music perception largely without reference to Saariaho's music. The musical examples that McAdams and Saariaho do refer to are also discussed in Saariaho's 1987 article, which is her first publication for a broader audience of music scholars.

6. Saariaho also explains these interpolations, with greater technical detail, in "Using the Computer in a Search for New Aspects of Timbre Organisation and Composition." For an explanation of interpolation and other techniques used by spectral composers, by whom Saariaho was influenced, see Joshua Fineberg, "Guide to the Basic Concepts and Techniques of Spectral Music" and "Musical Examples," both in *Contemporary Music Review* 19 (2000) Part 2.

7. Translation from Saariaho, "Using the Computer in a Search for New Aspects of Timbre Organisation and Composition," 269.

8. Translation from Anni K. Oskala, "The Voice in Saariaho's Music, 1977-2000" (PhD thesis, University of Oxford, 2007), 77.

further explains how within this transformation of sound/noise extremes, the parameters of orchestral importance, tape importance, polyphony, homophony, rate of harmonic progression, pitch range, and dynamics are carefully controlled and constantly, gradually, changing. Here harmony is but one of many parameters manipulated to create oppositions that enrich the "one-dimensional" sound/noise axis.[9]

Much of the literature on Saariaho explores the ideas she put forth in that 1987 article, often revisiting the same early works. An analysis of *Vers le Blanc* by Clifton Callender applies a mathematical model to describe the pitch transformation.[10] A couple of articles provide general overviews of Saariaho's works, drawing on her own descriptions of her compositional techniques.[11] Saariaho's biographer Pirkko Moisala discusses her works in the context of her compositional development over time, and describes Saariaho's compositional techniques in general terms.[12]

James O'Callaghan and Arne Eigenfeldt examine two of the works that Saariaho discussed in her 1987 article, *Verblendungen* and *Lichtbogen* (*Arches of Light*,[13] 1986, for ensemble and electronics) in a 2010 paper.[14] Their descriptions of changes in the level of noise

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9. Saariaho, "Timbre and Harmony," 94-97.
10. Callender, "Continuous Transformations," *Music Theory Online*, 10/3 (2004), http://mto.societymusictheory.org/issues/mto.04.10.3/mto.04.10.3.callender.pdf.
11. Julian Anderson, "Seductive Solitary," *The Musical Times,* 133/1798 (Dec. 1992); and Anders Beyer, "Kaija Saariaho: Colour, Timbre and Harmony," in *The Voice of Music: Conversations with composers of our time,* ed. and trans. by Jean Christensen and Anders Beyer (Burlington: Ashgate, 2000).
12. Moisala, *Kaija Saariaho.*
13. Translation from Tim Howell, "Preludes and Codas," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), xvii.
14. James O'Callaghan and Arne Eigenfeldt, "Gesture transformation through electronics in the music of Kaija Saariaho," *Proceedings of the Seventh Electroacoustic Music Studies Network Conference,* Shanghai, June 21-24, 2010, http://www.ems-network.org/IMG/pdf_EMS10_OCallaghan_Eigenfeldt.pdf.

in both the orchestral and electronic parts for these works, in addition to other musical parameters, comes closest to serving as a model for my research. O'Callaghan and Eigenfeldt combine score-based noise ratings for the orchestral part with listening-based noise ratings for the electronic part, developing a convincing illustration for how Saariaho's pre-compositional plan is realized.

A chapter by Tim Howell in a book on Finnish composers introduces Saariaho to a broader audience with descriptions of *Lichtbogen* as well as the more recent works *Aile du songe* (*Wing Dream,* 2001, for flute and string orchestra with percussion) and *Orion* (2002, for orchestra).[15] Howell focuses on the formal elements in each work, occasionally touching on the contribution of timbre to form (as in a transformational scheme for timbre and dynamics in the last movement of *Orion*). Damien Pousset discusses Saariaho within the context of spectral composers and describes the use of timbre as a formal element in Saariaho's early works, making a limited attempt at including the more recent *Du Cristal* (*From Crystal,* 1990, for orchestra) in the discussion.[16] With the exception of a brief mention of a recurring "complex sound," however, he makes no mention of timbre in his discussion of form in her post-1987 compositions. One of the more comprehensive analyses of Saariaho's more recent works, a 2008 dissertation by Spencer Lambright,[17] lacks any special mention of timbre. Lambright's analysis of the opera *L'amour de loin* focuses on Saariaho's style of vocal writing, use of pitch schemes, harmony, and orchestration.

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15. Tim Howell, "Kaija Saariaho – the French Connection," in *After Sibelius: Studies in Finnish Music* (Burlington: Ashgate, 2006).
16. Damien Pousset, "The Works of Kaija Saariaho, Philippe Hurel and Marc-André Dalbavie—Stile Concertato, Stile Concitato, Stile Rappresentativo," *Contemporary Music Review* 19/3 (2000).
17. Spencer N. Lambright, "L'amour de Loin and the Vocal Works of Kaija Saariaho" (DMA dissertation, Cornell University, 2008), http://ecommons.library.cornell.edu/handle/1813/10761.

A dissertation by Mark Aled Hutchinson includes a discussion of Saariaho's *Solar* (1993, ensemble), placing it into the context of its composition at a turning point in Saariaho's style.[18] Hutchinson points out connections in *Solar* to both the large-scale gestures of her 1980s compositions and the use of repetition as a structural tool in her works of the 1990s. He emphasizes the need to look at the integration of various musical parameters in Saariaho's work, but does not go beyond general descriptors in his discussion of timbre.

A 2011 collection of writings about Saariaho's music presents the most comprehensive study of her works to date.[19] It presents in-depth analyses from the perspective of physicality,[20] temporality and directionality,[21] semiotic meaning,[22] and perceptual possibilities,[23] as well as broader discussions of commonalities and contrasts across a range of her works; from themes of meaning in her operas,[24] to expressions of duality and opposition in her concertos,[25] to

18. Mark Aled Hutchinson, "Redefining Coherence: Interaction and Experience in New Music, 1985-1995" (PhD thesis, University of York Department of Music, 2012), http://etheses .whiterose.ac.uk/2636/1/Mark's_PhD_final.pdf, 125-158.

19. Tim Howell, Jon Hargreaves, and Michael Rofe, eds., *Kaija Saariaho: Visions, Narratives, Dialogues* (Burlington, VT: Ashgate Publishing Company, 2011).

20. Tania Riikonen, "Stories from the Mouth: Flautists, Bodily Presence and Intimacy in Saariaho's Flute Music," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 63-80.

21. Michael Rofe, "Capturing Time and Giving it Form: *Nymphea,*" in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 81-105.

22. Anni Oskala, "Dreams about Music, Music about Dreams," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 41-60; Jon Hargreaves, "Networks of Communication: (De)Crystallization and Perceptual Zoom in *Du cristal*," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 177-201.

23. Hargreaves, "Networks of Communication."

24. Liisamaija Hautsalo, "Whispers from the Past: Musical Topics in Saariaho's Operas," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 107-129.

evanescence and temporality in the instrumental works *Cendres* (*Ashes,* 1998, for alto flute, cello and piano) and *Terra Memoria* (*Earth Memory*, 2006, for string quartet),[26] and a consideration of timbral form in both her acoustic and electronic works.[27] The latter chapter is the most relevant to my approach to Saariaho's music. Vesa Kankaanpää questions the perceptual clarity of Saariaho's explanation that in *Im Traume* (*In Dreams,* 1980, for cello and piano), traditional sonorities represent stasis while non-traditional sonorities represent tension; he concludes that expectations based on "music-historical awareness" could make such perceptions possible.[28]

In the same volume, an interview between Saariaho and Tom Service reveals details about the influence of Saariaho's teachers Paavo Heininen and Brian Ferneyhough as well as the composers Tristan Murail and Gérard Grisey, the personal obstacles she overcame on her path towards becoming a composer, and her current thoughts about her past compositions. Notably, Saariaho characterizes *Verblendungen* as "stiff," compared with the "breathing" quality of *Lichtbogen.*[29]

This collection also includes one of the few writings specifically about *From the Grammar of Dreams*. Anni Oskala analyzes the work from a semiotic perspective, taking into consideration Saariaho's interest in the dream theories of Sigmund Freud and David (William)

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25. Tim Howell, "Dualities and Dialogues: Saariaho's Concertos," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 133-157.
26. Daniel March, "From the Air to the Earth: Reading the Ashes," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 15-40.
27. Vesa Kankaanpää, "Dichotomies, Relationships: Timbre and Harmony in Revolution," in *Kaija Saariaho: Visions, Narratives, Dialogues,* ed. by Tim Howell, Jon Hargreaves and Michael Rofe (Burlington, VT: Ashgate Publishing Company, 2011), 159-176.
28. Ibid., 160-161; Saariaho, "Timbre and Harmony," 104.
29. Kaija Saariaho and Tom Service, "Meet the Composer: Kaija Saariaho in Conversation with Tom Service," 11.

Foulkes, whose book *A Grammar of Dreams* was the inspiration for Saariaho's title.[30] Oskala reads the first movement of *From the Grammar of Dreams* as a nightmare, followed by the dreamer suddenly waking up and then gradually calming down while reflecting on the dream. In her interpretation, the remaining four movements then represent the Freudian process of interpreting the dream through free association, with the two voices representing the conscious and unconscious parts of the psyche.[31] This interpretation does line up with Saariaho's statement about the work that "this all happens in one person's mind."[32]

Two dissertations discuss *From the Grammar of Dreams,* one in the context of Saariaho's entire output for the voice up until 2000, and the other in the context of contemporary vocal music. The first, by Anni Oskala, is a both detailed and comprehensive study of Saariaho's vocal writing. Oskala examines Saariaho's evolving vocal composition techniques in the context of how her style has changed over time, comparing the techniques used in *From the Grammar of Dreams* to other vocal works of the late 1980's and early 1990's. In particular, she notes how *From the Grammar of Dreams* exhibits Saariaho's use of unintelligible text setting, and control of vibrato and amount of breathiness in the voice.[33]

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30. Oskala, "Dreams about Music, Music about Dreams," 51. Saariaho's 1988 work *Grammaire des rêves*, about which Oskala also writes, was also inspired by Foulkes' *A Grammar of Dreams* (Ibid.).

31. Oskala, "Dreams about Music, Music about Dreams," 55; While Oskala cites Saariaho's description of the first movement as depicting a nightmare (in Komsi, "*From the Grammar of Dreams:* Kaija Saariahon sävellys Sylvia Plathin tekstiin" [*From the Grammar of Dreams:* Kaija Saariaho's Setting of Text by Sylvia Plath"] [written submission, Sibelius Academy, Opera/Vocal music department, 2001], 21, cited in Ibid.), she makes no further claims as to the intentionality of her dream theory interpretation.

32. Kaija Saariaho, interview with the author, March 7, 2012, New York City.

33. Anni Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 80-99.

Oskala also discusses the semantic meaning of the work in relation to dream theory, a section that she would later develop into the chapter discussed above.[34]

The other dissertation focusing on *From the Grammar of Dreams* is by Marja Liisa Kay, who brings a performer's perspective to the work. Kay's analysis of *From the Grammar of Dreams* focuses on the emotional trajectory of the overall work. She also compares Saariaho's text treatment to Ligeti's use of phonemes.[35]

A separate line of research centers on Saariaho's identity as a woman. Pirkko Moisala has written about the composer's construction of her gender identity and the perception of her gender by the Finnish press, which strangely lagged behind the rest of the world in embracing Saariaho's success.[36] Sanna Iitti analyzes Saariaho's music through a feminist lens. Iitti finds a reflection of femininity in Saariaho's use of the soprano voice,[37] and examines the representation of gender in *L'amour de Loin*.[38] Taina Riikonen explores the embodiment of gender by the flautists in Saariaho's *NoaNoa* (*Fragrant*, 1992, for solo flute and electronics) comparing performances by different flautists in interaction with the male and female flautists recorded in the electronic part.[39]

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34. Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 161-167; Oskala, "Dreams about Music, Music about Dreams."

35. Marja Liisa Kay, "Contemporary Vocal Music: Language, Technology & Contemporary Vocal Music of Finland" (PhD dissertation, University of York Department of Music, 2012), 103-108.

36. Pirkko Moisala, "Gender Negotiation of the Composer Kaija Saariaho in Finland: The Woman Composer as a Nomadic Subject," in *Music and Gender*, ed. by Pirkko Moisala and Beverly Diamond (Chicago: University of Illinois Press, 2000).

37. Sanna Iitti, "Kaija Saariaho: Stylistic Development and Artistic Principles," *International Association of Women in Music Journal,* 7/3 (2001).

38. Sanna Iitti, "*L'amour de loin*: Kaija Saariaho's First Opera," *International Association of Women in Music Journal*, 8/1-2 (2002).

39. Taina Riikonen, "Shaken or stirred—virtual reverberation spaces and transformative gender identities in Kaija Saariaho's *NoaNoa* (1992) for flute and electronics," *Organised Sound* 8/1 (2003).

As Hutchinson points out, this line of inquiry and Saariaho's willingness to discuss experiences related to her gender is in contradiction with her desire not to be viewed as a "woman composer."[40] However, given the "chauvinist" references to her gender in early reviews,[41] some distancing from her gender was a natural reaction. Once she had reached a high level of success, she could discuss her gender without concern for how it would influence the reception of her music. It is worth noting that the earliest of these gender-focused interviews took place in 2000.

1.2 A Timbre-Focused, Score-Based Approach

In this dissertation I will look closely at a single work, Saariaho's 1988 vocal work *From the Grammar of Dreams.* My aim is to gain an in-depth understanding of how Saariaho manipulates timbre, how these timbral manipulations function on both a small and large scale in the music, and finally how the timbral changes relate to changes in other musical parameters. I will address the first two goals in "Chapter 3: *From the Grammar of Dreams*: Timbre," and I will address the third goal in "Chapter 4: *From the Grammar of Dreams*: Timbre in Context."

Many timbre-focused analyses study recordings, often using either spectrographs or computer-assisted analyses of the recordings as analytical tools. Such an approach is appropriate for electronic and popular music, where scores are often nonexistent, and the composer is personally involved with the creation of the recorded sound. It can also be also useful for electroacoustic music, where important information is missing from the score. For acoustic, traditionally notated music, however, a recording is just one of many possible

40. Hutchinson, "Redefining Coherence," 46; and Moisala, "Gender Negotiation of the Composer Kaija Saariaho in Finland," 172.

41. Lauri Otonkoski, "The Grammar of Dreams—Kaija Saariaho, Composer," *Finnish Music Quarterly,* 5 (1989): 4.

interpretations of the composer's score.[42] While Robert Cogan showed that spectrograph analysis can be revealing for both electronic music and acoustic instrumental music in his 1984 book that was a model for later analyses, his examples of vocal music analyses fail to elucidate aspects of the music that are not plainly heard without the aid of special visual representation.[43]

John Dribus' application of one type of computer-assisted analysis, fast Fourier Transform (FFT) analysis of noise content, to recordings of acoustic music does show that such an analysis can present an informative perspective. However, by focusing on the "objective" quantification of noise content achieved through FFT analysis, Dribus' analyses are divorced from the reality that timbre is a result of inherently subjective human perception.[44]

I will therefore present a score-based analysis, based on Saariaho's notated instructions to the performers. Just as timbre perception is subjective, my quantification of specific values for timbral dimensions will also depend on an element of subjectivity. My method, however,

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42. This is especially the case with *From the Grammar of Dreams*, for which the only commercially available recording was made without Saariaho's involvement (according to Saariaho, interview with the author, March 7, 2012).

43. Robert Cogan, *New Images of Musical Sound* (Cambridge, MA: Harvard University Press, 1984). In part, the fault lies in his choice of vocal examples, none of which employ extended techniques such as those that produce noise. He notes Ligeti's attention to the proportion of noise in sounds (43), yet chooses to analyze Ligeti's *Lux Aeterna,* rather than one of Ligeti's works in which singers speak and shout.

44. John A. Dribus, "Characterizing Noise and Harmonicity: the Structural Function of Contrasting Sonic Components in Electronic Composition" (DMA dissertation, University of North Texas, 2010), http://digital.library.unt.edu/ark:/67531/metadc30427/m2/1/high_res_d /dissertation.pdf. Dribus goes so far as to stipulate that noise is objective whereas timbre is subjective, a claim that I find problematic since noise is a timbral dimension, as I will discuss in Chapter 2. He explains, without reference to research in music perception: "Although the noise level in a sound often has a direct bearing on its timbre, the analytical and objective approach…is more accurate than simply discussing a sound's timbre, which can be thought of as the subjective effect of the distribution of partials and noise on a listener" (1). At one point in his analysis of Jean-Baptiste Barrière's electronic work *Chreode*, Dribus admits that "The rapid noise decrease seen on the analysis graph is not readily apparent to the human ear" (81). (Side note: Barrière is Saariaho's husband.)

minimizes focus on the quantification on timbre and focuses instead on the changes that the timbral dimensions undergo.

While the O'Callaghan and Eigenfeldt method of score-based analysis for noise could serve as a model for score-based timbral analysis, its flaws prevent me from using it as a model. The main problem is that they use an additive method for quantifying the amount of noise, which they admit sometimes results in illogical results, especially when solo instruments are used.[45] The authors also conflate timbral dimensions such as noise and vibrato, for example, considering *molto vibrato* playing as contributing to a higher noise level. In the absence of an adequate model for score-based timbral analysis, I will create my own method. This method, and the research on timbre on which the method is based, is the subject of the next chapter.

45. O'Callaghan and Eigenfeldt, "Gesture transformation through electronics," 5-9.

Chapter 2: Timbre & Methodology

In order to address some of the most important aspects of Kaija Saariaho's music, it is necessary to delve into timbre, a musical element that has been relatively neglected by past and present musical analysis. The reasons for this neglect may be practical—pitch and rhythm are scalable, allowing for measurement based on aural perception; while timbre is not scalable in such a straightforward way—or the neglect may be due to traditional ideas about which musical elements are most important.

2.1 Timbre: Historical Perspective

Historically, composition treatises have focused on harmony, melody (often in regards to counterpoint), and to some extent rhythm, ignoring timbre except to use knowledge of acoustics and psychoacoustics as background for their ideas. In the comprehensive *Cambridge History of Western Music Theory,* timbre is only mentioned in reference to discoveries in acoustics by Marin Mersenne, who first investigated the overtone series in 1623; Joseph Sauveur, who recognized the physical basis of the harmonic series in 1701; and other acousticians who built on their discoveries; leading up to Hermann von Helmholtz's revelations in psychoacoustics beginning in 1857 (as I will discuss later in this chapter), and Carl Stumpf's investigations of "tone psychology" (*Tonpsychologie*) published in 1883 and 1890.[46]

While the 18th Century music theorist Jean-Philippe Rameau created a composition treatise based on mathematical relationships of tones that turned out to relate to physical attributes of tones, timbre was for him only background for compositional rules based on

46. Thomas Christensen, ed., *The Cambridge History of Western Music Theory* (New York: Cambridge University Press, 2002), 250-265.

harmony and counterpoint.[47] Physical aspects of timbre were also background material for Hugo Riemann, the leading music theorist of the 19th Century. In one of his most influential pedagogic texts, he refers to the overtone series and the undertone series, and their perception in one overall sound, as the basis for all consonance, dissonance, and tonal functions.[48] Yet, though he discusses harmony, counterpoint, and even rhythm in *Vereinfachte Harmonielehre* (*Harmony Simplified*), the only mention of specific types of sound or sound sources is a section on writing for transposing instruments.[49]

Even Charles Stanford's 1911 treatise, which acknowledges the distinct ability of the voice to create a wide variety of sound colors,[50] fails to discuss timbre in a meaningful way. Instead, he refers to timbre as "top-dressing," and emphasizes its relative unimportance compared with melody and overall structure.[51] That same year, however, Arnold Schoenberg first expressed his idea of *klangfarbenmelodie* that finally acknowledged timbre as a potentially significant element of compositional design, inspiring the Twentieth Century composers who would realize his "futuristic fantasy."[52]

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47. Jean-Philippe Rameau, *Treatise on Harmony,* trans. by Philip Gosset (New York: Dover Publications, Inc., 1971) (Translation of *Traité de l'harmonie* [Paris: Jean-Baptiste-Christophe Ballard, 1722]). In a "Translator's Introduction," Gosset emphasizes that Rameau was unaware of Sauveur's discoveries when he wrote *Traité de l'harmonie*, though he concludes that "The inadequacy of many of Rameau's explanations do not always interfere with the brilliance of his theories" (xxi).

48. Hugo Riemann, *Harmony Simplified or The Theory of the Tonal Functions of Chords,* third impression, trans. by the Rev. H. Bewerunge (London: Augener Ltd., 1895.), 7-9 (Translation of *Vereinfachte Harmonielehre; odor, Die Lehre von den tonalen Funktionen der Akkorde* [London: Augener Ltd., 1893]).

49. Ibid., 131-139.

50. Charles Villiers Stanford, *Musical Composition: A Short Treatise for Students* (New York: Macmillan, 1911), 97, books.google.com/books?id=bWMJAQAAMAAJ.

51. Ibid., 110.

52. Arnold Schoenberg, *Theory of Harmony,* trans. by Roy E. Carter (Berkeley and Los Angeles: University of California Press, 1978), 421. (Translation of *Harmonielehre,* third edition [Vienna: *Universal Edition,* 1922], originally published in 1911.)

Even after Schoenberg's idea of *klangfarbenmelodie,* however, timbre continued to be ignored by the highly influential music theorist Heinrich Schenker. His *Der freie Satz* (*Free Composition*) discusses principles of harmony, counterpoint and voice leading, with a chapter on rhythm and meter but no mention of timbre. The closest he comes to discussing timbre is a brief acknowledgement of the overtone series, which he refers to as existing in nature,[53] and which may be the basis for his comments that "The fundamental structure shows us how the chord of nature comes to life through a *vital natural power*," and "Voice-leading transformations also spring from a *natural vital power*."[54]

2.2 Timbre: Popular Music Literature

In recent years, there has finally been some attention given to timbre by music theorists. There are a few music theorists who analyze electronic and electroacoustic music from a timbral perspective, notably Denis Smalley and Mario Mazzoli, whose work I will refer to in this chapter. Timbre has received perhaps the most attention in the literature on popular music; although it is generally described in categorical, descriptive terms, such as pointing out the metallic quality of a percussion sound. Nevertheless, some popular music scholars have recognized timbre as a significant contributor to musical meaning and form, and I will highlight a few of their writings.

Philip Tagg's semiotic perspective, including timbre as part of a holistic approach, has been influential in popular music scholarship. In his hermeneutic-semiological method of

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53. Heinrich Schenker, *Free Composition (Der freie Satz): Volume III of New Musical Theories and Fantasies,* trans. and ed. by Ernst Oster (New York: Longman Inc., 1979), 14 (Translation of *Der freie Satz,* Second Edition, ed. by Oswald Jonas [Vienna: Universal Edition A.G., 1956], in consultation with the first edition [Vienna: Universal Edition A.G., 1935]).

54. Ibid., emphasis mine, 25.

popular music analysis, timbre contributes to the melodic and orchestrational parameters of musical expression.[55] Jonathan Pieslak also focuses on the semiotic significance of timbre in his analysis of Korn's "Hey Daddy," in which he connects specific sounds with meanings related to the lyrics.[56]

In Walter Everett's rock analyses, he refers to specific timbres as signifiers of meaning, related to the lyrics or the emotional content of the song, as well as contributing to the song's form. For example, he hears the "rough timbre" of Stephen Stills' guitar in "Suite: Judy Blue Eyes" as signifying frustration; in the same analysis, he points out a formal echo created by reverberation in specific parts of the vocal melody and harmonies.[57] Mark Spicer also ascribes formal importance to timbre, describing timbres of musical layers in post-Beatles pop-rock in support of his argument about accumulative form.[58]

Albin Zak, in his book *The Poetics of Rock*, describes timbre as having both physical and rhetorical characteristics. He stresses its rhetorical importance as a signifier of genre and larger meaning outside of the specific expression of a song, while using detailed timbral descriptions. For example, he describes U2's "Zoo Station," the opening track of *Achtung Baby*, as containing timbral markers of the band's new direction:

> The guitar is thick, drenched with a submerged kind of ambience, and occupies a lower part of the track's overall frequency spectrum, while the snare sound is thin, quite dry, and pitched higher. The rhetorical sense…points to the highly processed, mechanized sound of the techno/industrial genre. The sonic allusion is to a futuristic, machine-ruled world—an image quite at odds with the

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55. Philip Tagg, "Analysing Popular Music: Theory, Method and Practice," *Popular Music*, 2 (1982): 47-48, http://www.jstor.org/stable/852975.
56. Jonathan Pieslak, "Sound, text and identity in Korn's 'Hey Daddy,'" *Popular Music* 27/1 (2008), doi: 10.1017/S0261143008001451.
57. Walter Everett, *The Foundations of Rock: From "Blue Suede Shoes" to "Suite: Judy Blue Eyes"* (New York: Oxford University Press, 2009), 398, 395.
58. Mark Spicer, "(Ac)cumulative Form in Pop-Rock Music," *Twentieth-Century Music* 1/1 (2004), doi: 10.1017/S1478572204000052.

> passionate humanism that U2 had been known for. Before any words are sung, the sounds alone alert the listener that the band has moved into new expressive territory.[59]

Still, in reference to Zak's study, Allan Moore asks, "Can we do more than simply recognize the quality of a particular sound?"[60] His attempt to do so highlights deviations from timbral norms, but like other popular music scholars he focuses on the meaning of specific timbres and does not go further beyond recognizing the quality of a timbre than did Zak.

While a growing number of popular music scholars include timbre in their musical analyses, discussions of timbre in popular music seem to be limited to qualitative descriptions of specific sounds, and extrapolations about their significance. When it comes to analysis of contemporary concert music, however, it is clear that musicologists and music theorists remain on the whole uninterested in timbre, despite its growing importance as an element in contemporary music.

2.3 Timbre: Creating a Definition

Meanwhile, an interdisciplinary field of timbre studies has flourished. The development of modern digital computers enabled researchers in computer music and psychoacoustics to develop increasingly complex models for instrumental tones in the 1960s and 1970s, with the use of additive synthesis and other analysis-synthesis methods.[61] These developments have led to the creation of a geometrical model for a perceptual timbre space, created with the use of

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59. Albin J. Zak III, *The Poetics of Rock: Cutting Tracks, Making Records* (Berkeley and Los Angeles: University of California Press, 2001), 68.
60. Allan F. Moore, *Song Means: Analyzing and Interpreting Recorded Popular Song* (Burlington, VT: Ashgate, 2012), 45.
61. See Jean-Claude Risset and David L. Wessel, "Exploration of Timbre by Analysis and Synthesis," in *The Psychology of Music*, ed. by Diana Deutsch (New York: Academic Press, 1999), for a review of these developments in timbre studies.

multidimensional scaling techniques.[62] This type of computerized analysis relies on similarity measurements rather than specific descriptors, and allows for the quantification of psychological distance between sounds without researchers' presuppositions about which parameters may be important. This body of research has yielded important knowledge about the nature of timbre and timbre perception. It is my aim to apply this knowledge in a timbre-focused analysis of Kaija Saariaho's music.

First, a definition of timbre must be established. Confoundingly, there are almost as many definitions of timbre as there are writings on the subject. Many definitions refer to it as the quality of a sound, separate from pitch or loudness,[63] and also frequently excluding duration.[64] It is also common to refer to timbre as that which makes a particular instrument sound like that instrument, and not another instrument.[65] An in-depth study of timbre, however,

62. Reinier Plomp described the first application of multidimensional scaling to timbre studies, although his focus was not on the timbral dimensions revealed ("Timbre as a Multidimensional Attribute of Complex Tones," in *Frequency Analysis and Periodicity Detection in Hearing,* ed. by R. Plomp and G. F. Smoorenburg [Lieden: Sijthoff, 1970]); and David Wessel used the technique to create a two-dimensional model of timbre space ("Psychoacoustics and Music: A Report From Michigan State University," *PACE: Bulletin of the Computer Arts Society* 30 [1973]); which John Grey then refined into a three-dimensional model ("Multidimensional Perceptual Scaling of Musical Timbres," *Journal of the Acoustical Society of America* 61/5 [1977]).

63. David Wessel, "Timbre Space as a Musical Control Structure," *Computer Music Journal,* 3/2 (1979), 45.

64. Grey, "Multidimensional Perceptual Scaling of Musical Timbres," 1271.

65. Hermann L. F. Helmholtz, *The Sensations of Tone as a Physiological Basis for the Theory of Music*, trans. by Alexander J Ellis (London: Longmans, Green, and Co., 1875), 16, books.google.com/books?isbn=1419178938. In this translation, *klangfarbe* is translated as "quality of tone" rather than the now-common "timbre," dismissed in a footnote by this translator as "a foreign word, often odiously mispronounced, and not worth preserving" (36). Also Risset and Wessel, "Explorations of Timbre by Analysis and Synthesis," 13.

reveals that there are more elements that need to be taken into account to create a full definition of timbre. It is just a start to recognize that timbre is a "multidimensional dimension."[66]

As early as 1862, Hermann Helmholtz demonstrated that objective physical characteristics of sound waves correlated with certain timbres. Without the aid of advanced technology, Helmholtz discovered the role that the frequencies and strengths of partials play in the creation of a particular timbre.[67] With the use of the spectrogram starting in 1945,[68] it became possible to more specifically quantify which distribution of spectral energies produces a sound with a certain type of perceived timbre. A specific timbre can be described in terms of the characteristics of its spectrum: what are the frequencies and relative intensities of its partials, and how do they cluster into the formant regions that play an important role in making each timbre recognizable.[69] All of these aspects of the spectrum are directly related to pitch and dynamics, the two characteristics that by many definitions timbre is supposed to exclude.

The characterization of a timbre by the attributes of its spectrum, as advanced by Helmholtz, is a classical view of timbre that has been challenged by researchers who show that a single profile of the spectrum of a sound's steady state, or middle section, is not sufficient. Researchers such as Jean-Claude Risset have shown that a fuller view of timbre perception must take into account temporal aspects such as the nature of a sound's attack and decay, as

66. Joseph C. R. Licklider, "Basic Correlates of the Auditory Stimulus," in *Handbook of Experimental Psychology,* ed. by S. S. Stevens (New York: Wiley, 1951); quoted in Grey, "An Exploration of Musical Timbre" (PhD dissertation, Stanford University, 1975), 2, https://ccrma .stanford.edu/files/papers/stanm2.pdf.

67. Helmholtz, *Sensations of Tone,* 115-173. While this translation of the third edition was published in 1875, the first edition was published in 1862.

68. Ralph K. Potter, "Visible Patterns of Sound," *Science* 102 (1945); followed two years later by Ralph K. Potter, George A. Kopp and Harriet C. Green's more comprehensive *Visible Speech* (New York: D. Van Nostrand Company, Inc., 1947).

69. See Robert Cogan and Pozzi Escot, *Sonic Design: The Nature of Sound and Music* (Englewood Cliffs, New Jersey: Prentice-Hall, 1976), 456-465, for a detailed explanation of formant regions.

well as changes over time to the steady-state sound such as variation of the spectrum over time and fluctuation in the various frequencies.[70] The importance of a sound's attack to the perception of its timbre is illustrated by psychoacoustic experiments that show listeners have difficulty identifying the source instrument of a sound when the attack has been electronically removed.[71]

The transformation of a sound spectrum, with its component pitches at relative levels of volume, into a specific timbre, is a function of human perception. The classic, often cited definition of timbre by the American Standards Association refers to timbre as an "attribute of auditory sensation."[72] By this definition, timbre only exists when a listener perceives it. Similarly, David Howard and James Angus define timbre as a "perceived quality" of sound.[73] As such, the best method yet developed to quantify timbre is to measure the psychological distances between timbres in a geometric representation known as perceptual timbre space, created with use of multidimensional scaling techniques. The refinement of the multidimensional scaling techniques allowed for the discovery of individual differences in the relative importance of various attributes of timbre in a listener's perception of timbre.[74] These differences can then be organized to recognize naturally occurring groups of listeners who tend to perceive timbre in similar ways, with no commonalities of musical training or lack thereof

70. Risset and Wessel, "Exploration of Timbre by Analysis and Synthesis," 117-119.
71. David M. Howard and James Angus, "Hearing Timbre and Deceiving the Ear," in *Acoustics and Psychoacoustics* (New York: Focal Press, 2001), 210-246.
72. American National Standards Institute, *American National Standard Acoustical Terminology* (New York: Acoustical Society of America, 1994), 35.
73. Howard and Angus, "Hearing Timbre and Deceiving the Ear," 210.
74. David L. Wessel, "Report to C.M.E.," University of California, San Diego, 1974; cited in Grey, "An Exploration of Musical Timbre," 14.

among the members of a group.[75] These individual differences support the idea that there is some inherent subjectivity in the perception of timbre. There is value in looking at timbre from the viewpoint of subjective perception. This perspective will be important when examining the role that timbre plays in the music of Kaija Saariaho.

A complete definition of timbre must incorporate all of the above ideas—timbre is all of the multidimensional aspects of a sound apart from loudness and pitch; it is characterized by the component frequencies of its spectrum and their relative strengths, including how the spectrum evolves over time; and it is a perceptual sensation as a result of cognition.

2.4 Dimensions of Timbre: Brightness

Just as studies of timbre have revealed its complexity, they have also revealed some fundamental attributes, or dimensions, that are most important in its perception. John Grey, in his 1975 dissertation and subsequent writings, determined the attributes of timbre that correlate with dimensions in a three-dimensional timbre space.[76] One dimension has to do with the spectral energy distribution.[77] Another way of describing this dimension is to refer to it as the spectral centroid, or the spectrum's "center of gravity."[78] This is related to the formant region,[79] the range of frequencies within a spectrum that are particularly strong, and which has

75. McAdams, "Perspectives on the Contribution of Timbre," *Computer Music Journal,* 23/3 (1999): 87-89, http://www.jstor.org/stable/3681242.

76. While Grey was not the first to use multidimensional scaling techniques in a study of timbre, his use of synthesized instrument tones based on analyses of actual instrument tones, along with his incorporation of the attack portion of the sound, set his work apart from other early studies.

77. Grey, "An Exploration of Musical Timbre," 67.

78. McAdams, "Perspectives on the Contribution of Timbre," 90.

79. Grey, "Multidimensional Perceptual Scaling of Musical Timbres," 1273.

long been considered to be an important characteristic of timbre.[80] It is also related to the brightness of a sound[81]—instruments that produce strong harmonics above the fifth or seventh harmonic are generally described as bright.[82] Since I am interested in how this research can be applied to listening to music, I will focus on the spectral centroid's relation to the easily heard dimension of brightness.

Grey found that the other two dimensions correlated to a number of temporal qualities of the spectrum. One temporal dimension involves both the degree to which the frequencies of the spectrum fluctuate over time (also known more recently as spectral flux) and the level of synchrony among the various partials during the onset of the tone. The other temporal dimension involves the type of energy shown during the attack, or the degree to which high frequency, low amplitude inharmonic energy is present in the attack. These temporal dimensions taken in combination relate to the instrument family groupings.[83] Of the dimensions of timbre revealed by Grey, only brightness is easily determined by the ear.

Subsequent studies have confirmed Grey's findings, while deepening the knowledge of timbre.[84] These studies generally agree on one dimension correlating to brightness and one dimension correlating to temporal attributes of the attack. The third dimension that Grey found correlated with spectral flux seems to differ based on the set of sounds used for the studies,

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80. R. W. Young, "Musical Acoustics," in *McGraw-Hill Encyclopedia of Science and Technology,* Vol. 8 (1960): 661; and Robert Erickson, *Sound Structure in Music* (Berkeley: University of California Press, 1975), 5. The discussion of formant regions contributing to quality of sound can be traced back to Helmholtz, "The Sensations of Tone," although he did not use that term.

81. Wessel, "Timbre Space as a Musical Control Structure," 48-49; and Risset and Wessel, "Exploration of Timbre by Analysis and Synthesis," 115.

82. Howard and Angus, "Hearing Timbre and Deceiving the Ear," 222.

83. Grey, "Multidimensional Perceptual Scaling of Musical Timbres," 1274.

84. For an overview of how the perceptual timbre space model was refined through the evolution and improvement of multidimensional scaling techniques, see McAdams, "Perspectives on the Contribution of Timbre."

sometimes correlating better with an attribute known as spectral smoothness (related to how close in amplitude the adjacent partials are over the course of the sound).[85]

2.5 Dimensions of Timbre: Specificity

In 1988, Carol Krumhansl, with David Wessel and Suzanne Winsberg, measured the extent to which a certain timbre contains aspects of the sound that are not accounted for in the traditional multidimensional scaling model of timbre. Krumhansl called this measure specificity, and using synthesized instrumental sounds, she found that some sounds are perceived as having higher specificity than other sounds.[86] For example, the synthesized harpsichord is heard as having a high level of specificity.

The concept of specificity in relation to timbre implies that there are important aspects of the harpsichord sound that are not taken into account by brightness, spectral flux, and type of attack. This has important ramifications for the study of Kaija Saariaho's music, in which the timbral palette stretches beyond the simple instrumental sounds tested by Grey. Some sounds seem to need their own descriptors.

This agrees with the view of Nicolas Misdariis and his colleagues, who declared in 2010 that there is no such thing as a universal low-dimensional perceptual timbre space that

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85. J. Krimphoff, S. McAdams, and S. Winsberg, "Caracterisation du Timbre des sons Complexes. II: Analyses Acoustiques et Quantification Psychophysique" ("Characterizing the timbre of complex sounds. II: Acoustic analyses and psychophysical quantification,") *Journal de Physique* 4/5 (1994): 625-628; cited in McAdams, "Perspectives on the Contribution of Timbre," 90.

86. Krumhansl, "Why is Musical Timbre so Hard to Understand?" in *Structure and Perception of Electroacoustic Sound and Music: Proceedings of the Marcus Wallenberg symposium held in Lund, Sweden, on 21-28 August 1988,* ed. by Sören Nielzén and Olle Olsson (New York: Excerpta Media, 1989).

applies to all sounds.[87] Misdariis et. al.'s conclusion was a result of studies that extended the research on the timbres of musical sounds to the timbres of everyday sounds that would be classified as noise. They found that it was possible to create a unique perceptual timbre space for each of the sounds tested: car engines in various speeds and gears, various models of air conditioners, different types of car horns, and various types of car doors slamming shut. The only dimension that was common to the perceptual timbre spaces for all of the sounds was a measure of the spectral centroid, which correlates to brightness.[88]

2.6 Dimensions of Timbre: Noise/Pure Sound Axis

Perhaps the most important aspect of timbre in Kaija Saariaho's music is the continuum between noise and pure sound. She has described this noise/pure sound axis as an important element in her music, having the potential to take over the functional importance of tonal harmony.[89] Wayne Slawson defines noise simply as "a non-periodic signal caused by some sort of random process,"[90] implying that a sound is either categorized as noise (having a non-periodic sound wave) or not (having a periodic sound wave).[91] Denis Smalley, on the other hand, defines two types of noise: granular noise ("non-pitched roughness, granularity or grit") and saturate noise ("a saturated spectral state which cannot be resolved into intervallic or

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87. Nicolas Misdariis et al., "Environmental Sound Perception: Metadescription and Modeling Based on Independent Primary Studies," *EURASIP Journal on Audio, Speech, and Music Processing, 2010* (2010): 5, doi:10.1155/2010/362013.
88. Ibid., 2-4.
89. Saariaho, "Timbre and Harmony," 1, 93.
90. Wayne Slawson, *Sound Color* (Berkeley and Los Angeles: University of California Press, 1985), 47.
91. Slawson is more specific about the single-valued nature of noise, in contrast with the multi-valued nature of other timbral dimensions, in "Operations on Timbre: Perspectives and Problems" (in *Proceedings of the International Computer Music Conference, 1984,* ed. by William Buxton and conference dir. by David Wessel [San Francisco: Computer Music Association, 1985]).

relative pitch"), and views both types of noise as relative. In his theory of spectromorphology, Smalley recognizes a dimension that has been explored in electroacoustic music in which intervallic pitch and noise are two extremes, in-between which lie pitch with a noise content and noise with a pitch identity.[92] Smalley's perspective on noise is more applicable than Slawson's for analyzing Saariaho's music, and indeed he demonstrates such by mentioning three of Saariaho's electroacoustic works in a discussion of transformations in electroacoustic music.[93]

While amount of noise is not one of the three basic dimensions of timbre recognized by Grey, it has been found to be important for some timbres in multidimensional scaling studies of timbre. Misdariis et. al. found that the balance between noise components and harmonic components correlated to a dimension in the perceptual timbre space for two out of the four environmental sounds they studied.[94]

2.7 Dimensions of Timbre: Vibrato

Although vibrato has only been included in the relatively young field of timbre studies as a categorical aspect (i.e. with vibrato or without vibrato), it is a timbral dimension that Saariaho specifically manipulates in *From the Grammar of Dreams*. The best research to date on vibrato, especially vocal vibrato, is still the work of Carl E. Seashore and his colleagues at the University of Iowa in the 1930s. Seashore explained much about pitch vibrato, intensity vibrato, and timbre vibrato, which can all be present in vocal vibrato (pitch vibrato is always

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92. Denis Smalley, "Spectromorphology: explaining sound-shapes." *Organised Sound* 2/2 (1997): 120, http://www.jaimeoliver.pe/courses/ci/pdf/smalley-1997.pdf.
93. Denis Smalley, "Defining Transformations," *Interface* 22 (1993): 293.
94. Misdariis et al., "Environmental Sound Perception," 2-4.

present in the voice, whereas the other two types are frequently present.)[95] While the University of Iowa group did not generally focus on vibrato as a continuum, Joseph Tiffin did find that when vocal students were asked to exaggerate their vibrato, they increased the extent of the pitch vibrato while leaving the other elements of vibrato (mainly intensity vibrato and rate of the pitch vibrato) unchanged.[96]

Tiffin's finding, combined with details about vocal vibrato and vocal trills revealed by Seashore, suggests that vocal vibrato is a continuum on which the variable element is the extent of the pitch vibrato. On one end of the continuum is what the singer or listener may describe as *senza vibrato*, straight tone, or lacking vibrato; which in actuality is vibrato with a small extent of pitch vibrato, or a small interval of pitch fluctuation. On the other end of the continuum is a vocal trill, which is essentially the same as vocal vibrato except for a large extent of pitch vibrato, or a large interval of pitch fluctuation.

Seashore demonstrated that the interval of pitch fluctuation in the normal vibrato of professional singers averaged a half-step, even though a listener perceived it as less.[97] He then demonstrated that the interval of pitch fluctuation for a requested half-step trill was actually much greater than a half-step (sometimes the interval approached a major third), even though it tended to be perceived as a half-step; meanwhile, the rate of the pitch fluctuation and the shape of the vocal trill wave was the same as that for vibrato.[98] Therefore, the only difference between a trill and vibrato is the extent of the pitch fluctuation. In my reading of the vocal

95. Carl E. Seashore, *Psychology of the Vibrato in Voice and Instrument* (Iowa City: The University Press, 1936), 60-81.
96. Joseph Tiffin, "The Role of Pitch and Intensity in the Vocal Vibrato of Students and Artists," in *The Vibrato,* ed. by Carl E. Seashore (Iowa City: The University of Iowa Press, 1932), 164.
97. Seashore, *Psychology of the Vibrato in Voice and Instrument,* 66.
98. Seashore, "The Vocal Trill," *Music Educators Journal* 29, no. 3 (1943): 40, http://www.jstor.org/stable/3386269.

work *From the Grammar of Dreams,* I will refer to the trill as an extreme form of vibrato and discuss Saariaho's use of the trill as one of the ways in which she controls the level of vibrato in the work.

Anni Oskala recognizes Saariaho's use of vibrato as a continuum in her vocal music, and relates this technique to Saariaho's background in electronic music.[99] Indeed, Saariaho has mentioned how her control of instrumental vibrato came out of her work with electronic sound synthesis and plays a structural role in her music:

> In connection with synthesis I also became aware that a synthesised sound becomes really boring unless it is varied constantly. I realised the degree to which an acoustic sound contains constant variations and that made me highly sensitive to it as well as to modes of playing. Gradually all that became very important, and it seemed to me necessary to make my notation more and more detailed. I wanted to know *what kind of vibrato* a musician used, how he placed his bow, things that were previously taken as given; I wanted to organise them in my music because *I felt these elements could also have a true structural function.*[100]

2.8 Dimensions of Timbre: Airiness

Another dimension of timbre that Saariaho manipulates is the amount of airiness in the sound. Research on this timbral dimension is limited. Air has been singled out as a category of product sounds,[101] but it has not been studied as a continuum along which sounds can vary. It plays an important role, however, in some works of Saariaho's. It often relates to the dimension of noise, as both airy and noisy timbres are non-harmonic sounds. In fact, Saariaho

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99. Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 95-96.
100. Pierre Michel, "Entretien avec Kaija Saariaho," in *Kaija Saariaho,* ed. by Risto Nieminen (Paris: Éditions IRCAM, 1994), trans. by Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 96 (emphasis mine).
101. Elif Özcan and René van Egmond, "Memory for Product Sounds: The Effect of Sound and Label Type," *Acta Psychologica* 126 (2007), doi:10.1016/j.actpsy.2006.11.008.

conceives of airiness as "in connection with noise and pure sound."[102] One can make an argument for airiness being a type of noise, since they are both non-harmonic sounds in their extreme states. I hear airiness as its own dimension, however, as it sometimes changes independently of noise, particularly in *From the Grammar of Dreams*. It is therefore useful to analyze airiness as a distinct dimension.

Oskala also hears airiness as a dimension in Saariaho's vocal music, although she uses the term *breathiness*. In fact, Oskala sees *From the Grammar of Dreams* as the first of three vocal works from the late 1980's to early 1990's in which Saariaho explores increasingly finer gradations of airiness in the voice.[103]

2.9 Dimensions of Timbre: Vowels

In vocal music in which the composer does not provide special instructions regarding vocal technique or vocal placement, such as most of *From the Grammar of Dreams,* the vowels of the sung text are the principal way to manipulate the brightness of the sound. The performer's interpretation often involves additional manipulations along the dimension of brightness, and it is common to hear a vocal coach suggest that a singer try a "brighter" or "darker" color in a specific section or on an individual note. In terms of what the composer has indicated in the score, however, the choice of vowel is the primary factor determining the relative brightness of a given note.

A vowel sound is distinguished by its unique timbre. While the frequency and amplitude of the first four formants all vary somewhat from vowel to vowel, the most dramatic

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102. Saariaho, interview with the author, March 7, 2012.
103. Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 91-92.

changes are seen in the frequency of the second formant.[104] Along with the first formant, the positions of these two formants are the most important elements for vowel identification. The formants of a particular vowel fall within a formant region, or range of frequencies. This formant region differs among speakers of different sexes and ages, but the listener accounts for the different size vocal chords found in a man, woman, and child, so that vowel perception remains unaffected.[105]

Since all vowels and some consonants are distinguished by the varying frequencies of their formants, they can easily be thought of as having a place on the timbral dimension that has to do with the profile of the steady-state spectrum, or brightness. In fact, it is common for singers to describe vowels by their relative brightness or darkness, with the vowel /i/ (as in "beet") being thought of as the brightest vowel and /u/ (as in "boot") being thought of as the darkest. This lines up with the research on the formant frequencies of those vowels, especially the second formant.

An early spectrogram analysis by Martin Joos established the acoustic mapping of vowel formant regions as closely adhering to previous diagrams based on tongue placement.[106] His diagram of vowel formant regions showed the progression along the second formant dimension as aligning with what singers commonly discuss as the brightness dimension, with the darker vowels having a lower second formant and the brighter vowels having a higher second formant (see Figure 2-1).

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104. Potter et. al., *Visible Speech*, 39.
105. Aniruddh D. Patel, *Music, Language, and the Brain* (New York: Oxford University Press, 2008), 56.
106. Martin Joos, "Acoustic Phonetics," *Language,* 24/2, 1948: 52-55, http://www.jstor.org/stable/522229.

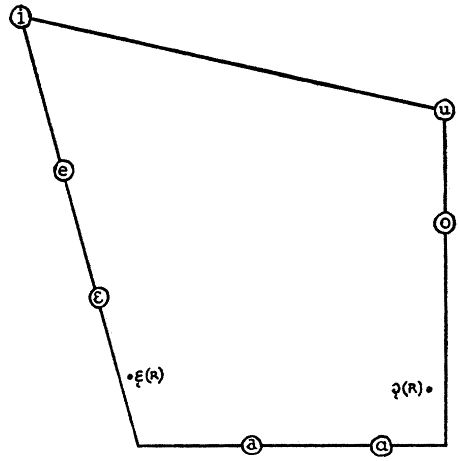

Figure 2-1: Formant diagram of French vowels based on spectrogram analysis, from Joos, "Acoustic Phonetics" (1948). The vertical axis represents the first formant (low at the top to high at the bottom), and the horizontal axis represents the second formant (low at the right to high at the left.) The axes are configured in this unusual way so that the diagram aligns visually with diagrams based on tongue position.

Later research by L. C. W. Pols and colleagues examined the relationship between the perceptual and physical spaces of vowel sounds, using a multidimensional scaling technique.[107] They found that the perceptual and physical spaces did correlate significantly, concluding that the information contained in the physical representation of the spectrum was the same information used by the listener in the perception of timbre. The Pols et al. data on the physical information of the vowel spectra is particularly useful for my creation of a brightness scale for vowels, as I will explain later in this chapter.

Saariaho was well aware of these attributes of vowel sounds, as she discussed in a 1985 paper co-authored with the psychoacoustician Stephen McAdams.[108] In fact, the research presented in that paper seems to have directly informed her use of vowels in *From the Grammar of Dreams* to create tension and release along the timbral dimension of brightness. As Saariaho and McAdams explained, "Vowels are the timbral resonance of the vocal tract and

107. L. C. W. Pols, L. J. Th. van der Kamp, and R. Plomp, "Perceptual and Physical Space of Vowel Sounds," *The Journal of the Acoustical Society of America* 46 (1969).
108. McAdams and Saariaho, "Qualities and Functions of Musical Timbre," 370.

may be associated with spectral color in musical timbre…One might conceive of the ordering of vowel structures as a timbral 'harmonic progression' implying a structural ordering of the main vowels used in a poem. This structuring can serve the musical function of tension and release."[109]

2.10 Dimensions of Timbre: Consonants

While vowels affect the timbral dimension of brightness, consonants affect the timbral dimensions of noise and airiness. A consonant is distinguished from a vowel by a closed or nearly closed vocal tract disturbing the flow of the air.[110] For consonants that are plosives, such as /b/ (be) or /p/ (pat), or fricatives, such as /ʃ/ (she), /z/ (zoo), or /f/ (fee), the air disturbance is enough to produce what Potter and colleagues refer to as "fill," because on the spectrogram it fills in the spaces between the formant regions.[111] In effect, what they see as fill is simply non-harmonic spectra. For most plosives and fricatives this non-harmonic spectra is heard as some combination of noise and airiness. The plosives /b/ (be), /d/ (do) and /g/ (go) produce primarily noise, while the plosives /p/ (pat), /t/ (to) and /k/ (key) produce both noise and airiness. The fricatives /v/ (vote) and /z/ (zoo) produce primarily noise, whereas the fricatives /f/ (fee), /s/ (see) and /ʃ/ (she) produce primarily airiness. This is due to the sound of the air escaping through the teeth, which creates a quality of airiness.

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109. Ibid., 368.
110. International Phonetic Association, *Handbook of the International Phonetics Association: A Guide to the Use of the International Phonetic Alphabet* (New York: Cambridge University Press, 1999), 6.
111. Potter et. al., *Visible Speech,* 110-165.

Consonants that are approximants, such as /ɹ/ (read) and /l/ (lead) have spectra that have formants like vowels but also show evidence of frictional modulation,[112] which creates a moderate amount of noise. Unlike the plosive consonants, which stop the flow of air, the approximants are produced while a pitch is spoken or sung, producing pitched sound in which some noise is incorporated. Consonants that are characterized as nasals, such as /m/ (me) or /ŋ/ (the sound just before the /g/ in "sing") have spectra that are similar to vowels, with distinct formants, and therefore contribute neither to noise nor airiness.

2.11 Timbral Consonance and Dissonance

Fred Lerdahl's theory of timbral hierarchies extends Lerdahl and Jackendoff's *Generative Theory of Tonal Music* to include timbre.[113] Just as Lerdahl and Jackendoff created grouping structures for how a listener hears pitch and rhythm, Lerdahl creates similar grouping structures for how a listener hears timbre. As part of developing these structures, he presents a theory of timbral consonance and dissonance, based on an intuitive perception of timbres as sounding more tense or more relaxed relative to each other along specific timbral dimensions. As Lerdahl explains, "It is essential that this concept be not just abstract but intuitive: along any particular dimension, one can *feel* timbres becoming more dissonant or consonant."[114]

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112. Ibid., 166-269. The authors use the term "glide," whereas I have adopted the term used by the IPA, "approximant."

113. Fred Lerdahl, "Timbral Hierarchies," *Contemporary Music Review,* 2 (1987); and Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge, Mass.: MIT Press, 1983).

114. Lerdahl, "Timbral Hierarchies," 142 (emphasis his).

Mario Mazzoli, in a recent dissertation, frames this same concept as a dichotomy between stable and unstable sounds.[115] Mazzoli hears timbral tension as a by-product of the way the stable and unstable sounds are used in context, and he makes a connection between the length of a sound and its stability. As he explains, in regards to Agostino Di Scipio's electroacoustic work *Audible Ecosystems 3b,* "tension is put into effect via the 'juxtaposition' of stable (sustained) sounds and unstable ones (short) and through the melodic 'disturbance' of sustained sounds."[116]

Mazzoli appears to agree with Lerdahl that some sounds are inherently more unstable than others, while separating instability from tension. Lerdahl, on the other hand, specifies the equivalence of instability and dissonance,[117] and uses the words "tense" and "dissonant" interchangeably.[118] John Dribus, who has analyzed timbral changes along the dimension of noise in acoustic and electronic music, prefers to think of timbre in terms of stability and instability, and describes his avoidance of the terms *tension* and *release* due to their associations with harmony in tonal music.[119] It is precisely their association with harmony, however, that makes *tension* and *release* the appropriate terms to use in relation to Saariaho's manipulation of timbre, as she has written of an ambition "to approach the use of timbre in place of harmony."[120]

I am inclined to agree with Lerdahl that a sound has an inherent stability or instability, and that this can also be described as consonance or dissonance, or a relaxed quality or tension.

115. Mario Mazzoli, "Emerging Musical Structures: A method for the transcription and analysis of Electroacoustic music" (PhD dissertation, CUNY Graduate Center, 2013), 47.
116. Ibid., 81-82.
117. Lerdahl, "Cognitive Constraints on Compositional Systems," *Contemporary Music Review,* 6 (1992), 108.
118. Lerdahl, "Timbral Hierarchies."
119. Dribus, "Characterizing Noise and Harmonicity," 23.
120. Saariaho, "Timbre and Harmony," 131.

The context in which the sound is heard, however, is still important, because an inherently dissonant sound can still be less dissonant relative to its surrounding sounds. While I do not apply Lerdahl's method of analysis based on grouping mechanisms, I do use his ideas about timbral tension.

Saariaho, who was familiar with Lerdahl's research in timbral tension,[121] has written about creating dissonance and tension through timbral manipulation in her music:

> In an abstract and atonal sense the sound/noise axis may be substituted for the notion of consonance/dissonance. A rough, noisy texture would thus be parallel to dissonance, whilst a smooth, clear texture would correspond to consonance. It is true that noise in the purely physical sense is a form of dissonance pushed to the extreme. At the level of auditory experience, we can compare on the one hand the perception of a tension which is related by the tonic (or by a consonance if the context is not tonal) and, on the other a noisy texture which, while magnifying itself, transforms into pure sounds.[122]

2.12 Methodological Approach

Of the specific dimensions of timbre that have been shown experimentally to be important in differentiating between different sounds—brightness, spectral flux, and the relative attack of various partials—only brightness is obvious enough to the ear to be heard and described by a listener. I will therefore examine the timbral dimension of brightness in *From the Grammar of Dreams*, along with three other timbral dimensions that are important in this work—noise, airiness, and vibrato.

In the interest of illustrating and discussing changes along the different timbral dimensions in Saariaho's music, I have created a system for tracking the relevant timbral dimensions by means of measure-by-measure ratings. These ratings are inherently subjective,

121. McAdams and Saariaho, "Qualities and Functions of Musical Timbre," 372.
122. Saariaho, "Timbre and harmony," 94.

as is the perception of timbre itself. Their value lies in the overall trajectory of timbral change that they outline, rather than in the specific level of a timbral dimension in any single measure. Therefore, I chose to remove the numeric values for these ratings from the graphs that accompany my discussions, so that the focus is on the relative rating of one timbral dimension over time and as compared to other timbral dimensions.

In creating these ratings, I relied on the available commercial recording of *From the Grammar of Dreams,* as recorded by Anu Komsi and Piia Komsi.[123] I also sang through sections of *From the Grammar of Dreams* to clarify, for example, the relative amount of airiness when singing while inhaling versus singing while exhaling. In the case of *From the Grammar of Dreams,* the recording was made without the composer's participation.[124] The score, therefore, is the definitive version of the composer's intentions for the work. At times when the interpretation on the recording affects the timbre in a way that is not notated in the score, the timbral ratings reflect the sounds that would be heard with a stricter adherence to the score. For the brightness ratings, I adhered to the vowels written in the score.

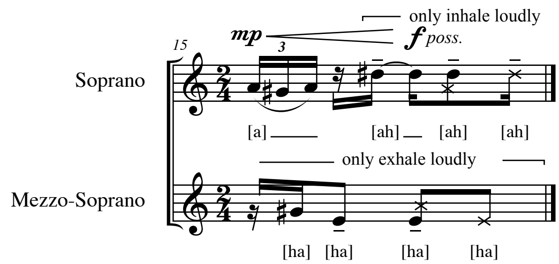
The first step in rating a timbral dimension for a section of music was to establish a musical equivalent to numerical values along a scale from 0 to 10. For example, in rating the fourth movement of *From the Grammar of Dreams* along the dimension of noise, I determined that singing without any special technique has a noise level of 0. I assigned a noise level of 3 to pitched singing while exhaling, a noise level of 6.5 to semi-pitched singing while exhaling, a noise level of 8 to pitched singing while inhaling, a noise level of 9 to semi-pitched singing while inhaling, and a noise level of 10 to unpitched speaking while inhaling or exhaling.

123. Kaija Saariaho, *From the Grammar of Dreams,* Avanti! Chamber Orchestra, Hanna Lintu, with Anu Komsi and Piia Komsi, Odine ODE 1113-2Q, 2000, compact disc.
124. Saariaho, interview with the author, March 7, 2012.

(Semi-pitched singing is often specified in transitions between singing while inhaling or exhaling, and pitched or unpitched speaking while inhaling or exhaling.)

One measure at a time, I assigned a value to each note in each voice, using the pre-determined rubric as a guide. I then weighted the value of each note according to its duration. For example, if a measure were to consist of one voice singing normally (a noise value of 0) and one voice speaking while exhaling (a noise value of 10), the overall noise value of the measure would be 5. In this way I created an average noise rating for each measure, which could then be shown visually in a graph. This mathematical approach reveals the gradual changes that Saariaho has carefully created.

By way of a specific example, I will show how I arrived at the noise rating for one of the more complicated measures in the fourth movement (see Figure 2-2). In m. 15, the soprano sings normally for half a beat, and then after a sixteenth note rest she sings while inhaling for the rest of the measure, first while singing, then while semi-pitched singing, and finally while speaking with a definite pitch. Meanwhile, the mezzo soprano has a sixteenth note rest at the onset of the measure, followed by exhaling while singing for one and a quarter beat duration, then exhaling while semi-pitched singing for an eighth note duration, and finally exhaling while speaking on a definite pitch for an eighth note duration. The ratings for the soprano part are 0, then 8, 9, and 10; and the ratings for the mezzo-soprano part are 0, then 3, 6.5, and 10.



Soprano: $(0\text{x}3/16)+(8\text{x}2/16)+(9\text{x}2/16)+(10\text{x}1/16)$

Mezzo: $(0\text{x}1/16)+(3\text{x}3/16)+(6.5\text{x}2/16)+(10\text{x}2/16)$

$$\text{Total} = \frac{(8\text{x}2)+(9\text{x}2)+(10)+(3\text{x}3)+(6.5\text{x}2)+(10\text{x}2)}{16} = \frac{86}{16} = 5.375\text{, rounds to } 5.5$$

Figure 2-2: Measure 15 from *From the Grammar of Dreams,* Movement IV, with the computation for the average noise rating of the measure.

I used the same approach to create ratings for the dimensions of airiness and vibrato. For airiness, as with noise, I assigned a rating of zero to singing without any special technique. The airiness rating increased when consonants containing an element of airiness were sustained, and when Saariaho called for whispering (a rating of 10) and inhaling or exhaling while singing (a rating of 8—exhaling while singing produces more airiness than noise, thus having an airiness rating of 8 and a noise rating of 3; while inhaling while singing produces equally significant airiness and noise, thus having an airiness rating of 8 and a noise rating of 8). For the dimension of vibrato, I assigned a rating of 3 to singing without any special technique, as only slightly noticeable vibrato is heard in normal singing. The vibrato rating decreased when *senza vibrato* was indicated (a rating of 0), and increased when a trill was indicated (a rating of 10).

In creating a scale for brightness, I supplemented my subjective perception of the relative brightness of each vowel with information from experimental research in acoustics and psychoacoustics. I started with data from Pols et al (1969) on the frequency (in hertz) and level (in decibels) of the second formant for each vowel.[125] I multiplied the frequency of the second formant with the level of that formant, creating a representation of the relative amplitude and strength of the second formant (see Figure 2-3). I chose this dimension over an average, such a calculation for all three formants, because it more closely aligned with my own perception of the relative brightness of the vowel sounds. This choice of basing the ratings on information about the second formant also lines up with the importance of the second formant in vowel identification.

vowel:	F2 Frequency (Hz)	F2 Level (Db.)	F2 Frequency x Level
/u/ ("boot")	620	33	**20460**
/ɔ/ ("boat")	750	29.5	**22125**
/ɑ/ ("bought")	950	31	**29450**
/a/ ("hot")	1450	26	**37700**
/ɛ/ ("bet")	1800	22	**39600**
/e/ ("bait")	2100	19.5	**40950**
/i/ ("beet")	2100	23	**48300**

Figure 2-3: Data from Pols et. al. (1969) on the frequency and level of the second formant of each vowel, during the constant portion of the vowel.

Using the values for the second formant of the vowels weighted for relative amplitude and strength, I constructed a brightness scale for English vowels included in the data from the Pols et. al. study (see Figure 2-4). I used the distance between the relative amplitude and strength for the vowels as a guide for the distance between the ratings for the vowels.[126]

125. Pols, et. al., "Perceptual and Physical Space of Vowel Sounds," 1969.

126. In effect, I am using the relative amplitude and strength of the second formant as a substitute for perceptual distance measurements along the brightness dimension. While the placement of vowel sounds in a perceptual timbre space was performed by Sadanand Singh and David Woods ("Perceptual Structure of 12 American Vowels," *The Journal of the Acoustical Society of America,* 49 [1970]), they did not interpret their data in correspondence with a brightness dimension. Instead, they found that their data correlated dimensions corresponding to the physical placement of the tongue in the creation of the vowels. This suggests that the

Importantly, this data-based approach correlates with my subjective ratings of the relative brightness of each vowel. Rather than replace the listening-based approach that I used for other timbral dimensions, I am supplementing a listening-based understanding of the vowel sounds' relative brightness with information from data that is available. For example, while it is clear to me that /i/ (as in "heat") is brighter than /e/ (as in "hate"), the relatively large distance between the two vowels in the brightness scale is based on the relatively large distance between the relative amplitude and strength of those vowels' second formants.

u	ɔ	ɑ	a	ɛ	e	i
0	.5	3.5	6	7	7.5	10
F2(AxS) LOW						F2(AxS) HIGH

Figure 2-4: Brightness scale for English vowel sounds included in data from Pols et. al. (1969), based on the relative amplitude and strength of the second formant [F2(AxS)].

The next step was to fill in the English vowels that are missing from the Pols et. al. data. While there is no single experimental data set for formant frequency and level for all of the English vowels, a chart by Dominic Watt and Anne Fabricius provides information on the frequency of the first and second formants of each vowel (see Figure 2-5).[127] Since this chart

perceptual timbre space of vowels is more complicated than simply a brightness continuum, and one's perception of vowels may involve a mental embodiment of their creation in one's own mouth. Fred Lerdahl did create a brightness scale for only a few American English vowels, although he did not explain how he created that scale, and his placement of /ʊ/ as brighter than /ɑ/ is counterintuitive. ("Timbral Hierarchies," 150-151). McAdams and Saariaho listed brightness as one of the possible dimensions along which vowel sounds could be transformed; included in that list are also the dimensions corresponding to the physical creation of the vowels identified by Singh and Woods ("Qualities and Functions of Musical Timbre," 371).

127. Dominic Watt and Anne H. Fabricius, "A Measure of Variable Planar Locations Anchored on the Centroid of the Vowel Space: A Sociophonetic Research Tool," in *Proceedings of the 17th International Congress of Phonetic Sciences (ICPhS XVII): August 17-21, 2011* (Hong Kong: City University of Hong Kong, 2011), 2103. The authors use an s-centroid

only provides frequency, not level, I relied on a combination of its data and my own perception of the vowels' relative brightness to fill in five more vowels to the brightness scale: /ʊ/ (as in "put"), /ʌ/ (as in "hut"), /ɝ/ (as in "church"), /æ/ (as in "hat"), and /ɪ/ (as in "bit").[128]

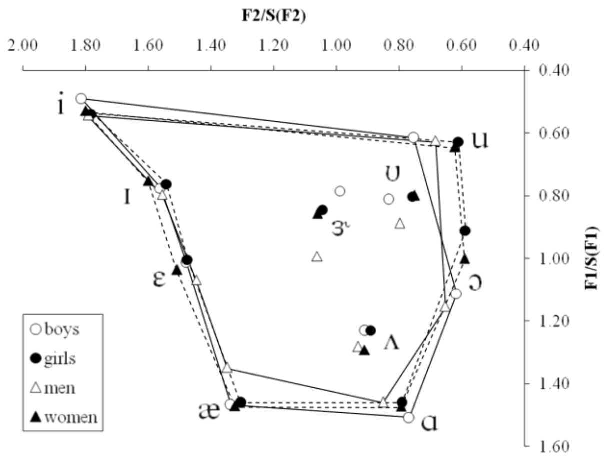


Figure 2-5: Formant diagram of American English vowels, from Watt and Fabricius, "Measure of Variable Planar Locations" (2011). Formant measurements have been adjusted using their S-centroid vowel normalization procedure.

This leaves one last vowel that occurs in sung English, even if Watt and Fabricius did not consider it as occurring in spoken American English—the vowel /ə/ (as in an open last syllable of "rememb<u>er</u>"). This vowel is referred to as the shwah vowel, and it is considered to be the vowel produced when the mouth and tongue are in their most relaxed state. While in spoken English the vowel may be closer to /ɝ/, a singer will open the vowel to /ə/ to create a more resonant sound. The /ə/ vowel is placed in the center of the IPA vowel chart, which corresponds both with mouth shape and with the placement of the second formant. I also hear it as just slightly brighter than /ɝ/, which has a rating of 4.5; therefore it seems appropriate to

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normalization procedure to correct for differences in formant frequencies between men, women, boys and girls.

128. The vowel /ɝ/ corresponds to the sustained consonant "r" (/ɹ/) found in *From the Grammar of Dreams.*

assign /ə/ the rating of 5. This completes the scale for brightness of vowel sounds that I will use in my analyses (see Figure 2-6).

u/ʊ	ɔ	ɑ	ʌ	ɝ	ə	a	æ	ɛ	e/ɪ	i
0	.5	3.5	4	4.5	5	6	6.5	7	7.5	10
F2(AxS) LOW										F2(AxS) HIGH

Figure 2-6: Complete brightness scale for English vowel sounds.

The measure-by-measure ratings for each dimension of noise, airiness, vibrato and brightness illustrate the transformations along each dimension in *From the Grammar of Dreams*. They also allow for a comparison of how the work unfolds along the different dimensions. In the next chapter, I will analyze the relevant timbral dimensions individually. I will then analyze how those timbral dimensions interact with non-timbral dimensions in Chapter 4.

Chapter 3: *From the Grammar of Dreams*: Timbre

3.1 *From the Grammar of Dreams*

From the Grammar of Dreams, composed in 1988, is a five-movement work for soprano and mezzo soprano in which Saariaho sets two different texts by Sylvia Plath. "Paralytic," a poem from the *Ariel* collection written in the last six months of Plath's life, describes the experience of a patient on an iron lung. Saariaho juxtaposes this poem with three excerpts from Plath's autobiographical novel *The Bell Jar,* which traces a young woman's journey through a mental breakdown. "Paralytic" explores literal entrapment due to physical illness, while the *Bell Jar* excerpts reflect on similar feelings of entrapment due to mental illness.

Saariaho created a second version of *From the Grammar of Dreams* in 2002, for soprano and electronics. The electronic part consists of a recording of the mezzo soprano part with only the addition of some reverberation.[129] Both the recorded mezzo soprano part and the live soprano part are sung by the same performer. The only commercial recording available is the version with two singers, so that is the one I listened to. When I heard the version for soprano and electronics live, I found that the imperfect balance between the live and recorded parts diminished the importance of the relationship between the two vocal lines. This technical glitch can, however, be improved on in other performances. Since the score remains the same for both versions, my observations here can apply to both.

Saariaho uses a wide palette of vocal techniques in this work. She asks the singers to modify the amount of vibrato in their voices, sing and speak while inhaling and exhaling, extend consonants, whisper and speak in semi-theatrical ways, and make gradual transitions

129. Saariaho, interview with the author, March 7, 2012.

from one vocal technique to another. These vocal techniques often affect the levels of noise and airiness in the sound, resulting in a more airy and/or noisy sound than is typically heard in classically trained singing of the European concert music tradition.

In this chapter I will discuss the four ways in which timbre gives shape to *From the Grammar of Dreams:* by creating tension and release, by delineating the form, by expressing the texts, and by clarifying the relationship between the two voices. I will further explore the changes within each timbral dimension and the relationships between the different timbral dimensions by applying Robert Morris' contour theory to analyses of airiness, noise, vibrato and brightness in this work.

3.2 Contour Theory

Contour theory has been recognized as applicable to timbre, but until recently it had never been applied to any timbral dimension. Robert Morris, whose 1987 seminal book on contour theory started a new direction in music theoretical scholarship, suggests that his theory may be applied to any scalable dimension of music. Specifically, he lists "timbre-color" (from dull to bright), "noise content" (from pure to noisy), and "internal agitation" (defined as sonic details, including vibrato and tremolo), as appropriate for contour analysis.[130] Elizabeth West Marvin goes into more detail on the possible applications of contour theory to timbre, specifying its usefulness in analyzing the "sound-noise axis" in Saariaho's music. Marvin also

130. Robert D. Morris, *Composition with Pitch-Classes: A Theory of Compositional Design* (New Haven: Yale University Press, 1987), 281-282.

agrees with Morris on the application of contour theory to the timbral dimensions of brightness and vibrato.[131]

In a recent dissertation on electroacoustic music, Mario Mazzoli includes the first application of contour theory to timbral analysis. In an analysis of Agostino Di Scipio's work for amplified voice and live electronics, *Audible Ecosystems 3b,* Mazzoli creates a "stability index" showing changes in timbral stability. Interestingly, Mazzoli reduces multidimensional timbre into a single dimension. His dimension of timbral stability, being a scalable dimension, lends itself to contour analysis. Through Mazzoli's analysis of the timbral stability contour, he reveals relationships between the overall work and its sub-sections.[132]

I will apply contour theory to analyses of the individual timbral dimensions in *From the Grammar of Dreams*, along the line of Morris' and Marvin's suggestions. Analyzing these timbral contours reveals patterns in transformations along each timbral dimension, and shows relationships between the different timbral dimensions. I will incorporate these analyses into my discussions of each of the ways in which timbre contributes to *From the Grammar of Dreams.*

3.3 Timbral Tension and Release

Traditionally, harmony creates tension and release by creating a series of dissonant sounds that resolve into consonant sounds. Similarly, Saariaho creates tension and release by creating tension along a given timbral dimension and then resolving that tension into a more

131. Elizabeth West Marvin, "A Generalization of Contour Theory to Diverse Musical Spaces: Analytical Applications to the Music of Dallapiccola and Stockhausen," in *Concert Music, Rock, and Jazz since 1945: Essays and Analytical Studies,* ed. by Elizabeth West Marvin and Richard Hermann (Rochester: University of Rochester Press, 1995), 161. Also see this chapter for an overview of how contour theory developed.

132. Mazzoli, "Emerging Musical Structures," 91-92.

relaxed timbre.[133] Along the timbral dimension of noise, I hear a sound with a high level of noise as tense. The consonance to that dissonance, or the release of that tension, is found in pure sound (lacking any noise). Along the dimension of airiness, a very airy sound is tense compared with pure sound (lacking any air). A sound with a high level of vibrato, such as *molto vibrato* singing or a trill, is tense compared with its opposite, *senza vibrato*, or even the low to moderate level of vibrato found in normal singing. Brightness can also create musical tension—in vocal music, the bright vowel /i/ (be) is tense relative to the dark vowel /u/ (boot).[134]

The association of a high level of noise, airiness, vibrato or brightness with tension is a subjective one, based on my own listening experience. The ensuing analyses will be based on this proposition that a high level of any of these timbral dimensions can be perceived as relatively tense. Furthermore, tension and release is just one of many possible metaphors for interpreting these timbral changes. One might also think of transformations in the timbral dimensions in terms of balance and imbalance, for example. I find tension and release to be the metaphor that resonates best with my own perception of this work.

Traditional harmonic patterns of tension and release in Western classical music are often described in terms of forward motion and stasis—dominant harmonies and seventh chords create a sense of movement, while tonic harmonies and triads create a sense of stability. The

133. As discussed in the previous chapter, Saariaho has discussed how changes along a timbral dimension associated with vowels can create tension and release (McAdams and Saariaho, "Qualities and Functions of Musical Timbre," 371). In relation to the noise/sound axis, which she specifically compares to harmony in its function, she uses the terms *consonance* and *dissonance* (Saariaho, "Timbre and Harmony," 94), which implies corresponding tension and release.

134. My tension scales for noise, vibrato and brightness agree with those suggested by Lerdahl in "Timbral Hierarchies," with the exception that Lerdahl also hears a non-vibrato sound as more tense than a sound having "optimal" (moderate) vibrato. Lerdahl also discussed harmonic vs. inharmonic spectrum instead of using the term "noise" (141-142).

infrequent use of harmonic dissonance sets up an expectation for the listener that a resolution to harmonic consonance will soon be reached, contributing to the equation of dissonance with motion and consonance with stasis. In jazz and contemporary concert music, however, dissonance (such as seventh chords in jazz, or a variety of dissonant harmonies in contemporary concert music) is often used with greater frequency, so that the expectation of change to a more consonant harmony is diminished. Similarly, Saariaho uses timbral tension frequently, diminishing the expectation that it will release into timbral consonance. The timbral tension often does change to a more relaxed sound, but sometimes she chooses to leave the tension unresolved.

What is the effect, then, of the timbral tension and release? While some amount of forward motion leading to stasis can be felt, it primarily serves as a source of continual interest in the music. In an interview, Saariaho explained to me that she carefully controls these timbral elements within each section of a work with an ear towards maintaining tension, interest, and continuity. "All those [timbral elements such as brightness and vibrato], they are all means to control and vary the sound…to keep the sound always living and always changing."[135]

3.4 Timbral Tension and Release: Small-Scale

It is notable that Saariaho speaks of "maintaining tension." Even though moments of tension within each timbral dimension usually dissipate into moments of release, Saariaho often offsets the movements of the various dimensions so that their individual tension climaxes follow one after another, creating wave-like patterns of tension and release. These

135. Saariaho, interview with the author, March 7, 2012.

asynchronous, wave-like relationships are sometimes reinforced by overlapping echoes of contour shapes in the different timbral dimensions.

In the first movement, some common shapes are found in the contours of the different dimensions, in overlapping succession. The vibrato dimension follows the contour of cseg <541230> in mm. 1-7. Repeating as an overlapping echo, the same cseg is heard in the dimension of noise in mm. 3-9. The cseg <541230> contains the cseg <1230>. As that cseg <1230> is heard in the noise dimension, it is heard in overlapping succession in the dimension of brightness, in mm. 8-11 (see Figure 3-1).

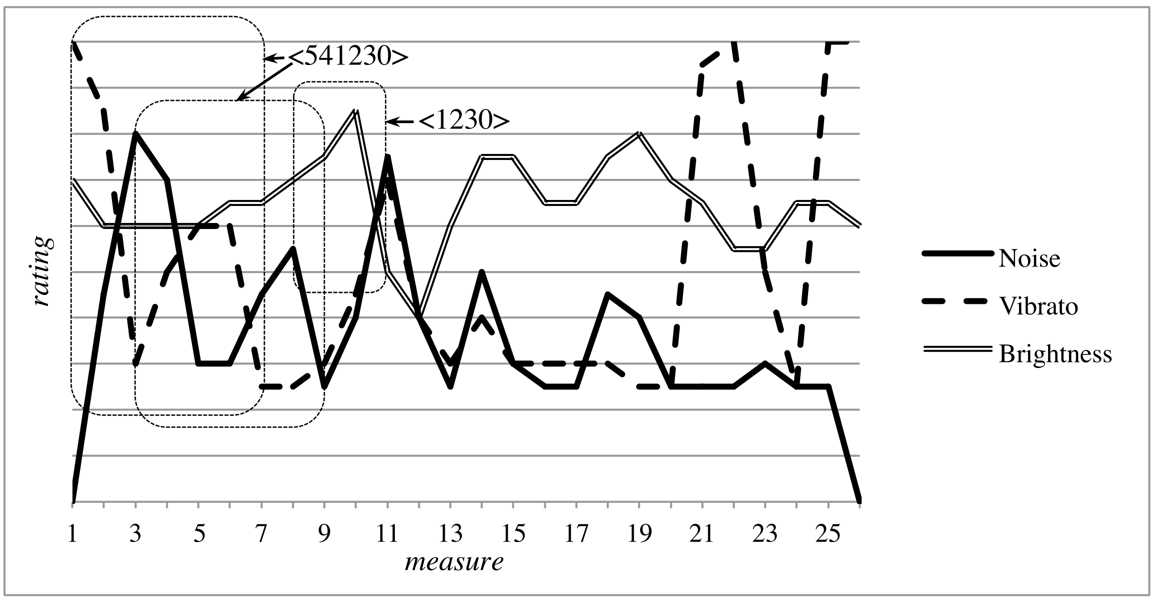

Figure 3-1: Overlapping csegs in ratings for noise, vibrato and brightness in *From the Grammar of Dreams,* Movement I.

The cseg <541230> traces a path from very tense to very relaxed that is at first gradual and then sudden, followed by a gradual increase in tension to a relative peak, and then a sudden release of tension to the most relaxed point in each segment. In the dimension of vibrato, the musical correlate of cseg <541230> starts off as a trill in m. 1 (see Figure 3-2), which is highest possible state of tension due to vibrato (as explained in the previous chapter, a vocal trill is essentially widened vibrato). In mm. 2-3 the trill is heard for a shorter duration, especially in m. 3, causing the decrease in tension. As the trill comes back in for short periods in mm. 4 and 5, the tension due to vibrato increases accordingly. The trill is entirely absent from m. 7, and therefore the vibrato rating decreases to its most relaxed state of the moderate vibrato that is present in normal singing.

Along the dimension of noise, the cseg <541230> is heard first as a high level of tension due to a high level of noise, caused by the soprano's plosive spoken consonant /p/ and sustained spoken consonants /h/ and /z/ ("s" in "happens") in m. 3 (see Figure 3-2). The noise continues to be contributed by the soprano part only in mm. 4-5, as sustained spoken consonants (/z/, /l/ and /ð/ as in "the") and the spoken plosive consonant /t/ alternate with increasing durations of sung vowels and silence, in which the sung vowels of the mezzo soprano part are heard, resulting in decreasing tension due to noise. The noise and tension levels remain relatively low in m. 6, as the soprano spends more time singing vowels and the voiced consonant /m/ (which does not produce any noise), alternating with noise contributions from the spoken consonants /n/, /d/, /ɹ/ ("r" in "rock"), and the sustained spoken consonant /x/ ("ck" in "rock"). In mm. 7-8 an increase in the duration of sustained spoken consonants (/x/, /ɹ/ and /z/) as well as the presence of short spoken consonants (/n/, /f/ and /t/) results in an increase of noise and tension due to noise. The noise and tension levels sharply fall in m. 9, where no spoken consonants are sustained for more than an eighth note duration, and the soprano sings for barely more than a quarter note consecutively for the first time so far in the movement.

Figure 3-2: Excerpt from *From the Grammar of Dreams,* Movement I, with corresponding ratings for noise, vibrato and brightness.

In the brightness dimension, a gradual increase in tension due to increasing brightness and then a sudden release due to decreasing brightness echoes the latter part of these vibrato and noise transformations. The cseg $<1230>$ starts off as a somewhat high amount of tension due to brightness in m.8, where the mezzo soprano is in the middle of a transformation from the vowel /a/ (hot), which is only slightly bright, to /e/ (hate), which is brighter than /a/ but not extremely bright, and then towards the brightest vowel, /i/ (heat) (see Figure 3-2). (Both the soprano and the mezzo soprano are singing in this section, but the changes in brightness are almost entirely due to the changes in the mezzo soprano's sustained vowels.) The brightness and resulting tension increases in m. 9, where the mezzo soprano alternates between the extremely bright /i/ and /e/, which is bright but less so. The mezzo soprano's alternation between those two bright vowels continues in m. 10, with an increased amount of time spent singing /i/ pushing it to the peak of brightness and highest tension due to brightness of the movement. Then in m. 11, a sudden release is heard as the mezzo soprano switches to the darker than average vowel /ʌ/ (the word "a," pronounced this way because it precedes the word "bad"—the mezzo soprano changes here from singing phonemes to singing text, as indicated by the lack of brackets around this single-letter word).

The effect of these transformations in the opening section of the first movement is a succession of different kinds of timbral tension and release, with parallels between the direction and rate of the movements towards and away from tension in the different timbral dimensions. Tension and release in the dimension of vibrato is followed by tension and release in the dimension of noise, and then there is a second tension in release in the dimension of vibrato followed by a second tension and release in the dimension of noise, which is in turn followed by tension and release in the dimension of brightness. As the release of tension is heard in one dimension, tension has already started building in another dimension. A sense of increasing tension is sustained, so that a moment of complete release is never achieved.

Another cseg, <3102>, occurs in the brightness dimension in mm. 10-13 (see Figure 3-3). The same cseg <3102> is then heard overlapping successively in the noise dimension in mm. 11-14. Then in mm. 17-21, a new cseg <02310> occurs in the brightness dimension. Dovetailing with that change in brightness is a change in vibrato that also follows cseg <02310>, in mm. 20-24.

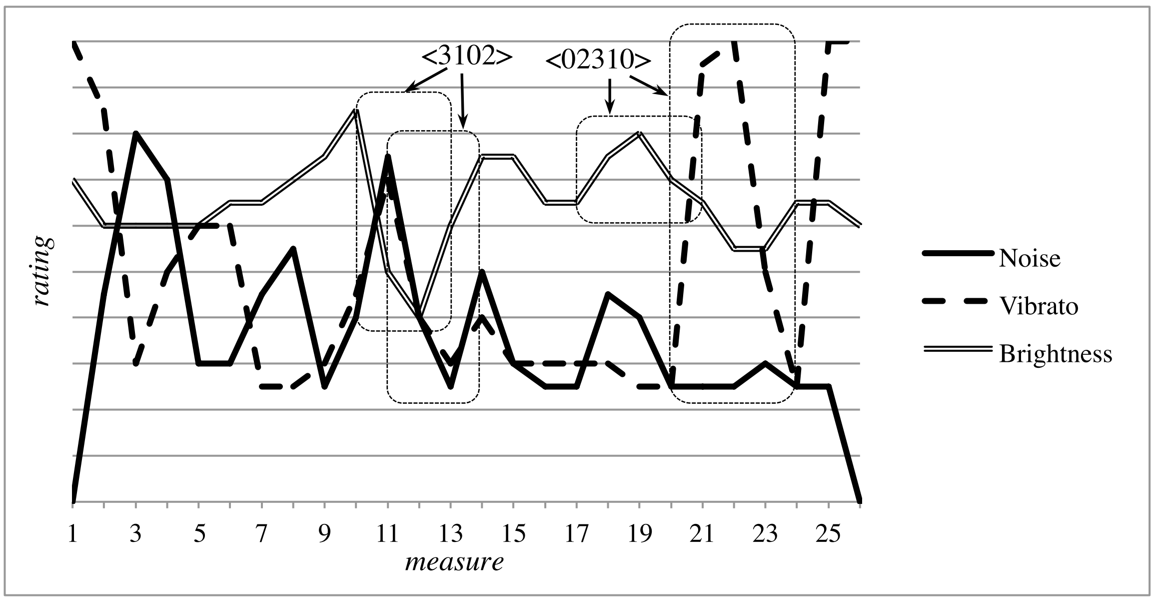

Figure 3-3: Overlapping csegs in ratings for noise, vibrato and brightness in *From the Grammar of Dreams,* Movement I.

The cseg <3102>, first heard in the brightness dimension, overlaps for two measures with the cseg <1230> in the same dimension. As discussed above, the brightness dimension is at its high point of brightness and tension in m. 10 due to the mezzo soprano's bright vowels /i/ and /e/, and then suddenly releases to a much less tense state in m. 11 due to the mezzo soprano's introduction of the darker vowel /ʌ/ in the word "a" (see Figure 3-4, Excerpt 1). From here, the brightness decreases further to the low point for the movement in m. 12, when the relatively dark vowel /ʌ/ is sung by the mezzo soprano for the entire measure and the soprano's text includes the vowel /ʌ/ in addition to the darkest vowel, /u/ (in "two"). Then in m. 13, the mezzo soprano moves to alternating the brighter vowel /æ/ in "bad" with the darker vowel /ʌ/, while the soprano speaks and sings a mixture of relatively bright and dark vowels, increasing the brightness and resulting tension to back above the middle level.

This release and then building of tension along the shape of cseg <3102> is immediately echoed in the noise dimension. Starting in m. 11, the level of noise is at a relative high due to the long duration of the sustained spoken consonants /h/ and /z/ ("s" in "loves") in the soprano part (see Figure 3-4, Excerpt 1). (All of the noise in this section is contributed by the soprano.) In m. 12, the spoken consonant /s/ ("s" in "pumps") is of a shorter duration than consonants in the previous measure, and the soprano spends an equal amount of time singing as she does speaking. As a result, there is a much lower amount of noise relative to pure sound, and a substantial release in tension due to noise. The amount of noise and tension continues to fall in m. 13, as this is the first measure in the movement in which the soprano does not sustain any consonants. The only source of noise in m. 13 is normal speaking, which creates much less noise and sounds more relaxed than the forceful lengthening of consonants. The noise and resulting tension build again to a middle level in m. 14, as the soprano sustains the consonant /h/ with the direction "exhale" for half of the measure.

Excerpt 1:

Excerpt 2:

Figure 3-4: Excerpts from *From the Grammar of Dreams*, Movement I, with corresponding ratings for noise, vibrato and brightness.

The cseg <02310> represents an increase in tension followed by a release, in which the changes is both directions are steeper at first and then more gradual. Its first occurrence, in the brightness dimension, begins and ends with a level of brightness that is a little brighter than average. In m. 17, there are three instances of the diphthong /ai/ (in “glides,” “by,” and “like;” “des” at the beginning of the measure is part of the word “glides” and should be pronounced as such by the singer), in which the slightly bright vowel /a/ is followed by the brightest vowel /i/ (see Figure 3-4, Excerpt 2). The mezzo soprano sings a mixture of relatively bright vowels (/ɪ/ and /ɛ/ in the first two syllables of “remembered”) and the vowel that is exactly in the middle between bright and dark, the schwa vowel /ə/ (the last syllable in “remembered”). This brings the average brightness for measure 17 to a little brighter than average, and the resulting tension is low relative to both what was recently heard and what is to come. Jumping ahead to m. 21, the same level of brightness and relative tension can be heard. While the diphthong /ai/ (in “lights”) is seen here in the soprano part, Saariaho confirms that the singer should follow the conventional practice of waiting until the very end of the sustained note to change vowels (in the next measure) by indicating that the vowel /a/ should be sustained. While /a/ is only slightly brighter than the balanced schwa vowel, the mezzo soprano’s bright /æ/ (in “bad”) and even brighter “i” (in “dream”) vowels raise the average brightness of m. 21 as equivalent to that in m. 17.

In-between mm. 17 and 21, a rise and fall in brightness and resulting tension is heard. In m. 18, the brightness and tension increases as one hears the relatively bright vowel /ɛ/ (the first syllable in “everything”), the even brighter vowel /ɪ/ (the last syllable in “everything”, and in “bring”), the diphthong /ai/ (in “night”) with its combination of slightly bright and extremely bright vowels, and the brightest vowel /i/ (in the second syllable of “everything”).

The one dark vowel in this measure, /ʌ/ (in "the"), is given the shortest duration possible as it is sung on a grace note. Then in m. 19, the brightness increases a bit more as the darkest vowel heard is the relatively bright /ɛ/, the brighter /ɪ/ and the brightest /i/ are heard again, and a relative peak in tension due to brightness is reached. In the next measure, m. 20, the bright vowels of the word "everything" are heard in the mezzo soprano part in conjunction with a mixture of a number of both brighter and darker vowels in the soprano part, bringing the average brightness and tension back down somewhat. Then in m. 21, the tension due to brightness continues to fall back to the level of m. 17 as described above.

The same rising and falling shape of <02310> in the dimension of vibrato begins and ends with a relatively low level of vibrato and resulting tension. In m. 20, this low level of vibrato is due to a mixture of normal singing, with its low level of vibrato, and speaking, which does not contain any vibrato (see Figure 3-4, Excerpt 2). It is worth noting that I hear the two voices as a whole, such that as long as at least one voice is singing, the level of vibrato in that one voice is salient. The absence of vibrato in the speaking voice only influences the rating when the other voice is silent, as does occur in m. 20, or if both voices were to speak at the same time (which does not occur in this movement). In m. 24, the same low rating for vibrato is obtained very differently—the combination of speaking, with its absence of vibrato, and singing a trill for only a quarter note, averages out to the same low rating for vibrato. While this difference in the actual sounds of m. 20 and m. 24 reveals an imperfection in this ratings system, a rise and fall of tension due to vibrato that that echoes the rise and fall of tension due to brightness can nonetheless be heard in mm. 20-24.

A dramatic increase in vibrato is heard in m. 21, as a whole note trill is heard in the soprano. Only an eighth note of normal singing in the mezzo soprano part keeps the rating for vibrato from reaching the highest level possible. This highest level is reached in the next measure, m. 22, where both voices sing trills for the whole time that they are singing in that measure. In m. 23, the rating for vibrato dramatically falls as the high level of vibrato contributed by the mezzo soprano's trill in the first half of the measure contrasts with the sudden lack of vibrato in the soprano's speaking. The resulting release of tension is even more extreme than the decrease in the vibrato rating reflects. Then in m. 24 the average vibrato decreases even further to the same level as was heard at the beginning of this segment in m. 20.

In both the successive overlaps of <3102> in the brightness and noise dimensions, and <02310> in the brightness and vibrato dimensions, changes in the level of tension are subsequently echoed in another dimension. The echo is more immediate in the case of cseg <3102>, in which only one measure after the contour begins in the dimension of brightness it is heard in the dimension of noise. The space between the cseg <02310> in the brightness dimension and the same cseg in the vibrato dimension is more substantial, but the wave-like relationship between the rise and fall of tension due to brightness and the rise and fall of tension due to vibrato can be heard nonetheless.

While the first movement contains overlapping waves of timbral tension and release, with only local relationships between the timbral contours, the fourth movement shows both more simultaneity in its timbral tension and release and more consistency in the timbral contours across the movement. The dimensions of noise and airiness rise and fall in their tension levels with relationships between their contours, and the dimension of airiness particularly contains a number of contour relationships across the scope of the movement.

Saariaho produces bursts of noise and airiness in the fourth movement by instructing the singers to exhale or inhale loudly while singing, while speaking specific pitches, and while speaking indefinite pitches. Singing while inhaling creates a great amount of air and noise in addition to the pure sound of the pitched tone. Singing while exhaling creates a great amount of air in addition to the pitched tone, and produces only a relatively small amount of noise. The levels of noise and airiness are both higher when this effect is produced while speaking, since the noise and airiness are not balanced by pitched sound. When the inhaling and exhaling accompanies unpitched speaking, the noise and airiness levels are even higher. The difference is more dramatic for noise than for airiness, since even singing while inhaling or exhaling produces a high level of air in the sound.

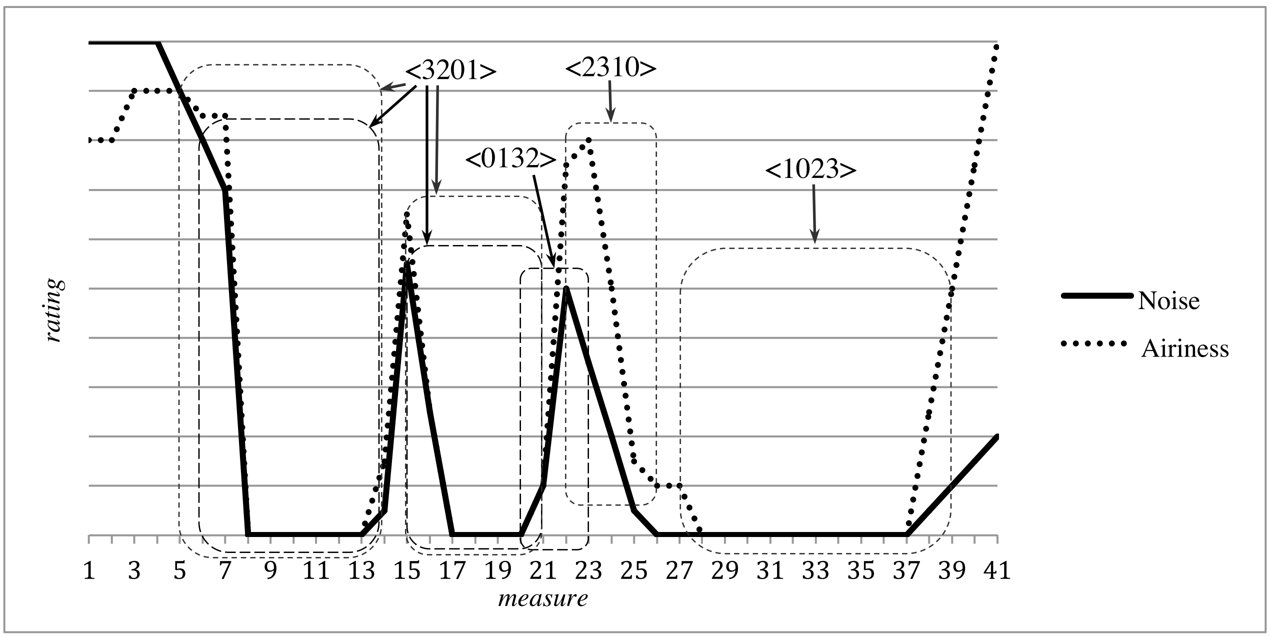

Figure 3-5: Csegs of csegclass c4-2 in the dimensions of noise and airiness, in *From the Grammar of Dreams,* Movement IV.

Taking a close look at the airiness and noise contours in the fourth movement, c-space segment class (csegclass) c4-2 is found four times in the airiness dimension and three times in the noise dimension. (A csegclass is a group of contour segments that are related by retrograde, inversion, or retrograde-inversion.)[136] Two of its occurrences in the noise

136. Elizabeth West Marvin and Paul A. Laprade, "Relating Musical Contours: Extensions of a Theory for Contour," *Journal of Music Theory* 31/2 (Autumn, 1987): 231, http://www.jstor

dimension are concurrent with the same contour in the airiness dimension. Cseg <3201> occurs in the airiness dimension in mm. 5-14, and in the noise dimension in mm. 6-14; the same cseg also occurs in both the airiness and noise dimensions in mm. 15-21 (see Figure 3-5). Its inverse, cseg <0132>, is found in the noise dimension (overlapping slightly with cseg <3201>) in mm. 20-23. Meanwhile, the retrograde of <3201>, cseg <2310>, occurs in the airiness dimension in mm. 22-26, overlapping with the <3201> in the noise dimension. Finally, the inverse of <2310>, <1023>, occurs in the airiness dimension in mm. 27-29.

The two instances of concurrent c4-2 contours in both the airiness and noise dimension both occur over valleys between the periodic peaks in tension due to airiness and noise that are heard in the movement. There is a decrease followed after an interim by an increase in both airiness and noise in mm. 5-14, over the cseg <3102>. This cseg begins in m. 5 in the airiness dimension, and in m. 6 in the noise dimension, though both dimensions decrease starting in m. 5. A high amount of airiness is heard in both voices in m. 5 due to speaking while inhaling and exhaling (see Figure 3-6). The level of airiness decreases as the both the soprano and mezzo soprano gradually change from speaking to singing in mm. 5-8, and then it remains at zero while both voices sing normally through m. 13. The decrease in noise over mm. 5-8 is steeper than the decrease in airiness because there is a greater difference in the noise levels of unpitched and pitched exhaling than in the airiness levels of unpitched and pitched exhaling. Therefore, cseg <3201> begins later in the noise dimension. In m. 14, the

.org/stable/843709. Marvin and Laprade rephrased Robert Morris' original definition of a csegclass, and Morris then adopted their definition. (Morris, "New Directions in the Theory and Analysis of Musical Contour," *Music Theory Spectrum* 15, no. 2 (Autumn, 1983): 208, http://www.jstor.org/stable/745814.) Additional characteristics of csegs in the same csegclass are csegs related by identity and translation, which is not relevant here as I have already translated all csegs into their normal forms. I follow the csegclass numbering system developed by Marvin and Laprade in "Relating Musical Contours."

levels of airiness and noise increase due to the mezzo soprano singing while exhaling in the second beat of the measure. Since exhaling while singing produces a greater amount of airiness than noise, the increase is more dramatic in the airiness dimension.

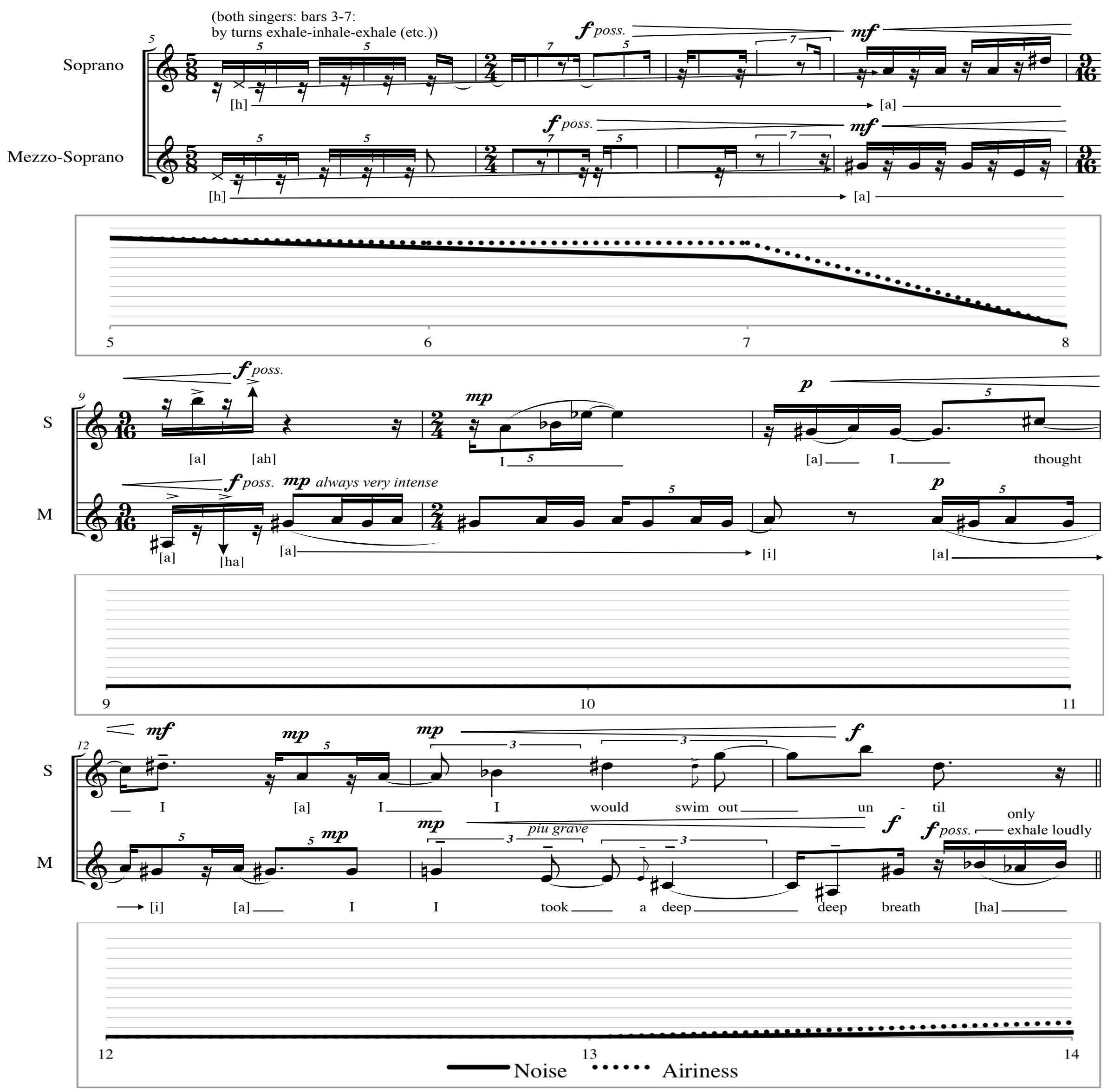

Figure 3-6: Excerpt from *From the Grammar of Dreams*, Movement IV, with corresponding ratings for noise and airiness.

The next instance of cseg <3201> is found simultaneously in the airiness and noise dimensions in mm. 15-21, as the tension decreases dramatically and then increases slightly. In m. 15, both the dimensions of airiness and noise are at a local peak as the mezzo soprano is singing while exhaling with instances of speaking while exhaling, and the soprano is singing while inhaling with instances of speaking while inhaling (see Figure 3-7). In m. 16, only the soprano is still singing and speaking while inhaling; the mezzo soprano has returned to normal singing. Therefore, the airiness and noise levels have both decreased, with the airiness level again higher than the noise level. Both airiness and noise are at zero while both voices sing normally in mm. 17-20. Then in m. 21, the soprano begins inhaling while singing in the second beat, resulting in an increase of tension due to airiness and noise, with a larger increase in airiness.

The changes in airiness and noise, especially that of airiness, continue to follow contours of csegclass c4-2. The next burst of airiness and noise follows cseg <0132> in the noise dimension in the early portion of the burst (mm. 20-23), and it follows the retrograde, cseg <2310>, in the airiness dimension in the latter portion of the burst (mm. 22-26). As described above, the airiness and noise levels increase from m. 20 to m. 21. Then in m. 22, the mezzo soprano begins exhaling while singing, resulting in a large increase in noise and airiness, especially airiness (see Figure 3-7). In m. 23, the soprano joins the mezzo soprano in exhaling while singing. Since exhaling while singing creates a great amount of air and only a small amount of noise, the airiness level continues to climb while the noise level starts to decrease. As the mezzo soprano resumes normal singing in m. 24, tension releases in both the airiness and noise dimensions, especially the noise dimension, since the soprano's singing while exhaling does not produce a lot of noise. The soprano still sings while exhaling for most

Figure 3-7: Excerpt from *From the Grammar of Dreams,* Movement IV, with corresponding ratings for noise and airiness.

of the first beat of m. 25, and then resumes normal singing in that measure; therefore there is still some airiness and noise in m. 25, but much less than in the previous measure. In m. 26, though both voices are singing normally, the soprano's accented grace notes on the phoneme

/ha/ produce a small amount of airiness. Thus, the tension due to noise is completely released by m. 26, whereas the release of tension due to airiness is almost but not yet quite complete.

The full release of tension in the dimension of airiness occurs over the next iteration of csegclass c4-2, cseg <1023> in the airiness dimension in mm. 27-39. In m. 27, the soprano continues to produce a small amount of airiness due to the accented /ha/ phoneme (see Figure 3-8, Excerpt 1). In mm. 28-37, both voices are singing normally without any additional sources of airiness or noise, and both dimensions are completely released at a level of zero. The final measure of the movement, m. 38, contains "several" repetitions within. Therefore, I represent this one measure as four measures on the graphs in Figures 3-5 and 3-6. Choosing three as the number of times to repeat m. 37, these repetitions are represented as mm. 38-40. The new notation at the end of the actual m. 38 is therefore represented as m. 41 on the graphs. In m. 37, both voices are singing normally and the airiness and noise levels are both at zero (see Figure 3-8, Excerpt 2). As the singers repeat that measure, they are instructed to "change very gradually the singing voice into speaking then whispering." This change from speaking to whispering creates an increase in airiness and noise, with a more dramatic increase in airiness. By the second repetition of m. 37, the amount of airiness has increased enough to complete the cseg <1023>, and the movement ends with a high level of tension due to airiness left unresolved.

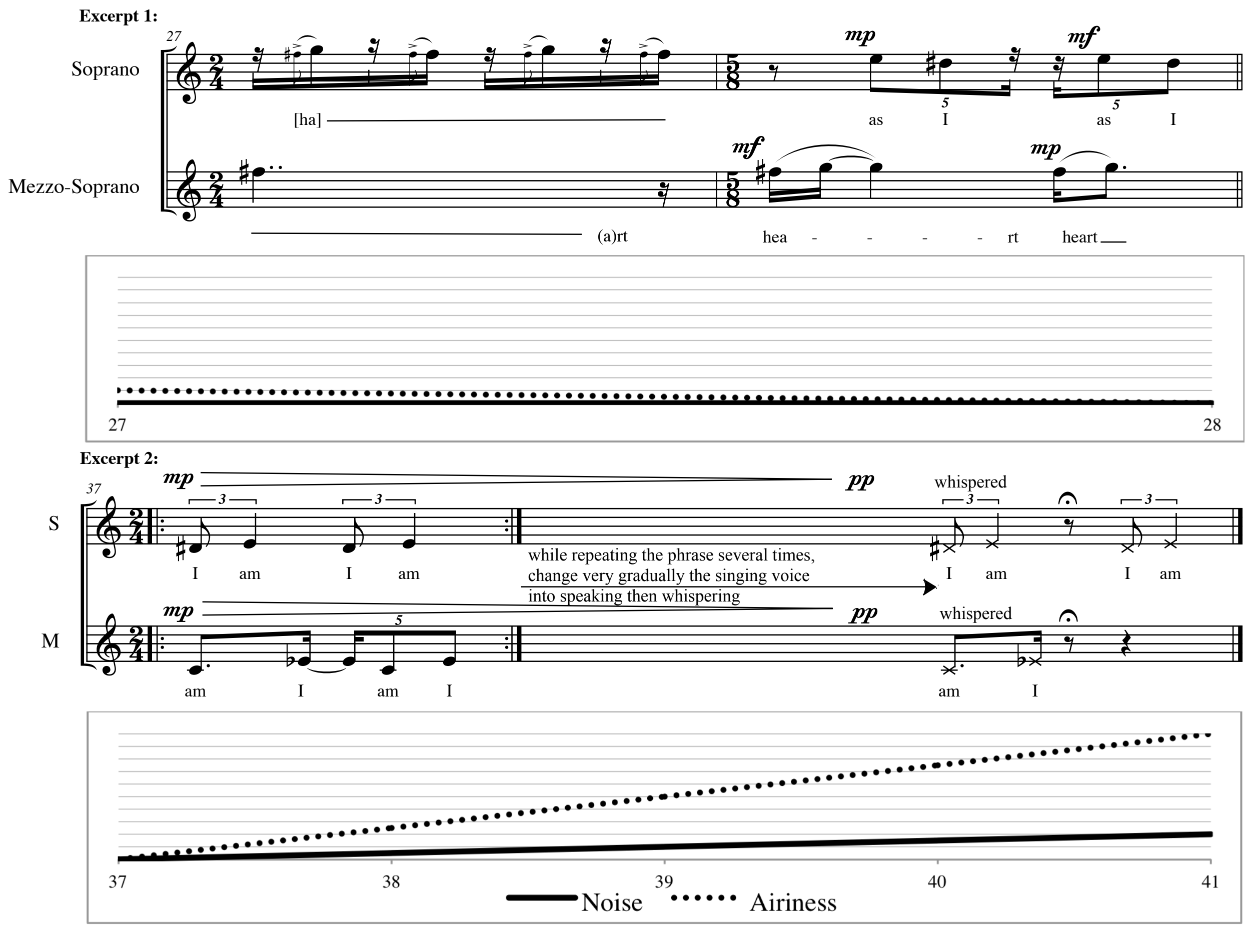

Figure 3-8: Excerpt from *From the Grammar of Dreams,* Movement IV, with corresponding ratings for noise and airiness.

3.5 Timbral Tension and Release: Large-Scale

Timbral tension and release is also found on a larger scale. Saariaho explained that when she thinks about tension and release in her compositions it is on this larger scale. It is part of her conception of the form, which she plans before she begins writing a work.[137] An example of large-scale tension and release is found in the second movement. The movement begins with an extremely high level of noise, and over the course of the movement the noise decreases, with local fluctuations. This is illustrated by looking at the trendline for noise in the

137. Saariaho, interview with the author, March 7, 2012.

second movement (see Figure 3-9), which clearly moves from a high level of noise to a low level of noise.

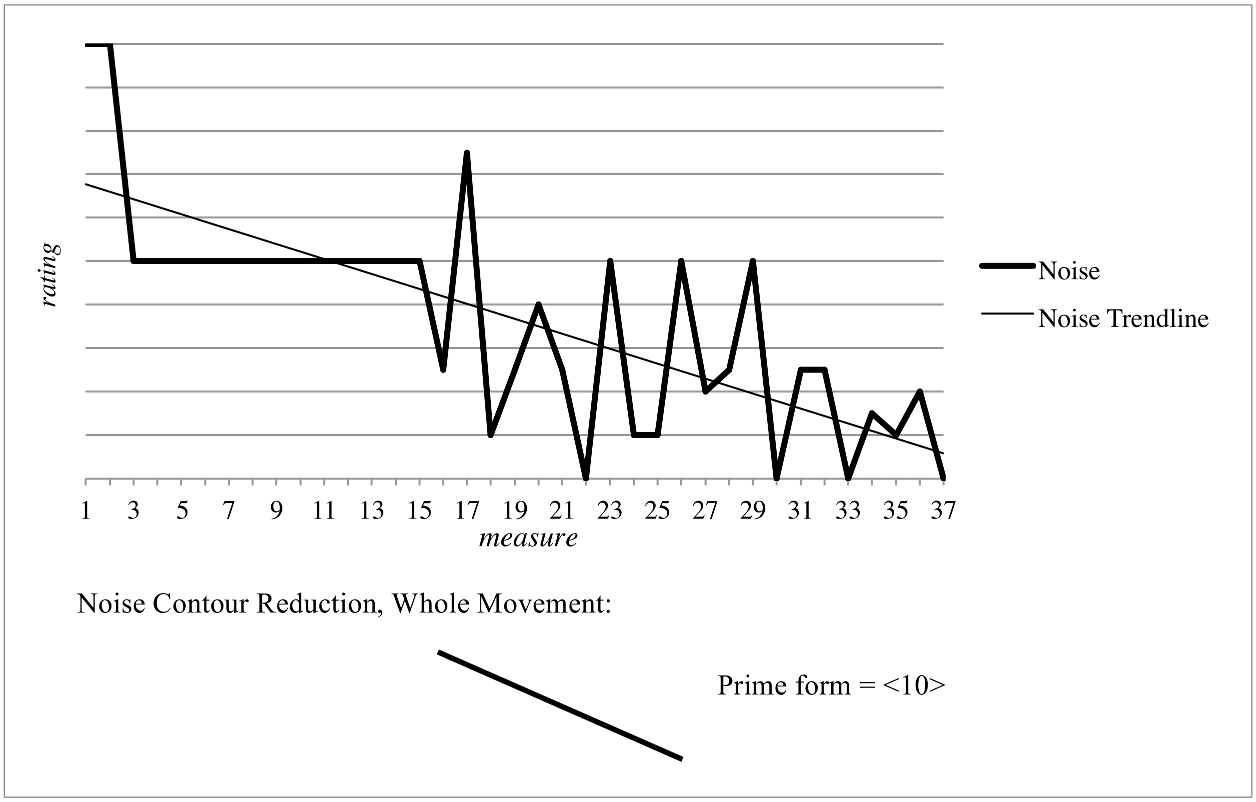

Figure 3-9: Ratings for the noise dimension in *From the Grammar of Dreams,* Movement II, with the linear trendline shown on the graph and the contour reduction shown below.

The trendline is reinforced by the contour reduction of noise in the second movement. Robert Morris' pruning algorithm reduces a complex contour into a prime form that maintains its most salient characteristics.[138] The contour reduction for noise in the second movement, attained through this algorithm, reveals an overall prime form of < 10 >. This contour shape illustrates direct movement from a higher value to a lower value, which in this case represents a movement from tension due by noise to the release of that tension.

138. Morris, "New Directions in the Theory and Analysis of Musical Contour," 213.

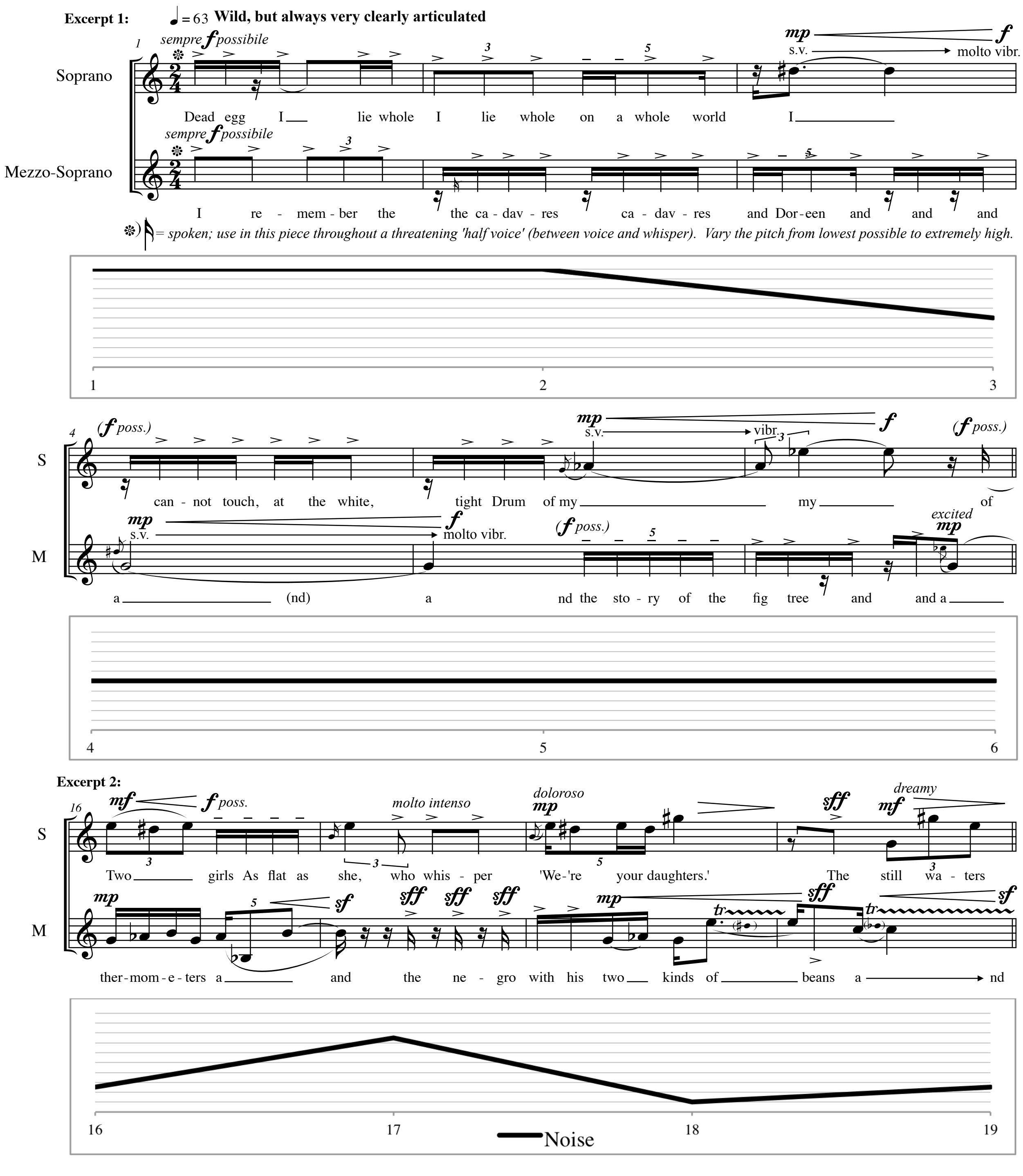

Figure 3-10: Excerpts from *From the Grammar of Dreams,* Movement II, with corresponding ratings for noise.

The high level of noise at the beginning of the second movement is caused by the first two measures being entirely spoken, using “a threatening ‘half voice’ (between voice and whisper)”[139] (see Figure 3-10, Excerpt 1). These instructions, along with a heavy use of accent marks, result in a guttural quality to the speaking voice that contains much more noise than regular speech. One at a time, the singers begin to sing (producing pure sound, or a noise level of zero). From mm. 3-15, they alternate so that one singer is always speaking in this special threatening way (see mm. 3-6 in Figure 3-10, Excerpt 1).

In the middle section, mm. 16-20, sections where both performers are singing alternate with those in which only one is singing (see Figure 3-10, Excerpt 2). This alternation continues into the next section, mm. 21-29, where some longer sections are found in which two voices are singing at the same time (see Figure 3-11, Excerpt 1). In the last section, mm. 30-35, there is hardly any noise—both voices are mostly singing, with a few speaking exclamations introducing infrequent noise (see Figure 3-11, Excerpt 2.) (Since m. 35 contains six beats, or is three times the length of all other measures, not including fermatas, I have broken it into three measures for the purpose of illustrating timbral change. It is represented on the graphs in Figures 3-9 and 3-11 by mm. 35-37.) Notably, the last three beats of the last measure contain no noise at all—we have arrived at the complete release of tension.

139. Saariaho, *From the Grammar of Dreams* (Copenhagen: Edition Wilhelm Hansen AS, 1988), 4.

Figure 3-11: Excerpts from *From the Grammar of Dreams,* Movement II, with corresponding ratings for noise.

The fifth movement also contains large-scale tension and release through timbre, albeit in a way that is more discrete. This short movement consists of two contrasting sections, which are distinguished by changes in the timbral dimension of vibrato (as well as other musical elements, as I will discuss in the next chapter). The changes from the first section to the second are illustrated by the respective contour reductions for each section (see Figure 3-12). In the first section, the amount of vibrato fluctuates from moderate to high, decreasing only at the end of the section, and is reduced through pruning to the prime of <120>. Then in the second section, the vibrato contour remains completely flat. The second section contour cannot be reduced to a prime cseg, because a contour segment requires a change in value.

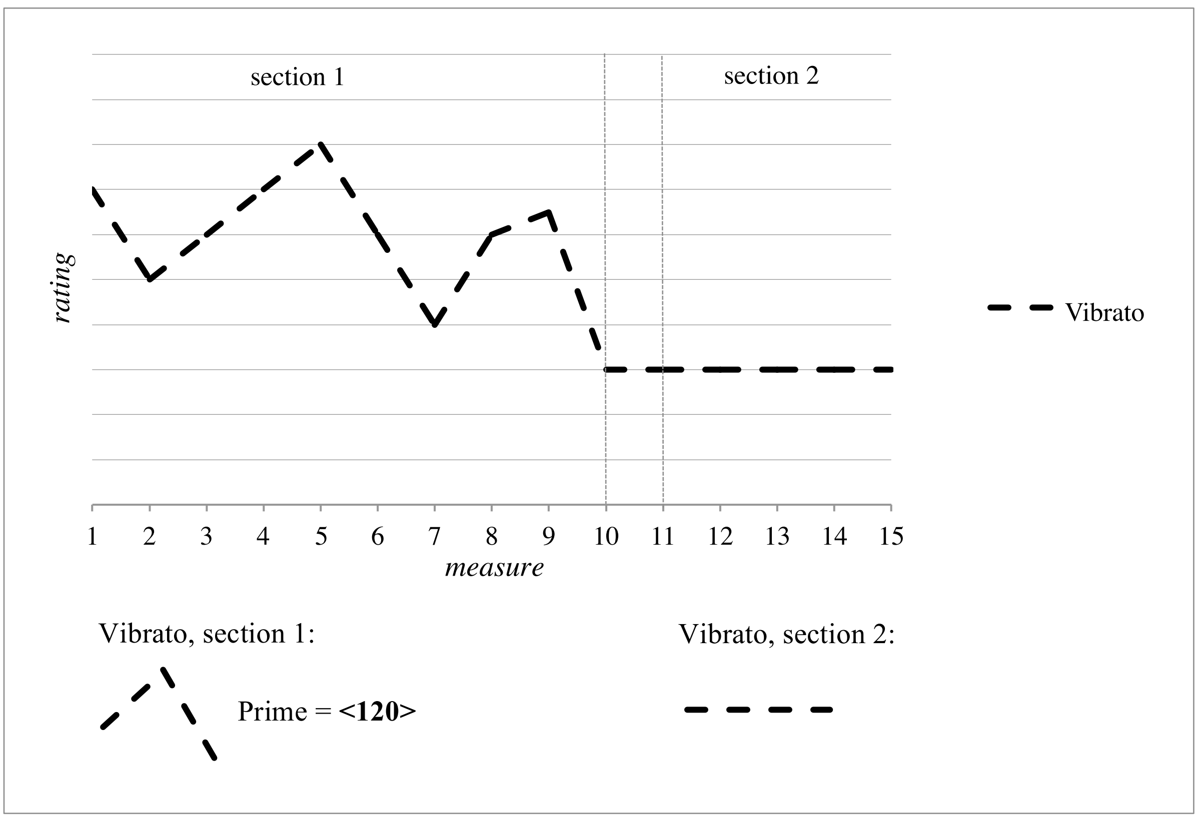

Figure 3-12: Contour reductions for the vibrato dimension of *From the Grammar of Dreams,* Movement V, by section.

Figure 3-13: Excerpt from *From the Grammar of Dreams,* Movement V, with corresponding ratings for vibrato.

The first section's frequent use of trills, which are essentially heightened vibrato, is responsible for its moderate to high level of vibrato in mm. 1-9. The peak in vibrato occurs in measure 5, where the soprano sings a trill for the entire measure and the mezzo soprano sings a trill for half of the measure (see Figure 3-13, which shows this section starting in m.5 and going into the second section). A local low point occurs in m. 7, where the trills are only heard in the soprano. Then a local peak occurs in m. 9, when trills are heard in both voices for the duration of an eighth note and in either the soprano or the mezzo soprano for the rest of the measure, with the exception of a third of a beat. Overall, there is a significant amount of tension due to vibrato in this first section. That tension decreases in m. 10, where both voices are singing with a normal amount of vibrato (without trills) for the first time in the movement. Then in the second section, the amount of vibrato present in normal singing persists consistently throughout the rest of the movement (of which mm. 11-13 are shown in Figure 3-13). The result is a large-scale tension and release, with the first section containing significant tension due to vibrato, and the second section acting as a sustained release of that tension.

3.6 Timbral Delineation of Form: Symmetry Within Movements

Saariaho frequently uses changes in timbre to demarcate the formal structure of this work. She views contrasts in timbre and other musical elements as essential to the creation of form, and she plans much of these formal contrasts in advance.[140] Within movements, timbral changes often indicate the beginning of a new section. This is seen in the change along the dimension of vibrato in the fifth movement, as discussed above. In addition to releasing the

140. Saariaho, interview with the author, March 7, 2012.

tension due to vibrato that was heard in the first section, the sudden decrease in vibrato is an important cue to the listener that a structural divide exists at the point of the change.

In three of the movements, the timbrally delineated structure contains symmetrical elements. This is the case in the fifth movement, where listening to the dimension of brightness in addition to the dimension of vibrato, one hears an overall symmetry. This symmetry is illustrated by looking at the reduction (via pruning) of each of the two sections into their prime forms for the dimensions of brightness and vibrato (see Figure 3-14). In the first section, mm. 1-10, the vibrato dimension takes the prime form of < 120 >, while the brightness dimension stays flat. Then in the second section, the vibrato dimension stays flat while the brightness dimension takes the prime form of < 021 >, the retrograde of the vibrato prime form from the first section. Therefore, the overall form is symmetrical across the two dimensions. This is also reflected in the prime form for the whole movement in each dimension—< 120 > for vibrato, and the retrograde < 021 > for brightness.

In the first movement, there are symmetrical relationships between the contour reductions of all four timbral dimensions, both for the overall movement and individual sections (see Figure 3-15). Overall, the noise and airiness dimensions follow the prime form of < 010 >, while the vibrato dimension follows the inversion, < 101 >. The levels of noise and airiness start and end at extreme lows, while the level of vibrato starts and ends at extreme highs.

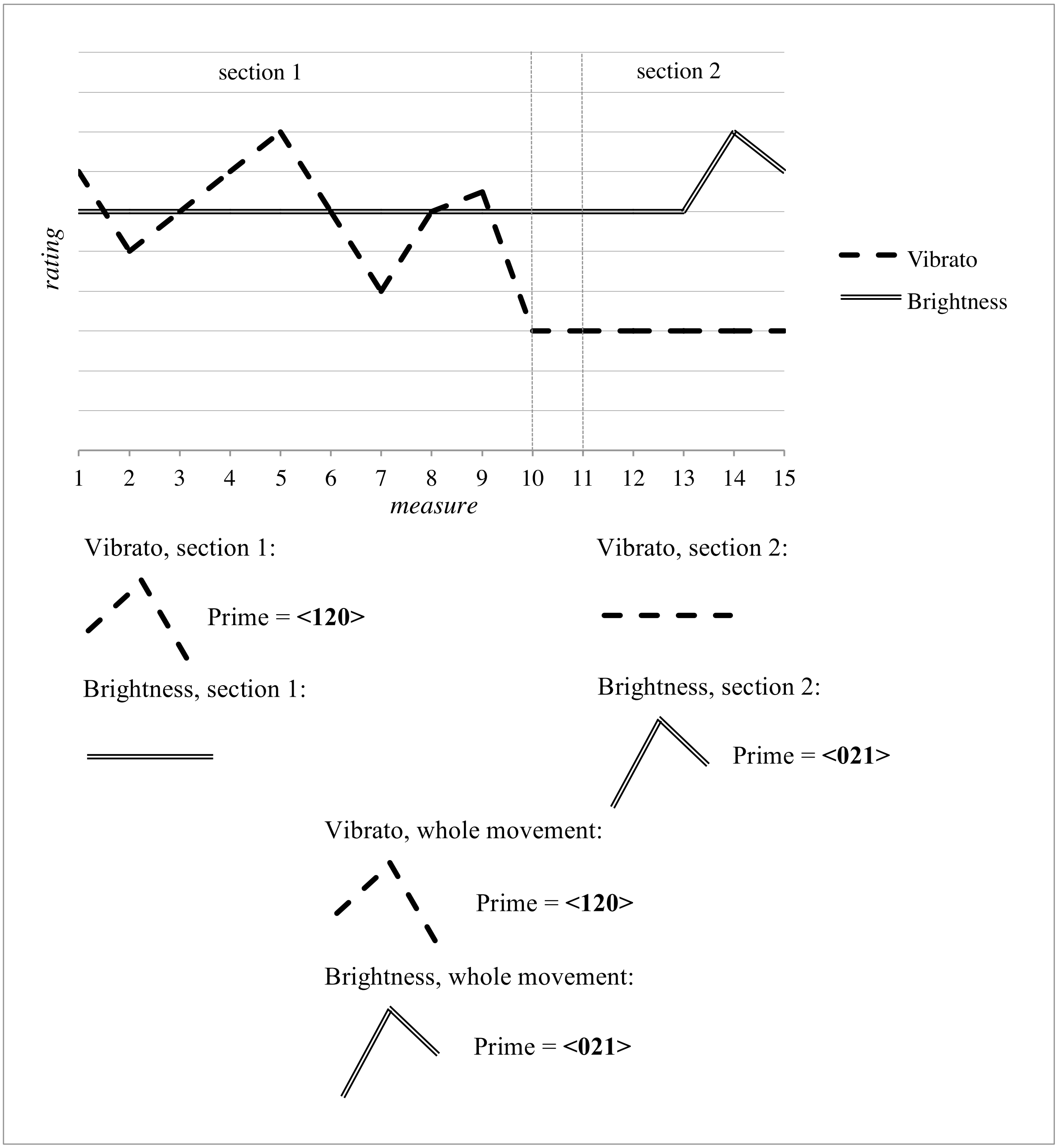

Figure 3-14: Contour reductions for the vibrato and brightness dimensions of *From the Grammar of Dreams,* Movement V, for the whole movement and by section.

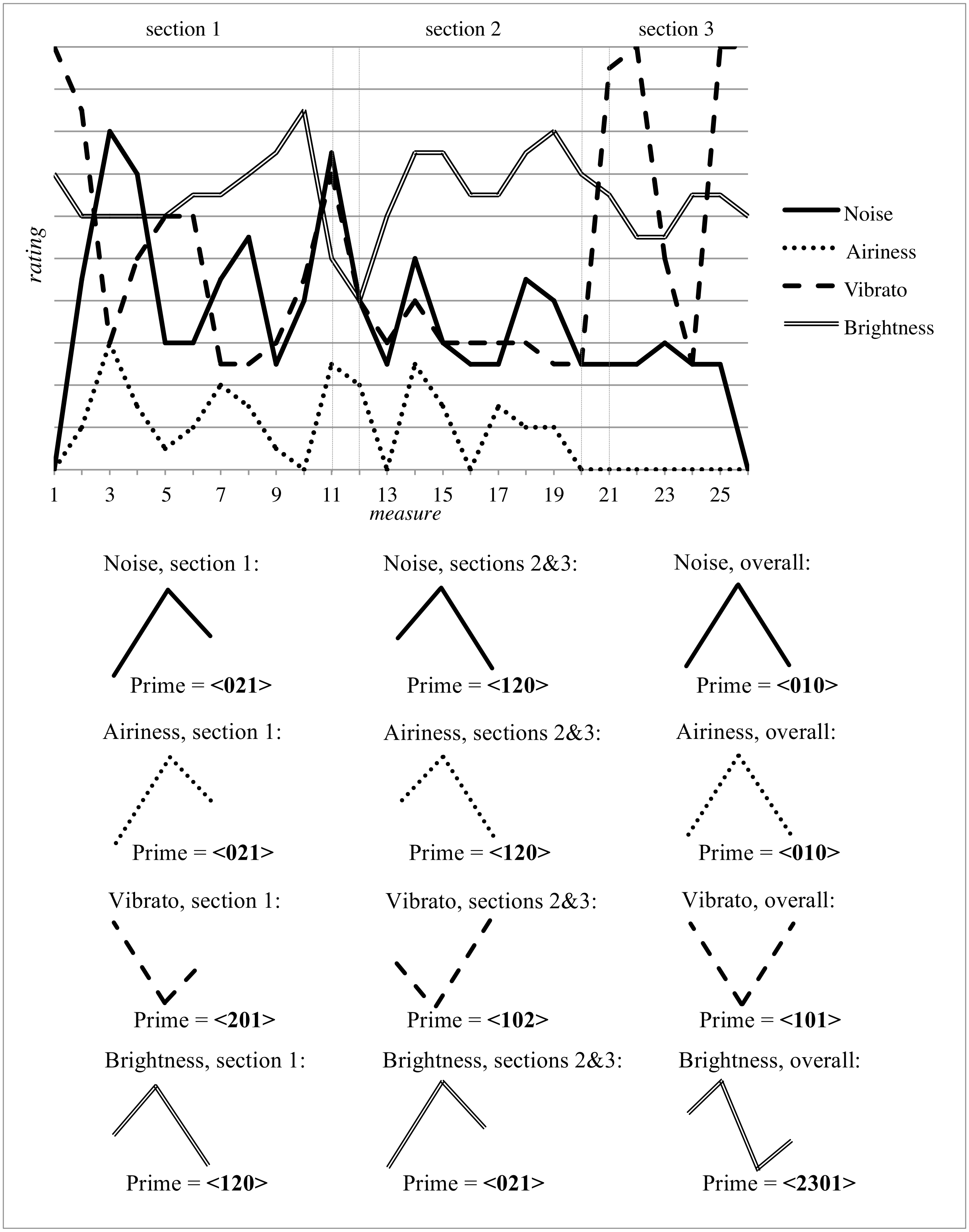

Figure 3-15: Ratings for noise, airiness, vibrato and brightness
in *From the Grammar of Dreams,* Movement I, with contour reductions.

In the first section, there is also an inverse relationship between the reductions of the noise and airiness dimensions vs. the vibrato dimension. Here the noise and airiness dimensions follow the prime form of <021>, while the vibrato dimension follows the inversion, <201>. There is also a retrograde relationship between the dimensions of noise and airiness, on the one hand, and brightness, on the other. The reduction of the first section in the brightness dimension is the prime form <120>, which is the retrograde of the noise and airiness prime forms of <021> for that section. The first section reductions of the vibrato and brightness dimensions are therefore related by retrograde inversion.

While I distinguish between a second section and a third section based on differences in melodic contour, rhythm, text setting, and the use of trills and speaking; I find considering the second and third sections as a unit to reveal further formal symmetries. Between the first section, and the second and third sections, the contour reductions are related by retrograde in each of all four timbral dimensions. Both the noise and airiness dimensions follow the prime form <021> in the first section, and the retrograde <120> in the second and third sections. The vibrato dimension follows the prime form <201> in the first section, and the retrograde <102> in the second and third sections. Finally, the brightness dimension follows the prime form <120> in the first section, and the retrograde <021> in the second and third sections. There is a clear line of symmetry between the contour reductions of the first section and the contour reductions of the second and third sections, in all timbral dimensions.

In the fourth movement, the non-singing expressions at the opening and closing contribute an element of symmetry to the form by serving as bookends for the movement. The form is otherwise asymmetrical, consisting of five distinct sections; only the first and fifth sections show elements of symmetry. The first section (mm. 1-9) gradually transforms from rhythmic speaking to singing on precise pitches, and the fifth section (mm. 37-38) gradually transforms from singing to rhythmic speaking and then to rhythmic whispering.

This relationship between the beginning and end of the fourth movement is further revealed by examining the contours for the noise and airiness dimensions. In the dimension of noise, the first fourteen measures of the movement follow the cseg <543201>. In the dimension of airiness, the final fifteen measures of the movement follow its retrograde, cseg <102345> (see Figure 3-16). Both csegs are members of the csegclass c6-2.

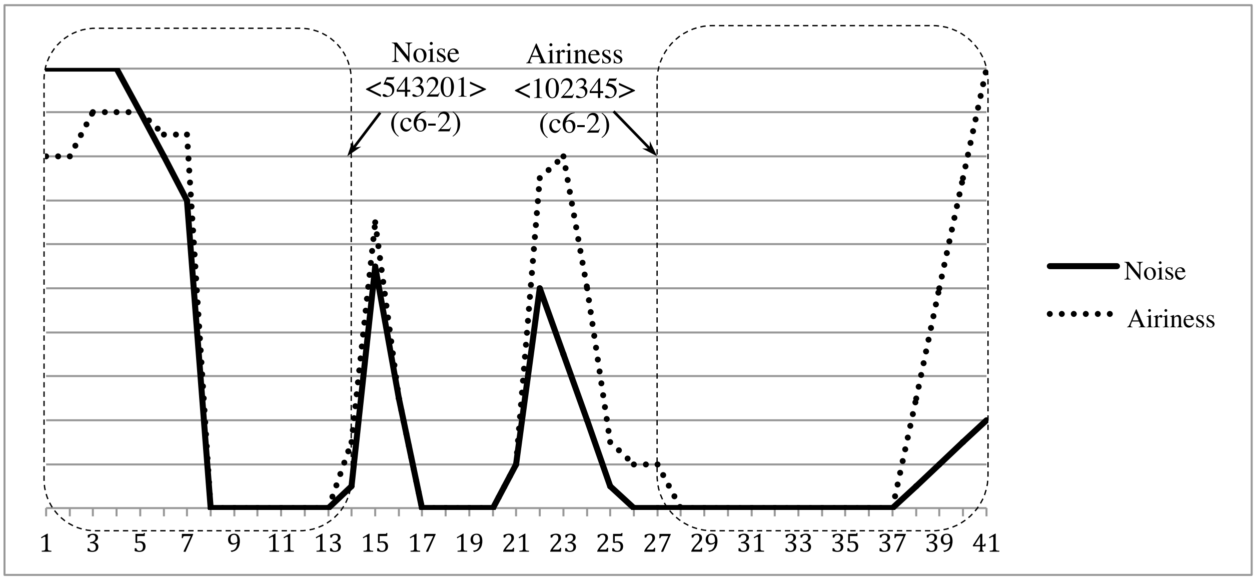

Figure 3-16: Symmetrical csegs of csegclass c6-2
in *From the Grammar of Dreams,* Movement IV.

The high level of noise in the opening of the movement is due to speaking, which creates a high level of noise. The first two measures consist of rhythmic speaking with the performance direction “breathless, yet very precise” (see Figure 3-17). I interpret this direction to mean that the spoken voice should include an element of airiness that is not present in normal speech, created by allowing air to escape between the vocal chords as they phonate. Therefore the level of noise is very high, and the level of airiness is high but less so. In the following two measures, Saariaho asks the singers in turns to exhale and inhale while speaking.

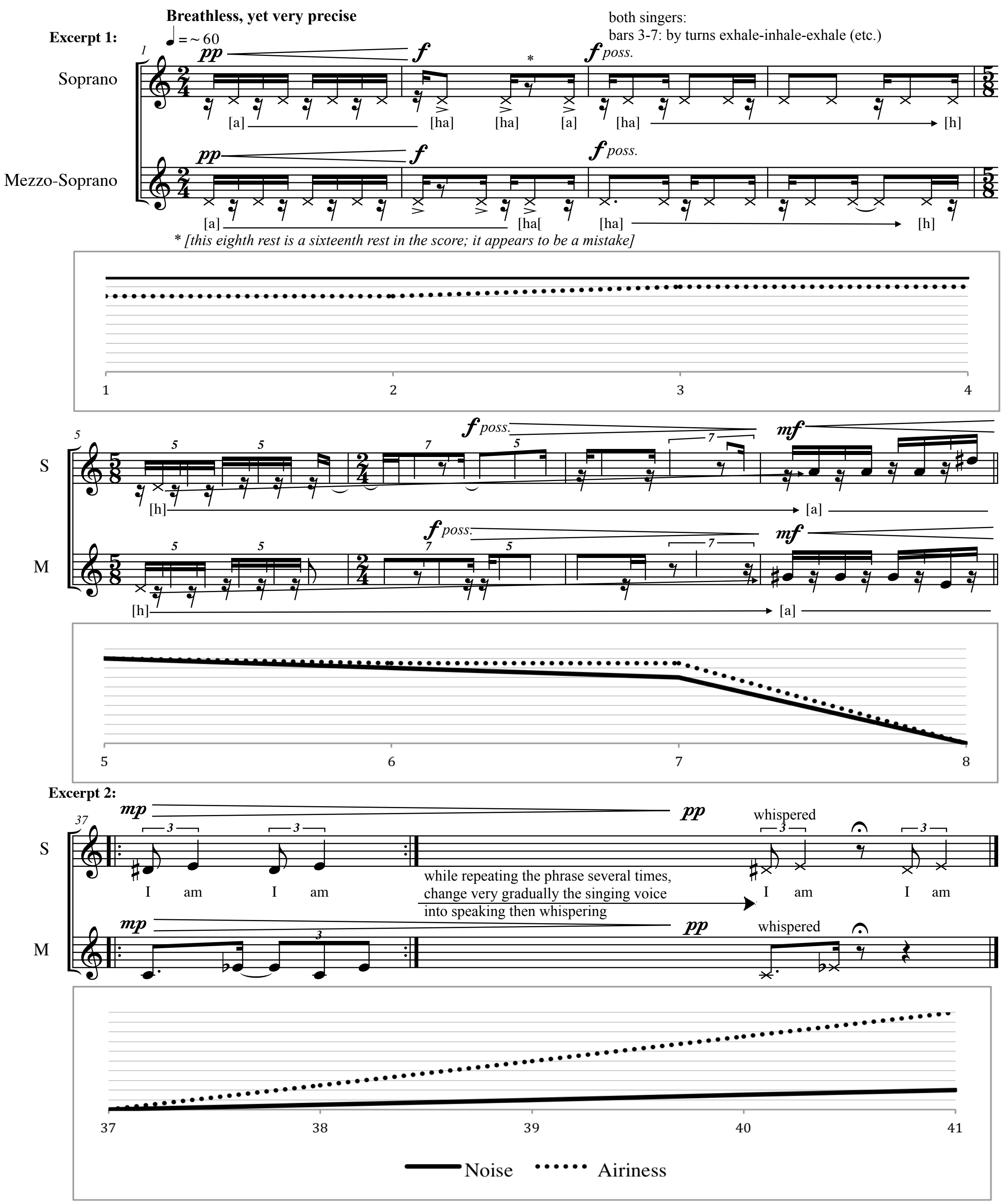

Figure 3-17: Excerpts from *From the Grammar of Dreams*, Movement IV, with ratings for noise and airiness.

As discussed earlier, voiced, unpitched exhaling and inhaling results in a great amount of air and noise. This is especially the case since the dynamics indicated are *forte* and *forte possibile*. Then in mm. 5 through 7, the singers continue the exhaling and inhaling technique while transitioning towards the sung pitches that appear in m. 8. A dramatic timbral transformation occurs as the noise and airiness of the exhaled and inhaled speaking turns into the pure sound of singing.

A similar transition occurs in reverse at the end of the fourth movement. In the final extended measure, Saariaho gives the following instructions: "while repeating the phrase several times, change very gradually the singing voice into speaking then whispering."[141] Here there is an increase in noise and airiness, but the increase in airiness is much more extreme than the moderate increase in noise. The transition here from pitched singing to unpitched whispering echoes the transition from unpitched speaking to pitched singing in the opening, while the change of technique from speaking to whispering causes the more dramatic transformation to occur this time in the dimension of airiness.

3.7 Timbral Delineation of Form: Symmetry in the Entire Work

In addition to using timbre to help define the form of each movement, Saariaho uses timbre on an even larger scale as a means of outlining the overall structure of the work. Her choices of which timbral dimensions to draw on in each movement create a symmetrical structure for the work. The outer movements, the first and the fifth, both feature the dimension of vibrato with the prominent use of trills. (see Figure 3-18 for a graphic representation of the average rating for each dimension within each movement). Moving inwards, the second and

141. Saariaho, *From the Grammar of Dreams*, 8.

fourth movements feature the dimension of noise, with speaking being an important way of producing that noise. While the first, second, and fourth movements all involve additional timbral dimensions, the prominence of these aforementioned dimensions makes the connections between these symmetrically placed movements salient.[142]

The third, middle movement, is distinguished by its near lack of timbral variability. It is the only movement in which traditional singing, with minimal use of trills and no explicit manipulation of vibrato, comprises the whole movement.[143] As such, it serves an important structural purpose. The third movement is an oasis of timbral simplicity, a placid respite from the relative anxiety and tension that surrounds it. Overall, the prominent timbral dimensions of each movement form the following symmetrical pattern: vibrato, noise, none, noise, vibrato.

Further relationships between the timbral dimensions over the work as a whole can be seen by looking at the average rating for each movement, for each of the four timbral dimensions (see Figure 3-18). The lack of timbral tension in the third movement is reflected by its situation at the lowest point in the curve for noise, airiness, and brightness (the average rating for vibrato in the third movement is relatively low, though it reaches its lowest point in the fourth movement).

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142. The first movement in particular makes important use of noise and airiness in addition to vibrato. The final section features six measures of sustained trills, in addition to sustained trills in the opening two measures and elsewhere in the movement. As a result I hear vibrato as a prominent timbral dimension, if not the only important timbral dimension, in the movement.

143. The second section of the third movement does contain a couple of trills, which can be heard as changes in the timbral dimension of vibrato. In comparison with the timbral transformations occurring in other movements, however, these changes are minimal.

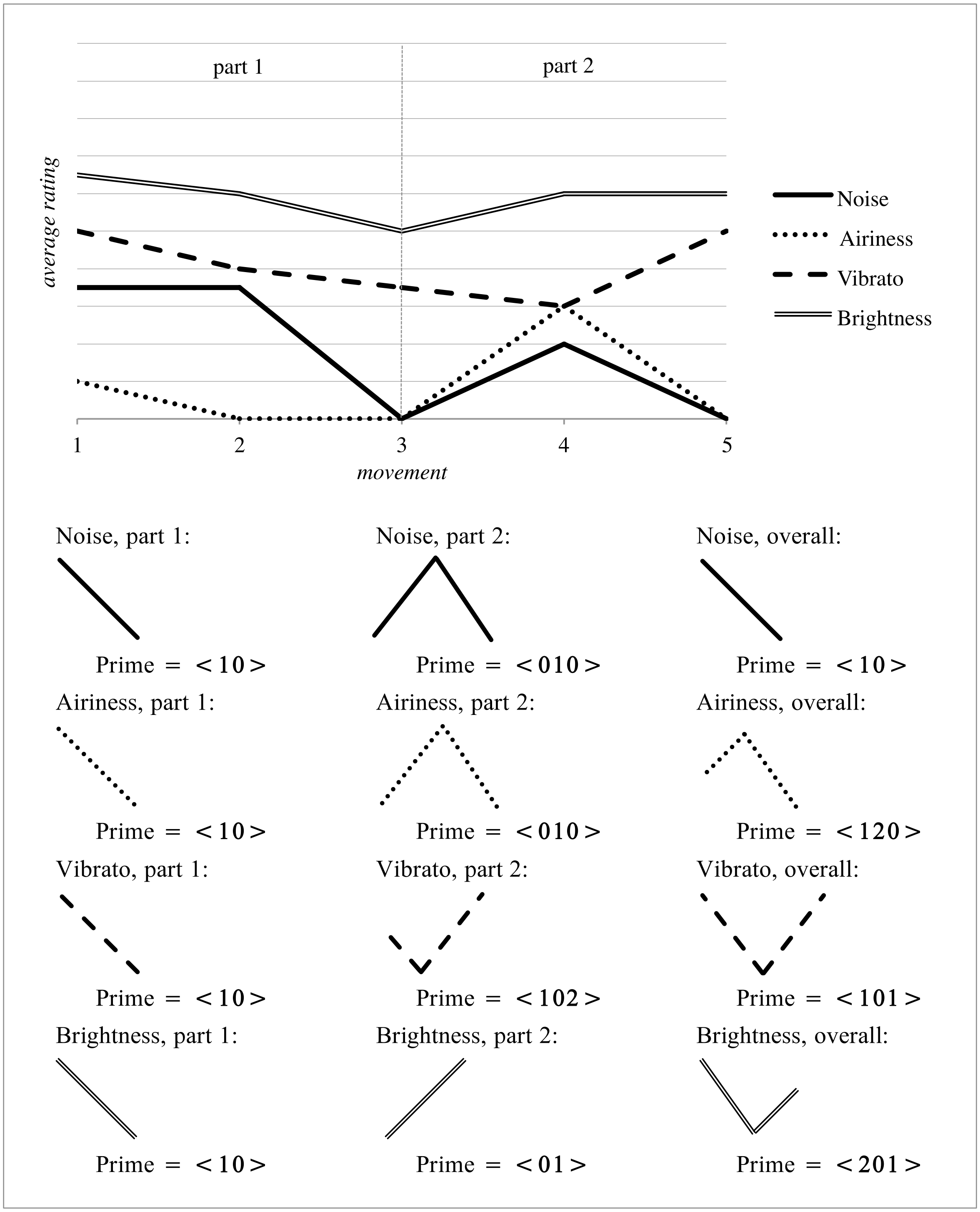

Figure 3-18: Comparison of the average rating for each timbral dimension across all five movements in *From the Grammar of Dreams*, with contour reductions.

While the contours of each timbral dimension over the course of the entire work do not exhibit the simple symmetry of my list of prominent timbral dimensions, there are elements of symmetry in the brightness dimension. Marking the third movement as a point of symmetry, I reduced the contours for the first through third movements (part 1) and the third through fifth movements (part 2). In the dimension of brightness, the prime form of the first part, <10>, is symmetrical with the prime form of the second part, <01>, as they are related by retrograde (and inversion).

These contour reductions also show relationships between dimensions in the first and second part of the work. In the first part, all four timbral dimensions follow the prime form of <10>, or decrease from a relative high to a relative low. The different dimensions are less synchronous in the second part, in which only the dimensions of noise and airiness follow the same prime form of <010>.

3.8 Timbral Text Expression

Another important way that Saariaho uses timbre in this work is as a means of text expression. Her chosen texts, with their undercurrents of turmoil and anxiety, lend themselves well to expression with noise, airiness, and vibrato. In a contemporary style of text painting, Saariaho literally depicts some of the emotions and actions within the texts with her choices of timbres.

For example, airy timbres in the fourth movement depict the action of the two texts. The performance instruction, "breathless, yet very precise," gives a clue to the significance of this airiness in a setting of two excerpts from *The Bell Jar,* one about difficulty swimming and another involving a deep breath. The two excerpts in their entirety read:

> I thought I would swim out until I was too tired to swim back. As I paddled on, my heartbeat boomed like a dull motor in my ears.
>
> I am I am I am.

> I took a deep breath and listened to the old brag of my heart.
> I am I am I am.
>
> —Plath, *The Bell Jar,* p. 177-178 and p. 274
> (The complete *The Bell Jar* excerpts can be found in Fig. 3-20.)

The airy sounds therefore suggest both the breathless state of a swimmer who is literally gasping for air and the deep breathing of the second excerpt.[144] In fact, as explained previously, the airiness is produced largely by instructions for the singers to exhale and inhale, either while singing or while speaking. The resulting airy timbres clearly illustrate the actions described by the text.

The fifth movement contains another example of timbral text expression. I have already discussed how the timbral changes in the second section function as a means of creating large-scale tension and release and marking the structure of the movement. In addition, the disappearance of the first section's high level of vibrato creates a peaceful feeling that aptly illustrates the text. Appropriately, the performance instructions at this point are *"dolcissimo"* in the soprano and *"calmato, dolce"* in the mezzo soprano. The text, in both voices, is a simple phrase from the second-to-last stanza of "Paralytic:" "I smile."

The normal level of vibrato contributes to an emotional character in this section that matches the emotion of these words. It is not an exuberant type of smiling of which Plath writes—this stanza is preceded by seven emotionally wrought stanzas describing the anxiety of a hospital patient on an iron lung. Rather, this is the turning point in the poem from distress to acceptance. Similarly, the abrupt change in timbre mirrors this sudden shift from anxiety to calmness.

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144. Anni Oskala hears the fourth movement as "a vivid musical depiction of drowning," with the rhythmic pulse representing the heartbeat that ultimately keeps the protagonist alive. ("Dreams about Music, Music about Dreams," 57.)

3.9 Interaction of Voices and Dialogue Between Texts

Unusually, the two voices often sing different, overlapping sections of text. This is not done with complete disregard for the text expression, although it does obscure the listener's ability to hear the text.[145] Rather, these juxtapositions contribute to the dynamic between the two voices and to the reading of the texts. At times the competing texts create a sense of conflict between them. At other times Saariaho brings together excerpts from the different text sources in such a way that they seem to come from the same source, expressing a single idea. Timbre plays an important role in creating an evolving dynamic between the two voices and the texts that they express.

Saariaho has chosen two texts by Sylvia Plath that do not at first seem to have much in common. One source is the poem "Paralytic," first published posthumously in the book *Ariel* (see Figure 3-19 for the full text of "Paralytic").[146] This collection of poems, which Plath wrote in the last six months before she ended her life, are widely considered to be her greatest writing. This poem in particular is written from the perspective of a hospital patient on an iron lung, which perhaps is a metaphor for the difficulties in the author's own life. The other source, from which she extracts three excerpts, is Plath's autobiographical novel *The Bell Jar* (see Figure 3-20 for the full excerpts form *The Bell Jar* set by Saariaho). This novel draws on

145. Anni Oskala has written of text intelligibility as a defining characteristic of Saariaho's vocal music of the late 1980's and early 1990's, as exhibited in *From the Grammar of Dreams* ("The Voice in Kaija Saariaho's Music, 1977-2000," 85-89).

146. While "Paralytic" was published in the first (1966) edition of *Ariel*, edited by Plath's husband Ted Hughes, it was excluded from Plath's original manuscript. According to Plath's daughter Frieda Hughes, Ted Hughes selected "Paralytic" to be included in the first edition, despite its absence from Plath's manuscript ("Foreword," in Sylvia Plath, *Ariel: the restored edition,* foreword by Frieda Hughes [New York: HarperCollins Publishers, 2004], xvi-xvii). Paralytic was still among Plath's last poems. She wrote it on January 29, 1963, thirteen days before her suicide (David Semanki, "Notes," in Sylvia Plath, *Ariel: the restored edition,* 209-211).

Plath's own experiences to depict a young woman's mental breakdown, suicide attempt, and journey towards recovery. By combining the powerful poetry with the personal experiences of the author, Saariaho sets up a telling commentary between poetry and prose. In two of the movements, the first and the second, she even directly juxtaposes text from "Paralytic" in the soprano with text from *The Bell Jar* in the mezzo soprano. It's as if the younger Plath's inability to forget her traumatic experiences informs the older Plath's meditation on suffering.

Paralytic

It happens. Will it go on?—
My mind a rock,
No fingers to grip, no tongue,
My god the iron lung

That loves me, pumps
My two
Dust bags in and out,
Will not

Let me relapse
While the day outside glides by like ticker tape.
The night brings violets,
Tapestries of eyes,

Lights,
The soft anonymous
Talkers: 'You all right?'
The starched, inaccessible breast.

Dead egg, I lie
Whole
On a whole world I cannot touch,
At the white, tight

Drum of my sleeping couch
Photographs visit me—
My wife, dead and flat, in 1920 furs,
Mouth full of pearls,

Two girls
As flat as she, who whisper 'We're your daughters.'
The still waters
Wrap my lips,

Eyes, nose and ears,
A clear
Cellophane I cannot crack.
On my bare back

I smile, a buddha, all
Wants, desire
Falling from me like rings
Hugging their lights.

The claw
Of the magnolia,
Drunk on its own scents,
Asks nothing of life.

—Sylvia Plath, *Ariel* (1966), 77-78

Figure 3-19: The full text of "Paralytic," sections of which are set in movements I (soprano), II (soprano), III (both voices), and IV (both voices).

In a interview, Saariaho explained her perspective on these two texts. In her mind, the two voices are one person. The fragmentation and juxtaposition of the texts reflects the illogical nature of dreams; thus the title, *From the Grammar of Dreams.* Seen from this perspective, the dialogue between the two voices can be seen as the internal monologue of a single person. She also suggests, with the title, that the experience of mental illness is not as foreign to the sane as they would think. She explains that the thoughts of the mentally ill and the dreams of the sane have in common an unconventional perception of reality. "What happens in these texts could happen to all of us in [a] dream."[147]

Texts from *The Bell Jar*

A bad dream.
I remembered everything.
I remembered the cadavers and Doreen and the story of the fig tree and Marco's diamond and the sailor on the Common and Doctor Gordon's wall-eyed nurse and the broken thermometers and the Negro with his two kinds of beans and the twenty pounds I gained on insulin and the rock that bulged between sky and sea like a gray skull.
Maybe forgetfulness, like a kind of snow, should numb and cover them.
But they were part of me. They were my landscape.

—p. 267

I thought I would swim out until I was too tired to swim back. As I paddled on, my heartbeat boomed like a dull motor in my ears.
I am I am I am.

—p. 177-178

I took a deep breath and listened to the old brag of my heart.
I am, I am, I am.

—p. 274

—Sylvia Plath

Figure 3-20: The complete collection of excerpts from *The Bell Jar* set in *From the Grammar of Dreams.*

The first movement is an excellent example of how the two texts form a dialogue with each other. The mezzo soprano sings only two lines from *The Bell Jar*, "A bad dream. / I remembered everything."[148] Meanwhile, the soprano sings the first four stanzas of "Paralytic."

147. Saariaho, interview with the author, March 7, 2012.
148. Plath, *The Bell Jar* (New York: Harper & Row, 1971), 267.

Saariaho has described this first movement as a musical depiction of a nightmare,[149] although neither text actually describes a dream in the contexts from which they came. The lines from *The Bell Jar* come in response to a suggestion from the character's mother that she try to forget her mental breakdown and the experiences that followed, as if they were just a nightmare. By bringing these texts together, Saariaho plays with both the idea that the events in the poem may be a nightmare, and the idea of willful forgetting. But as the protagonist of *The Bell Jar* knows, forgetting is impossible. As she later concludes, she has neither the ability nor the desire to forget. So too will the nightmare of being a hospital patient trapped in an iron lung linger in the dreamer's memory.

Since Sylvia Plath suffered from depression (culminating in suicide) and struggled with problems in her marriage to the poet Ted Hughes,[150] I read "Paralytic" as a metaphor for Plath's feelings of suffocation in her own life. Applying this reading to the first movement, the *Bell Jar* texts suggest Plath's inability to forget or overlook her own suffering.

The two voices in this first movement gradually come together from disparate beginnings, in both the sung texts and in the timbral dimensions of brightness and vibrato (The dimension of brightness is directly related to the vowels in the sung text or phonemes.) In the first section, mm. 1-11, the soprano sings the "Paralytic" text while the mezzo soprano sings only vowels (see Figure 3-21, Excerpt 1). The performance instructions spell out quite

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149. Komsi, "From the Grammar of Dreams: *Kaija Saariahon sävellys Sylvia Plathin tekstiin,"* 166, cited in Oskala, "Dreams about Music, Music about Dreams," 55. Oskala explores the idea of the first movement depicting a nightmare followed by the dreamer waking up, and the subsequent movements representing attempts to understand the dream through Freudian free association (Ibid., 53-57).

150. Janet Malcolm, *The Silent Woman: Sylvia Plath & Ted Hughes* (New York: Alfred A. Knopf, 1994.)

different emotional tones for the two voices—at the opening the mezzo soprano is marked "intensive, restless," while the soprano is marked "excited, violent."

Figure 3-21: Excerpts from *From the Grammar of Dreams,* Movement I, with corresponding ratings for vibrato and brightness in each voice.

As the movement progresses, the relationship between the two voices changes. In the second section, mm. 12-20, the soprano continues to sing the “Paralytic” verses while the mezzo soprano sings the excerpt from *The Bell Jar* (see Figure 3-21, Excerpt 2). Their emotions are still distinct for much of the second section, converging by the end of the section. Saariaho marks the soprano part as “tender,” “concentrated, not hurrying,” “excited,” “sad,” “calming down little by little,” “*doloroso,*” and “ecstatic” over the course of the second section. Meanwhile, the mezzo soprano still follows the indication “intense, anxious,” re-articulated towards the end of the first section, through m. 16. In m. 17, a measure after the soprano is marked “calming down little by little,” the mezzo soprano’s instructions change to “calming down.”

In the third and final section, mm. 21-26, both voices alternate singing the vowel /a/—at first as part of the sustained word “lights,” and then as an isolated vowel—with speaking text from their respective sources (see Figure 3-21, Excerpt 3). Because only one excerpt of text is heard at a time, alternating from which voice it comes, the two texts are effectively merged in this final section like a single dream sequence in which actual chronology and geography is jumbled. The emotional indications, though still somewhat different, are similar in tone. While the soprano goes from “*poco doloroso*” to “calm” to “dolce,” the mezzo soprano goes from “sad, tender” to “dolce” to “tender.”

The progression in the way that the texts are set in the different voices is reflected in the progression of brightness within each voice. Along the dimension of brightness, the separateness of the two voices is reflected by different brightness contours in the first section. Comparing the contour reductions of each section for each voice, the soprano follows a brightness contour of the prime form $<201>$ in the first section, while the mezzo soprano follows a brightness contour of the prime form <120> (see Figure 3-22). While these two contours are related by retrograde and therefore belong to the same csegclass, their opposite directions of movement contrast with the relationship between the brightness contours of the two voices in the next section.

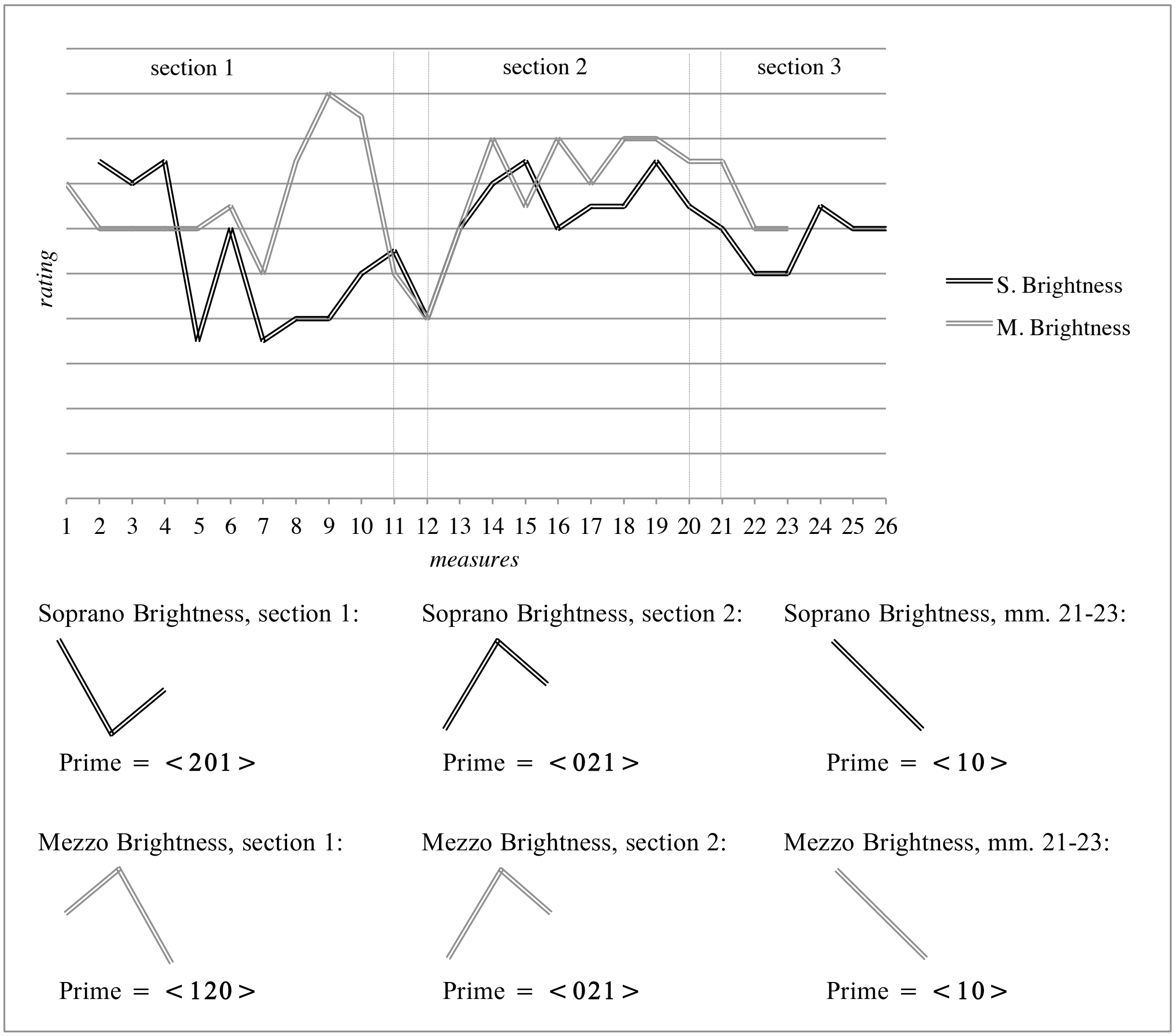

Figure 3-22: Contour reductions for the brightness dimension of each voice, in *From the Grammar of Dreams*, Movement I, by section.

In the second section, when the two voices come together in their mutual singing of texts, their brightness contours also come together. The prime form of the brightness contour for both voices in this second section is <021>. For the third section, it is difficult to ascertain a prime form for the mezzo soprano brightness contour, since the mezzo soprano is silent for two of the six measures that comprise this section. A similarity is seen, however, in three measures of the section for which there is consecutive data for both voices, mm. 21-23. Here the two voices share the same prime contour of <10> in addition to the same full cseg of <100>. There is also the same brightness rating for two consecutive measures in each voice in this final section (mm. 22-23 in the soprano, and mm. 25-26 in the mezzo soprano), due to the shared /a/ vowel.

The brightness contours for each voice in the first movement also reflect the fact that each voice is expressing a completely different text, by having different general characteristics in each voice. For example, the soprano's brightness contour is characterized by repetitions of rc5-4/9, which appears twice in the prime form of <01231> (in mm. 7-12 and mm.12-16) and once in its inversion, <32102> (in mm. 19-24). Meanwhile, the mezzo soprano's brightness contour is characterized by repetitions of c4-4, which appears twice in the form of cseg <1320> (in mm. 8-11 and mm. 17-22) and once in its retrograde inversion, <3102> (see Figure 3-23). This relationship between the brightness and the individual text of each voice may be related to vowel patterns of the different texts, but it is worth noting that one of the characteristic csegs in the mezzo soprano part occurs before the mezzo soprano has begun singing actual text.

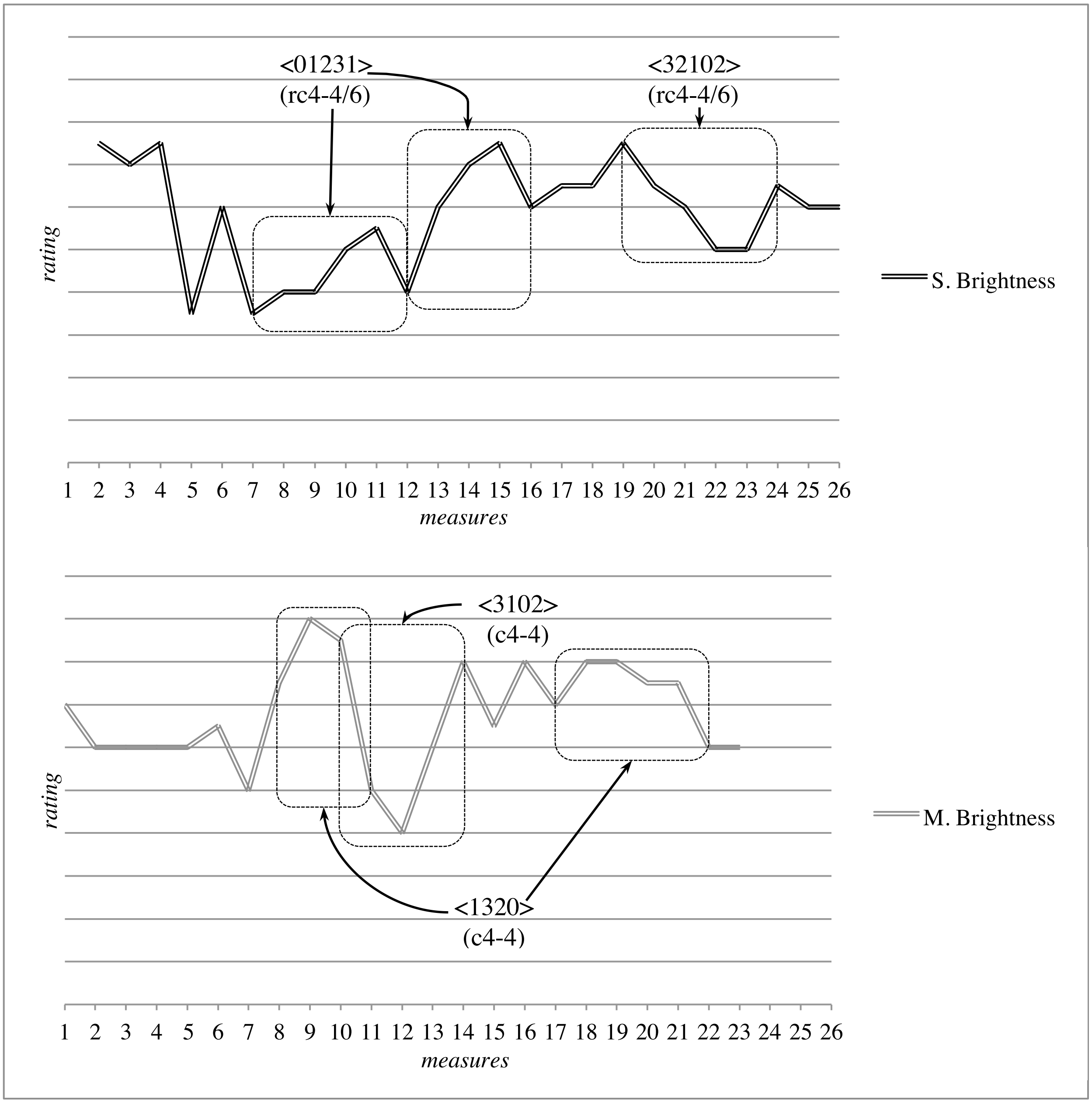

Figure 3-23: Repetition of rc5-4/9 in the soprano and c4-4 in the mezzo soprano in the dimension of brightness, in *From the Grammar of Dreams*, Movement I.

A similar progression of the dynamic between the two voices in the first movement is heard in the dimension of vibrato. In the first section, the mezzo soprano's heighted vibrato of trills illustrates anxiety, while the soprano's vibrato levels remain low (see graph in Figure 3-24; and score in Figure 3-21, Excerpt 1). In the second section, the soprano picks up one of the trills (in m. 14) that had previously been heard only in the mezzo soprano part, and the mezzo soprano's trills disappear (see graph in Figure 3-24; and score in Figure 3-21, Excerpt 2). As a result, the overall levels of vibrato in the two voices converge. In the third section, the voices' alternation between trills and speaking causes both voices to oscillate between extremely high and moderately low to extremely low levels of vibrato (see graph in Figure 3-24; and score in Figure 3-21, Excerpt 3).

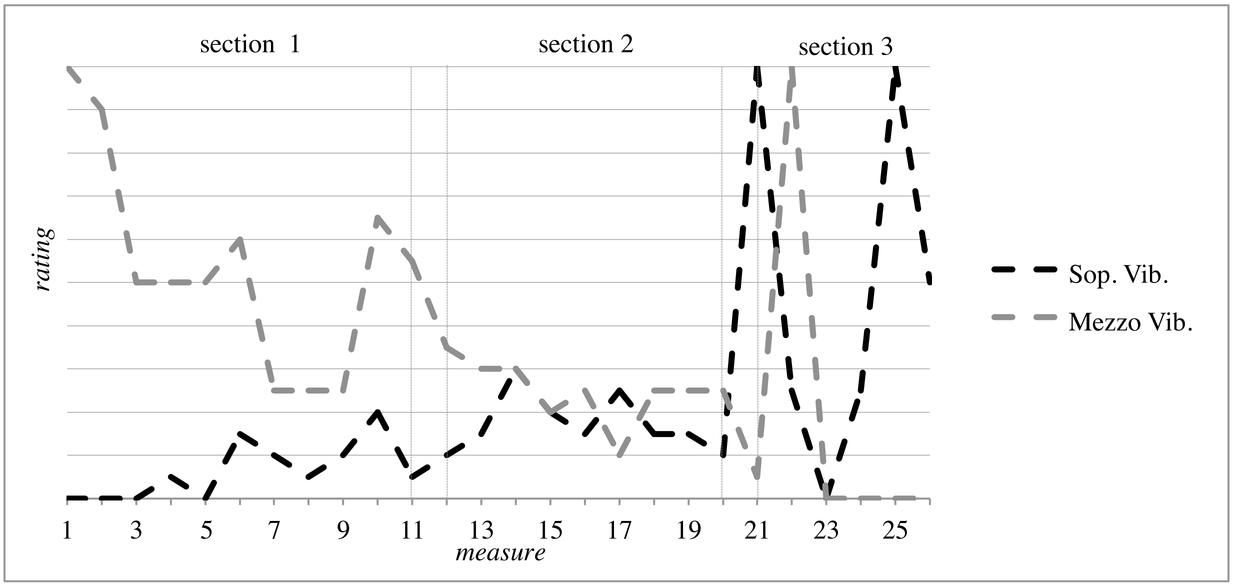

Figure 3-24: Transformations of individual voices along the dimension of vibrato in *From the Grammar of Dreams*, Movement I

As the ranges of vibrato ratings in the two voices converge, contour relationships emerge between the two voices in the second and third sections of the first movement. Members of csegclass c-1 are heard in both voices starting at the end of the first section and going into the second section. In the mezzo soprano, cseg <3210> occurs in mm. 10-14 and in mm. 11-15 in the vibrato dimension (see Figure 3-25). At the same time, the soprano's vibrato follows the cseg <0123>, which is both the inverse and retrograde of <3210>. Then in mm. 15-18, both voices follow csegclass rc4-5/8 in the vibrato dimension—<1202> in the mezzo soprano, and the inverse, <1020>, in the soprano.

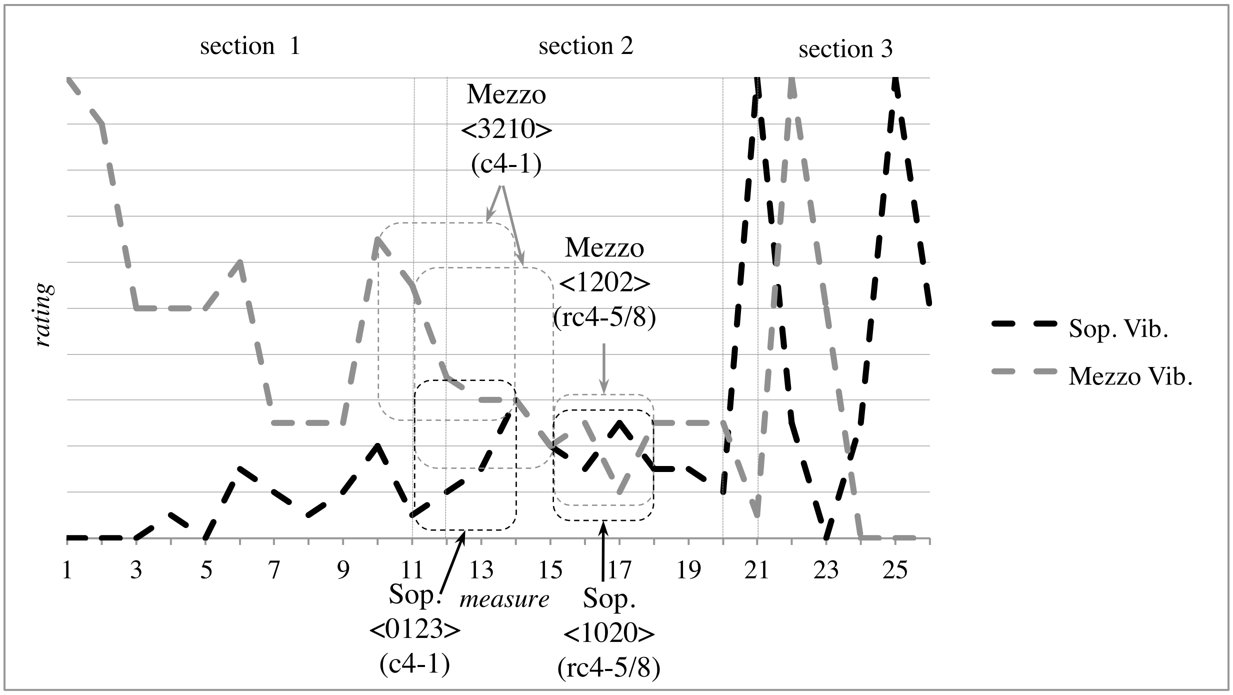

Figure 3-25: Csegs of csegclasses c4-1 and rc4-5/8 in individual voices along the dimension of vibrato in *From the Grammar of Dreams,* Movement I.

Looking at the musical correlates of these changes in the vibrato ratings, they are largely caused by changes in the frequency and duration of trills in the two voices. In mm. 10-15, when the mezzo soprano follows overlapping, descending <3210> contour segments, she sings first a trill over a duration of two and a half beats, then over a duration of two and quarter beats, and then she does not sing any more trills in this segment. (See Figure 3-26; a further dip in the mezzo soprano vibrato dimension in m. 15 is due to a beat and a half of rest). When the soprano follows the inverse, ascending <0123> contour segment in mm. 11-14, it is caused largely by the introduction of a trill in m. 14. In m. 11, the vibrato rating is below that of the amount of vibrato in normal singing because for most of the measure the soprano is speaking, which does not produce any vibrato. The soprano continues to speak and have rests in mm. 12-13, with slightly more time spent singing in m. 13 than in m. 12. Therefore, from

m. 11 through m. 13 the overall amount of vibrato per measure increases as the soprano spends a greater portion of the measure singing.

Figure 3-26: Excerpt from *From the Grammar of Dreams,* Movement I, with corresponding ratings for vibrato and brightness in each voice.

Over the next section in which the two voices sing inversionally related contours, mm. 15-18, overall vibrato levels per measure for both voices stay below the level of vibrato found in normal singing. As in mm. 11-13, the changes in vibrato levels are again caused by changes in the amount of time within each measure that each voice is singing. Over mm. 15-18, the soprano decreases, then increases, and then deceases the portion of the measure in which she is singing rather than speaking (see Figure 3-26). In the same time span, the mezzo soprano does the opposite—she increases, then decreases, and then increases the portion of the measure in which she is singing. Unlike the soprano, the mezzo soprano does not speak in this segment; however, neither speaking nor silence produce any vibrato.

From the end of the second section through the third section, both voices' vibrato ratings follow the cseg <21430> (see Figure 3-27). This cseg is first heard in the soprano in mm. 19-23. It then repeats overlapping in the mezzo soprano, in mm. 20-26. That the two voices follow exactly the same vibrato contour throughout the third section underscores the extent to which the two voices have become similar.

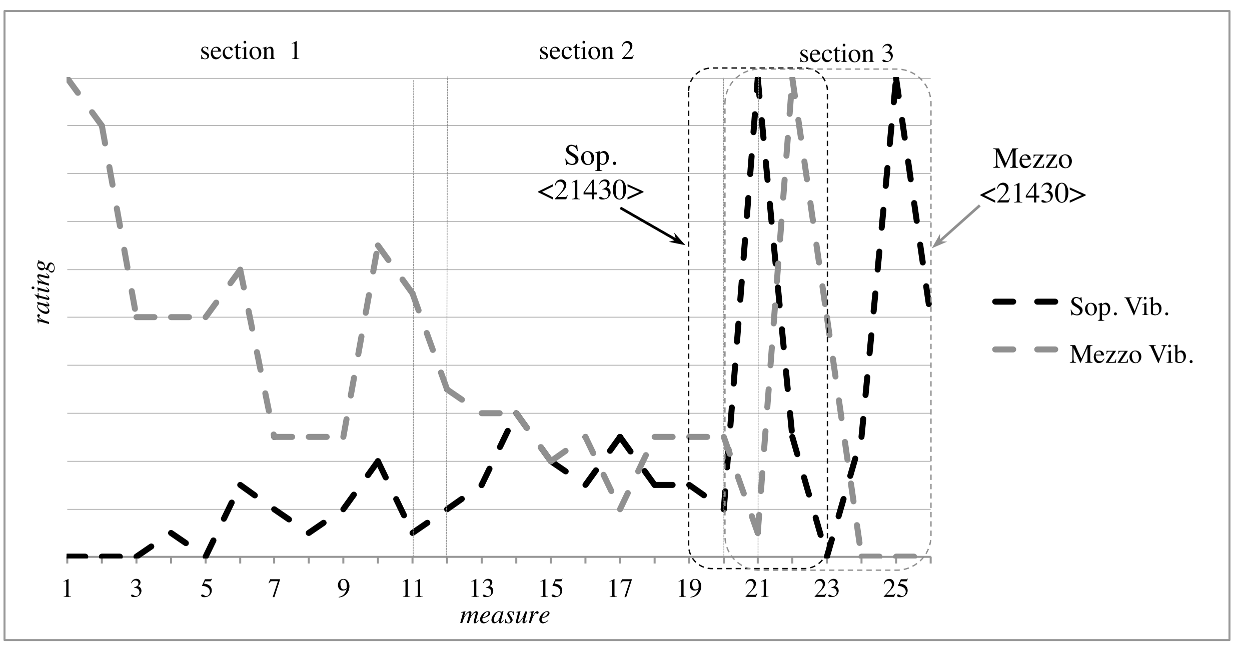

Figure 3-27: Cseg <21430> in individual voices along the dimension of vibrato in *From the Grammar of Dreams,* Movement I.

Looking at the score for this section, the soprano's progression along the vibrato dimension begins with a decrease in the portion of the measure in which she is singing, from m. 19 to m. 20. Then her level of vibrato increases dramatically in m. 21, as she sings a trill for the entire measure (see Figure 3-28). Then in m. 22, the sings a trill for one beat and speaks for the rest of the measure, resulting in a much lower level of vibrato for the overall measure. This level of vibrato in the soprano in m. 22 is still higher than that of mm. 19-20, when she sang without trills for partial measures.

The causes of the mezzo-soprano's progression along the vibrato dimension are very similar, only starting a measure later. In mm. 19-20, an overall relatively low level of vibrato is caused by normal singing interspersed with rests. In m. 21, her vibrato level decreases significantly as she sings for only a half of a beat, has an eighth note rest, and speaks for the remaining three beats. Suddenly, her vibrato level increases to a peak in m. 22, as she sings a trill for the entire measure. A two-beat trill in m. 23 is responsible for a moderate level of mezzo soprano vibrato in m. 23, followed by an absence of vibrato as the mezzo soprano is silent in m. 24.

Both voices' vibrato levels have followed a path of moderate decrease, enormous increase to a peak, moderate decrease, and then another decrease to zero. Saariaho off-sets the two voices' progressions so that they alternate in their amount of singing and trills, but the similarity in their paths along the dimension of vibrato is evident and illustrates the convergence of text expression in the soprano and mezzo soprano.

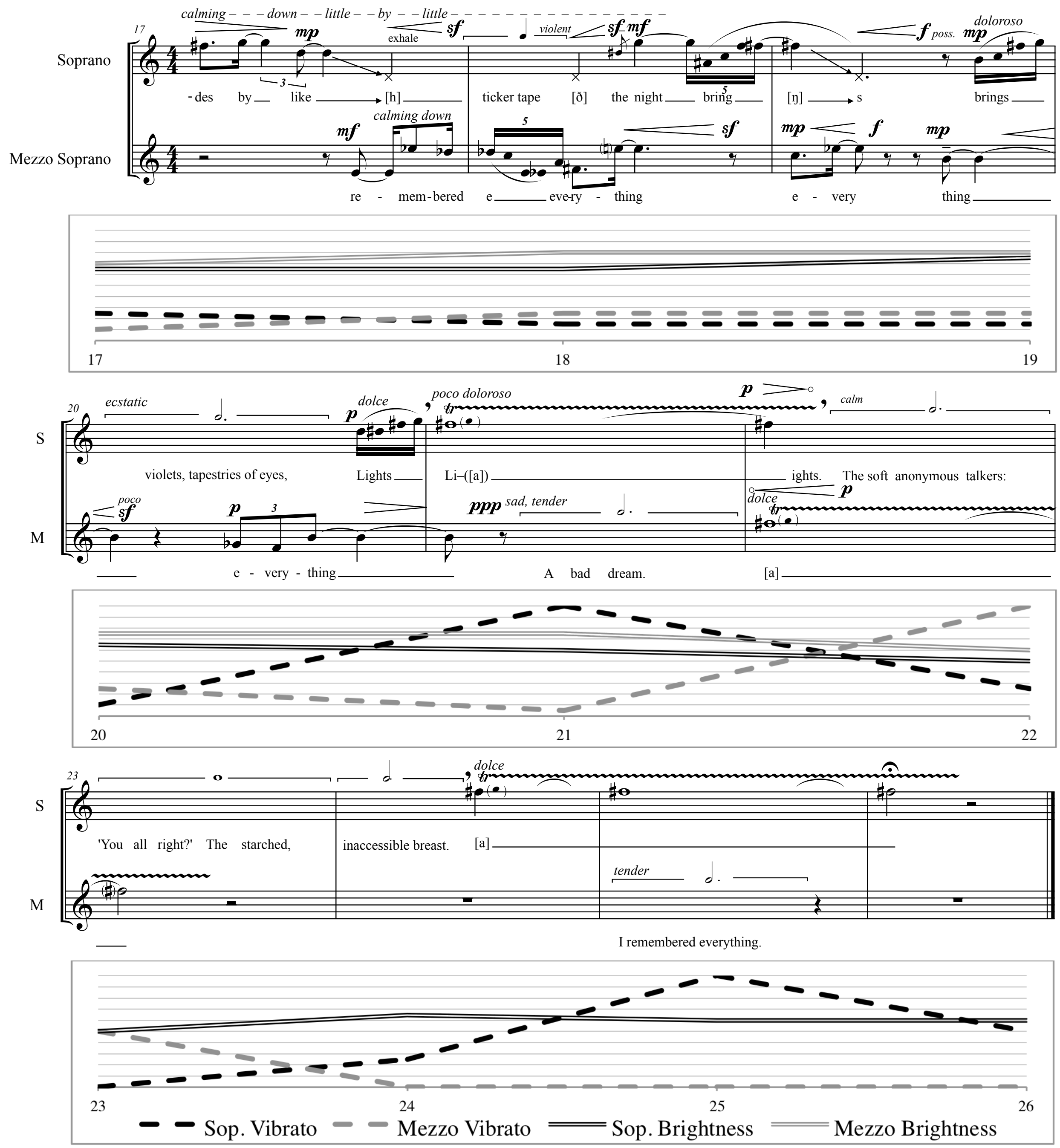

Figure 3-28: Excerpt from *From the Grammar of Dreams*, Movement I, with corresponding ratings for vibrato and brightness in each voice.

Saariaho's use of timbre in *From the Grammar of Dreams* is wide-ranging. She creates interest through tension and release, in both overlapping and synchronous fluctuations across timbral dimensions. She uses large-scale tension and release to shape the form of a movement;

and she creates elements of symmetry in the form through the manipulation of timbral dimensions into symmetrical progressions, both within and across the various timbral dimensions. Finally, Saariaho uses timbre as a means for text expression, and controls the changing timbres within individual voices in order to reinforce interactions between the two voices in their expression of the texts. In each of these areas—tension and release, form, and text expression—timbre is important, but it is only one of many musical elements. In the next chapter, I will explore how timbre interacts with the musical elements of harmony, rhythm, melodic contour and register.

Chapter 4: *From the Grammar of Dreams*: Timbre in Context

While timbral transformations are important in *From the Grammar of Dreams,* they are by no means the only musical dimensions that Saariaho makes use of. She still controls the more traditionally emphasized elements of harmony, melody and rhythm. Specifically, she thoughtfully transforms melodic contour, register, pitch range, harmonic rhythm and rhythmic density. How do changes in these non-timbral dimensions interact with the timbral changes? How do they relate to the tension and release, demarcation of form, and text expression contributed by the timbral transformations?

4.1 Non-Timbral Interactions with Timbral Tension and Release

In the fourth movement, timbre and melodic contour enhance each other's effects by operating in coordination with each other. On a small scale, tension and release in the timbral dimensions of noise and airiness often corresponds with pitch range expansion and contraction. The pitch range expansion and contraction usually overlaps with the timbral tension and release, occurring just after the timbral changes rather than simultaneously.

The relationship of the changes in noise, airiness and pitch range is more precisely observed by zooming in to a closer perspective than is necessary for the other analyses, since the changes in pitch range occur over a small timeframe. For this section of the fourth movement, I have created timbre ratings and indicated the pitch range for each half of a measure. (To create pitch range values for each measure, I assigned numerical values to each pitch based on the rubric $C_3 = 0$. The pitches C_3 through B_3 follow the standard assignment of pitch class numbers; C_4 through B_4 are represented by the numbers 12-23; and C_5 through B_5

are represented by the numbers 24-35. The pitch range is the difference between the numerical values for the highest and lowest pitches in each measure. The graph in Figure 4-1 shows the average pitch range for each measure.)

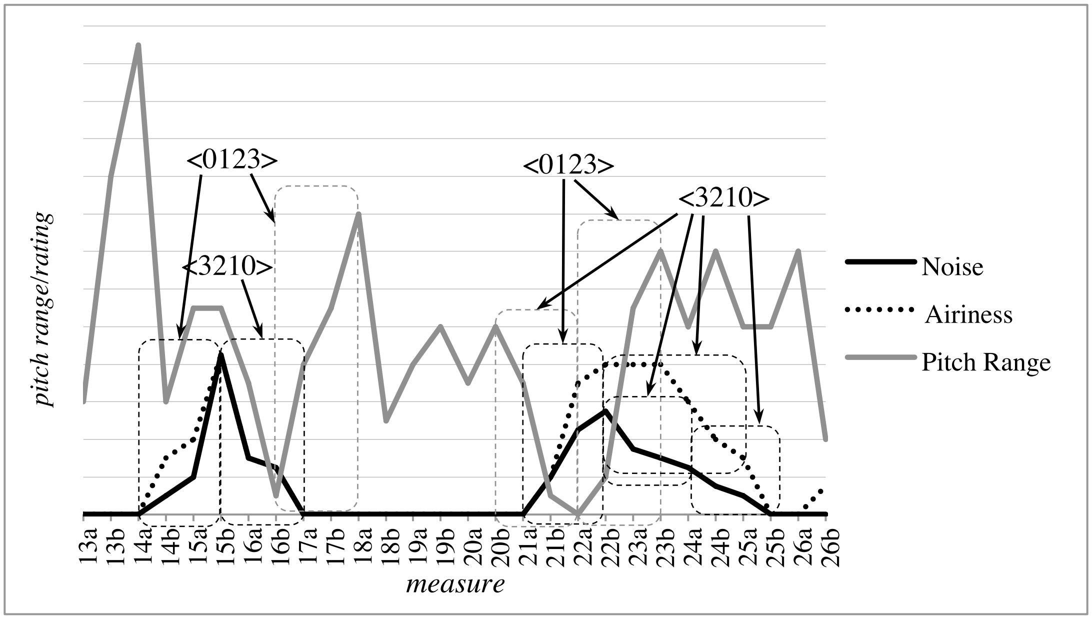

Figure 4-1: Csegclass 4-1 in average pitch range and ratings for noise and airiness, per each half measure, in *From the Grammar of Dreams,* Movement IV.

There are two surges in noise and airiness while pitches are being sung: mm. 14-16 and mm. 21-25. The first increase in noise and airiness in mm. 14-15 is closely followed by a modest expansion of the pitch range of the combined two voices. Then as the levels of noise and airiness subside in mm. 15-17, a larger pitch range expansion begins. This increase in pitch range occurs in mm. 16-18, overlapping with the decrease in noise and airiness. The increase in noise and airiness, and the subsequent larger increase in pitch range, both follow the cseg <0123>, of the csegclass c4-1 (see Figure 4-1; these <0123> csegs occur over the measures labeled 14a-15b and 16b-18a, since each measure is represented twice on the graph). The decrease in noise and airiness in mm. 15-17 also follows csegclass c4-1, as it takes the shape of <3210>, the retrograde/inversion of <0123> (displayed as mm. 15b-17a in Figure 4-1).

In the score, the pitch range expansion coincides with the phrase structure of the two voices (see Figure 4-2; the phrases indicated by dotted slurs are my addition). A new phrase begins in the second beat of m. 14 and extends through to the end of m. 16. Over the course of this phrase, the pitch range between the voices expands from i. 4 to i. 11, and then contracts slightly to i. 6. At the same time, the noise and airiness increases and then decreases. This occurs because the mezzo soprano exhales while singing, then briefly exhales while speaking first on a definite pitch and then on an indefinite pitch, and then finally returns to singing normally. The soprano follows her own progression, staggered a bit after the mezzo soprano. The soprano begins inhaling while singing a beat and a half after the mezzo soprano begins exhaling while singing, then briefly inhales while singing first on a definite pitch and then on an indefinite pitch, then inhales while singing, and finally gradually changes to speaking at the end of the phrase. The result of all these changes in vocal production is an increase and then decrease in tension due to noise and airiness, offset only slightly from the expansion and then contraction of the pitch range.

The larger pitch expansion that occurs in mm. 16-18 following the cseg <0123> is an echo of the surge in noise and air heard in mm. 14-15 that also followed cseg <0123>. Starting from a pitch range of i. 1 within the mezzo soprano only in the second half of m. 16, the pitch range expands to i. 7 and then i. 11 in m. 17, and finally to i. 16 in the first beat of m. 18. The direct increase of noise and airiness over four beats is echoed by the direct increase of pitch range over four beats.

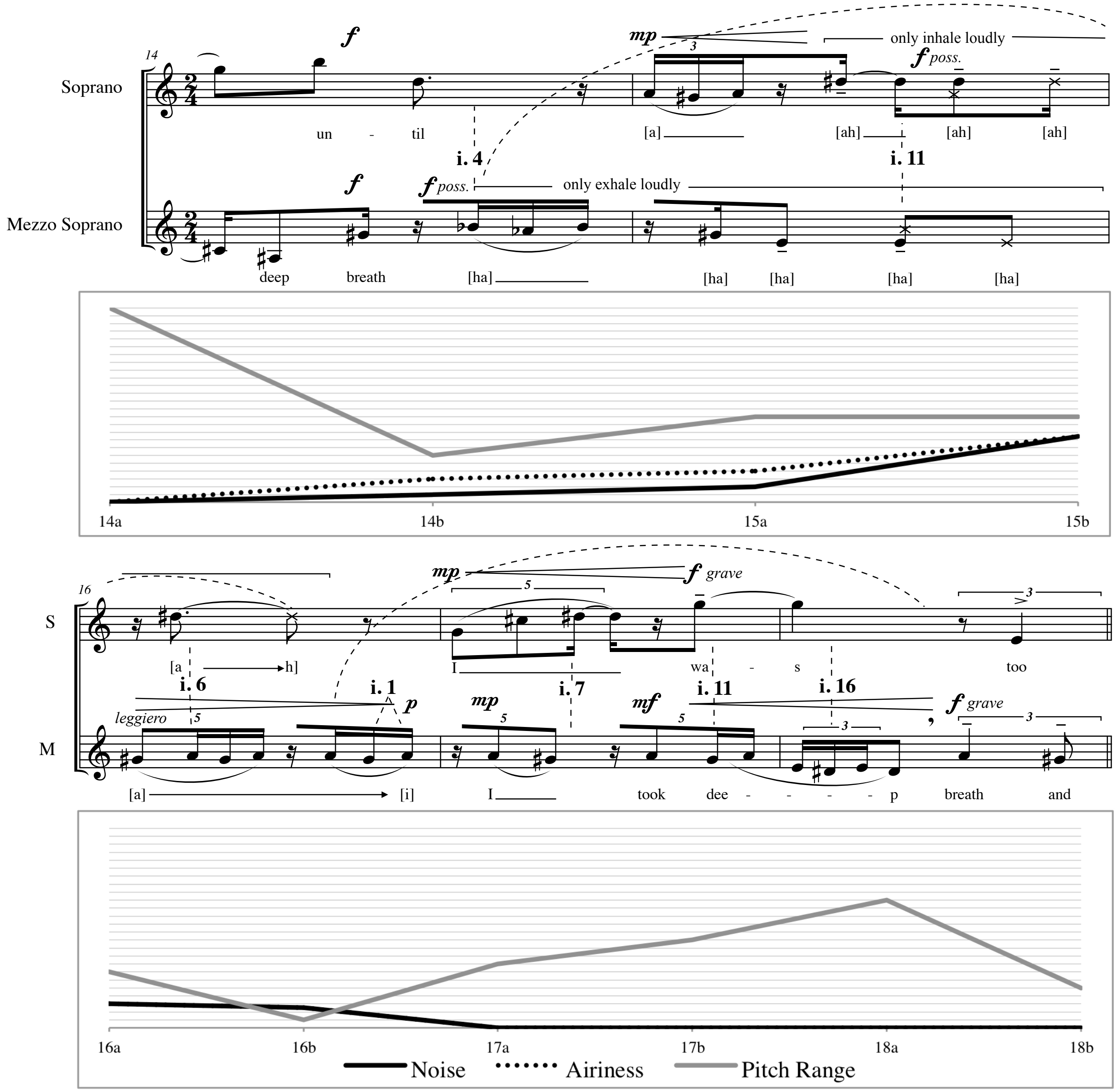

Figure 4-2: Excerpt from *From the Grammar of Dreams,* Movement IV, with average pitch range and ratings for noise and airiness per each half measure. Pitch range intervals and phrases (dotted slurs) are also indicated.

The second surge of noise and airiness also follows the cseg <0123> while increasing in mm. 21-22 (shown as mm. 21a-22b in Figures 4-1 and 4-3), and follows the retrograde/inverse cseg <3210> while decreasing in mm. 22-24 for noise (shown as mm. 22b-24a) and mm. 22-25 for airiness (shown as mm. 22b-25a). The dimension of noise also follows a second <3210> in mm. 24-25 (shown as mm. 24a-25b). Like in mm. 16-18, this surge in noise and airiness is followed by an increase in pitch range following the same <0123> contour, in mm. 22-24 (shown as mm. 22a-24a). This time, however, the pitch range expansion begins while the noise and airiness dimensions are still increasing. The pitch range expansion is also preceded by a pitch range contraction in mm. 20-22, in which the decrease in pitch range follows the retrograde/inverse of the increase to come, cseg <3210>.

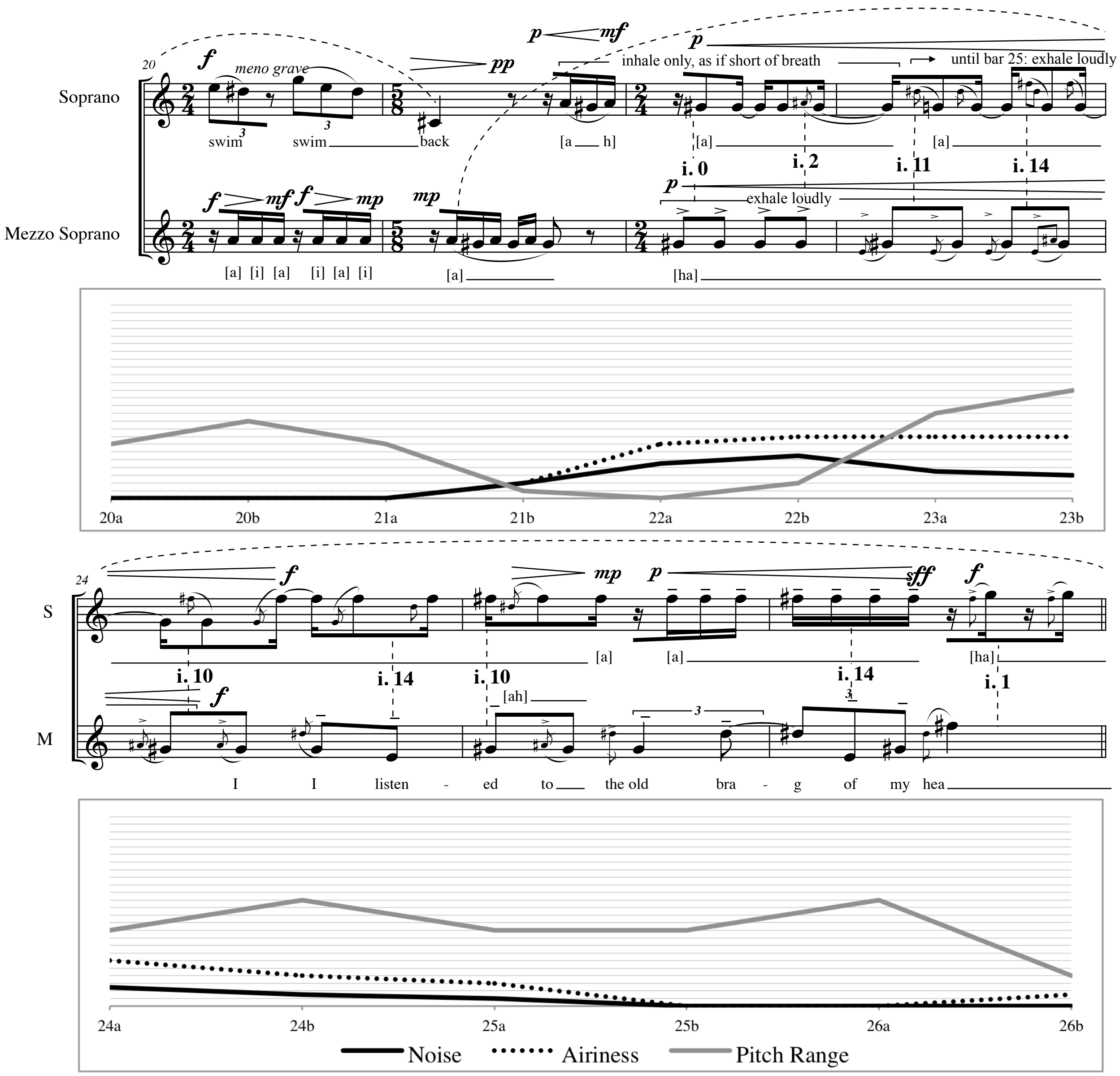

Figure 4-3: Excerpt from *From the Grammar of Dreams,* Movement IV, with average pitch range and ratings for noise and airiness per each half measure, and pitch range intervals.

The second surge in noise and airiness is also offset from the changes in the pitch range of the two voices. While a similar staggering of inhaling and exhaling while singing in the two voices produces an increase and then decrease in noise and airiness in mm. 21-25, the pitch range expands beginning in m. 22 and does not contract (see Figure 4-3). The pitch range expansion is close to coinciding with the phrase structure—this phrase begins in the last beat of m. 21, and extends through to m. 27. Over the course of the phrase, the noise and airiness increase as the voices stagger their entrances of inhaling and exhaling respectively while singing, and then decrease as the mezzo soprano returns to normal singing and the soprano continues exhaling while singing. The decrease in noise and airiness is complete when the soprano returns to normal singing in m. 25, with the precise location of the change indicated by the change in phoneme from "[ah]" to "[a]." (The shift from inhaling to exhaling while singing in the soprano in m. 23 also results in a decrease of noise.)

The pitch range expansion over the cseg <0123> takes place in m. 22-23 (shown as m. 22a-23b in Figures 4-1 and 4-3). The pitch range reaches its maximum expansion for the phrase when the decrease in noise and airiness is almost complete, and the pitch range stays relatively expanded for the rest of the phrase. The pitch range increases from i. 0 to i. 2 in m. 22, and then to i. 11 followed by i. 14 in m. 23. For the duration of the phrase, the pitch range remains relatively expanded as it alternates between i. 10 and i. 14 in mm. 24 to the beginning of m. 26; finally, it contracts to i. 1 towards the end of the phrase.

These offset changes of timbre and melodic contour have an interesting effect—the timbral tension and release captures the listener's attention, which is then sustained by the pitch range expansion. A series of crescendos in the soprano and a single crescendo in the mezzo soprano in mm. 22-24 further works with the increase in noise, airiness and pitch range to build up energy. Both voices are marked *piano* in m. 22, and crescendo to *forte* in m. 24, coinciding with the increase in pitch range in mm. 22-23.   One can see here how Saariaho's focus on maintaining a sense of continuity drives her choices about the coordinated changes in timbre and melodic contour, and to a lesser extent, dynamics.

One can even argue that the pitch range expansions and contractions create their own sense of tension and release, which extend the instances of timbral tension and release preceding them. A study by Carol Krumhansl in the perception of musical tension did indicate that listeners' perceptions of tension often correlate with pitch height, especially on the local level.[151] In addition, the same study found that perceptions of tension also correlate with a louder dynamic, though the influence of dynamics on tension perception appears to be secondary to that of pitch and duration.[152] Krumhansl's research corroborates Leonard Meyer's theoretical ideas about ascending melodic lines and increasing volume corresponding to rising tension, and descending melodic lines and decreasing volume corresponding to relaxation.[153]

The pitch range expansions and contractions in the fourth movement do involve ascent and descent in the pitch of the soprano part, though of course the opposite occurs in the mezzo

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151. Carol L. Krumhansl, "A Perceptual Analysis of Mozart's Piano Sonata K. 282: Segmentation, Tension, and Musical Ideas," *Music Perception: An Interdisciplinary Journal* 13/3 (Spring, 1996): 413-414, 429, http://www.jstor.org/stable/40286177.

152. Ibid, 428. Perception of musical tension has also been studied by Frede V Nielsen (*Oplevelse af musikalsk spænding [The Experience of Musical Tension]* [Copenhagen: Akademisk Forlag, 1983], cited in Clifford Madson and William E. Fredrickson, "The Experience of Musical Tension: A Replication of Nielsen's Research Using the Continuous Response Digital Interface," *Journal of Music Therapy*, 30/1 [1993]), and Madson and Fredrickson (Ibid.,) who replicate Nielson's study with a modification of how tension is measured by listeners. Madson and Fredrickson discuss the implications for musical analysis in general terms, citing a correspondence of tension levels with the general dynamic structure and "some aspects of the melody" (59).

153. Leonard B. Meyer, *Style and Music: Theory, History, and Ideology* (Philadelphia: University of Pennsylvania Press, 1989), 209; and Leonard B. Meyer, *Emotion and Meaning in Music* (Chicago: University of Chicago Press, 1956), 139.

soprano part. While the effect of pitch range between voices on tension perception has yet to be explored experimentally, it is plausible that it would have the same effect as that of pitch height—an increase in pitch range may be associated with an increase in perceived tension. Austin Patty suggests that the "wedge effect" of simultaneous ascending and descending melodic lines, in combination with changes in other parameters that produce intensification or increase in tension, does not detract from the intensification effect of the ascending melodic line. Rather, he asserts that in these situations "the melodic descent participates in the intensification."[154] If that is the case, then these two examples from the fourth movement would show timbral tension and release extended by tension and release due to a combination of pitch range expansion and contraction, and increase in dynamic levels.

In the second movement, large-scale release of tension due to decreasing noise is countered by an increase in harmonic rhythm. As discussed in the previous chapter, the amount of noise follows a trendline from high to low over the course of the second movement. An opposite transformation, or inverse relationship of the trendline, occurs in harmonic rhythm over the course of the movement. The harmonic rhythm begins slowly, and becomes progressively faster, seen graphically as low to high in Figure 4-4. (To obtain a measure of harmonic rhythm, I started with the duration of each harmony in the movement. Then I took the average harmonic duration for each measure. Finally, I obtained the inverse of the average harmonic duration for each measure, which essentially shows the speed of harmonic change—this is what is shown on the graph as harmonic rhythm.)

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154. Austin T. Patty, "Pacing Scenarios: How Harmonic Rhythm and Melodic Pacing Influence Our Experience of Musical Climax," *Music Theory Spectrum*, 31/2 (Fall 2009), 331, http://www.jstor.org/stable/10.1525/mts.2009.31.2.325.

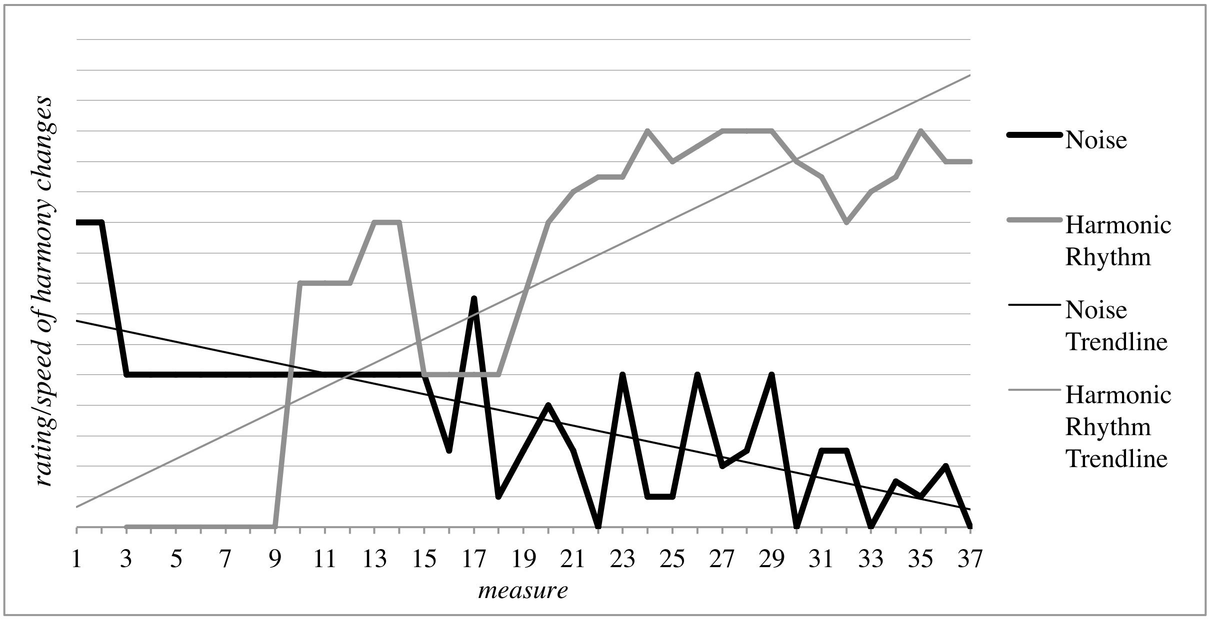

Figure 4-4: Noise and Harmonic Rhythm, with trendlines, in *From the Grammar of Dreams,* Movement II. Harmonic rhythm is shown as the inverse of the average duration.

In the music, one can hear a contrast between a high level of noise and a low speed of harmonic rhythm in the beginning of the second movement, and a low level of noise and a high speed of harmonic rhythm at the end of the movement. For example, in mm. 3-6, *forte possibile* speaking in one of the voices creates a great amount of noise. (I start with the third measure because there are no pitches sung in the first two measures.) At the same time, only a single harmony is heard in those four measures (see Figure 4-5). The opposite is heard in the last three measures of the movement, mm. 33-36. Here there is only a little noise, heard as one spoken syllable in the mezzo soprano in m. 34, and one semi-spoken syllable and two spoken syllables in the soprano in m. 35. Compared with the constant speaking of the beginning, the noise level is quite low.

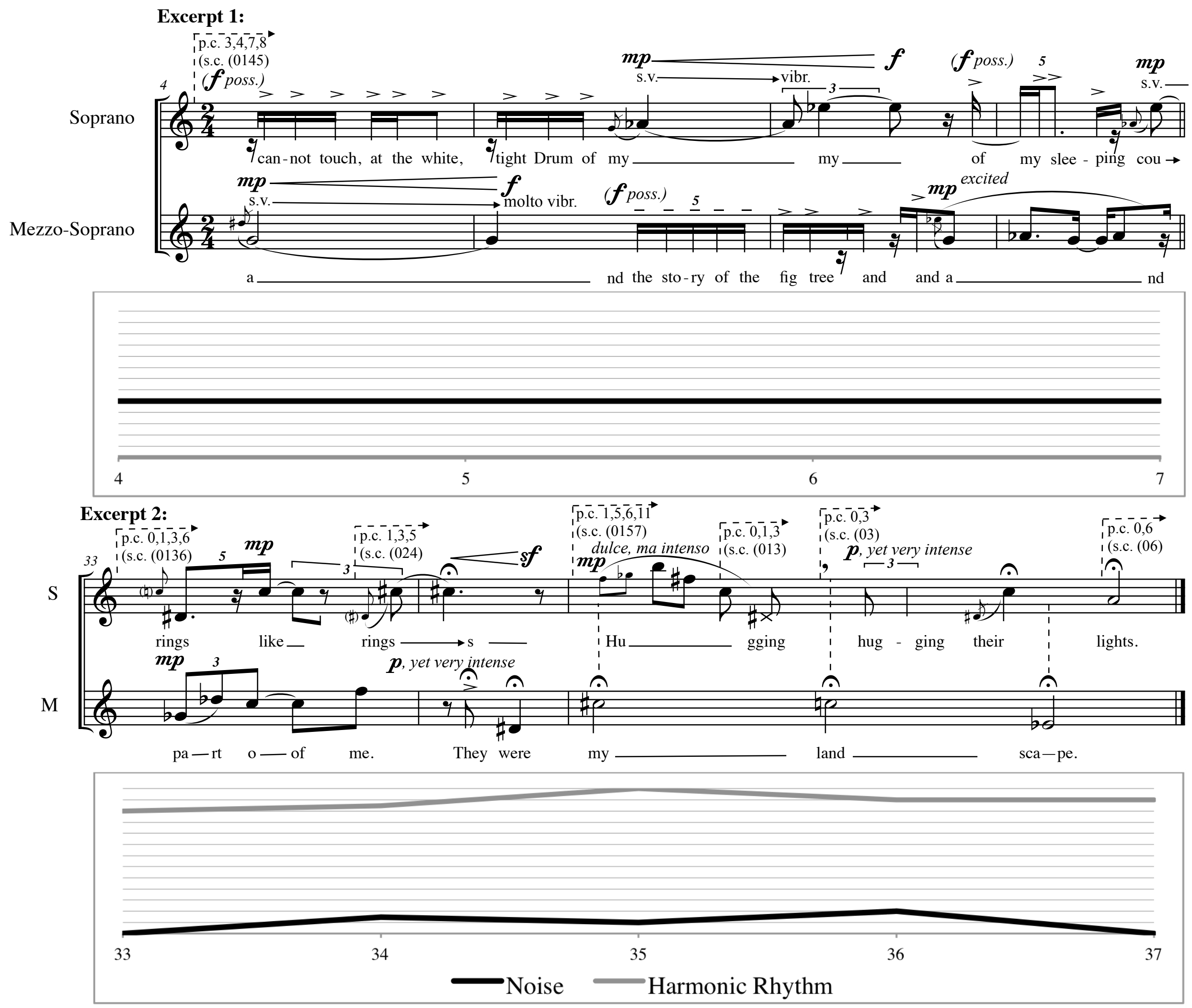

Figure 4-5: Excerpts from *From the Grammar of Dreams,* Movement II, with indications of harmonic rhythm and ratings for noise.

I hear six distinct harmonies in these three measures. Even if one thinks of the last long measure as three measures, since mm. 36 contains six beats without a change from the 2/4 time signature (accordingly, it is shown as three measures on the graphs in Figure 4-10 and 4-4), this is still a markedly faster harmonic rhythm than the opening. There is a clear progression from a slow harmonic rhythm to a faster harmonic rhythm, which is in an inverse relationship to the progression from a high level of noise to a lower level of noise.

How does this increase in harmonic rhythm relate to tension and release? A speeding up of harmonic rhythm is often associated with the building of tension. As Joseph Swain explains in reference to harmonic motion, "Motion creates musical tension, and the faster the motion (the more changes per unit of time) the greater the tension."[155] Austin Patty challenges the notion that faster harmonic rhythm always results in tension, focusing on the importance of the musical context and the contributions of other, often conflicting, parameters.[156] Patty attempts to show that an accelerating harmonic rhythm can contribute to either an increase or decrease in tension, however, his analyses always involve conflicting contributions from parameters such as melodic contour, dynamics, and durational rhythm. While I am not persuaded by his argument that an acceleration of harmonic rhythm can contribute to a decrease in tension (or intensity, which he uses as a synonym for tension), and vice versa, he does show that faster harmonic rhythm does not always cause increasing tension. In these cases, I interpret his analyses as showing that an overall decrease in tension is felt *in spite of* an increase in the speed of the harmonic rhythm. On its own, increasing the speed of harmonic rhythm increases the amount of tension. In context, the influence of harmonic rhythm may be overridden by more salient changes in other musical parameters.[157]

In the second movement of *From the Grammar of Dreams,* the amount of noise is a more salient influence on the amount of overall tension than the harmonic rhythm. The

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155. Joseph P. Swain, *Harmonic Rhythm* (Oxford: Oxford University Press, 2002), 98. Leonard Meyer also attributes faster rates of motion to increased tension, in *Style and Music*, 209.

156. Austin T. Patty, "Pacing Scenarios."

157. This idea that some parameters are more salient than others is found elsewhere in Patty's theory. He views harmonic rhythm as one of two factors that contribute to the overall pacing, the other of which is melodic rhythm. When harmonic rhythm and melodic rhythm are in conflict, he says, "One pace change may trump the other, which seems more common." (Patty, "Pacing Scenarios," 346.)

acceleration of harmonic rhythm does not cancel out the decrease in tension due to the decrease in noise over the course of the movement. Rather, it contributes a contrasting transformation that adds complexity and interest. In the final three measures (see Figure 4-5), the parameter of durational rhythm also comes into play. The longer durations of the half notes extended by fermatas in the mezzo soprano part reinforce the sense of relaxation created by the overall decrease in the amount of noise.

4.2 Delineation of Form Through Timbral and Non-Timbral Changes

In the fifth movement, a number of different elements converge to create a clear division of the movement into two discrete sections. As discussed in the previous chapter, there is a sudden decrease in the timbral dimension of vibrato in the second section, which begins in m. 11. This change is matched by transformations of the melodic contour and rhythm from one section to the other. The melodic lines use more stepwise motion and the note durations become longer as the frequent grace notes and large leaps that characterize the first section largely disappear. In order to illustrate these melodic and rhythmic changes, I have counted the number of leaps greater or equal to a minor third in each measure, which I call melodic disjunction; and the number of notes in each measure, which I call rhythmic density.[158] The decrease in melodic disjunction and rhythmic density, along with the decrease in the level of vibrato, creates a strong sense of a two-part, AB form in this movement (see Figure 4-6).

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158. I define the number of leaps per measure as including leaps from a note in the previous measure, and excluding leaps separated by a rest or breath mark. In determining the rhythmic density of a measure, I counted all new notes (not including notes tied over from the previous measure), counting each trill as a single note, and counting a specified endpoint of a glissando as a distinct note.

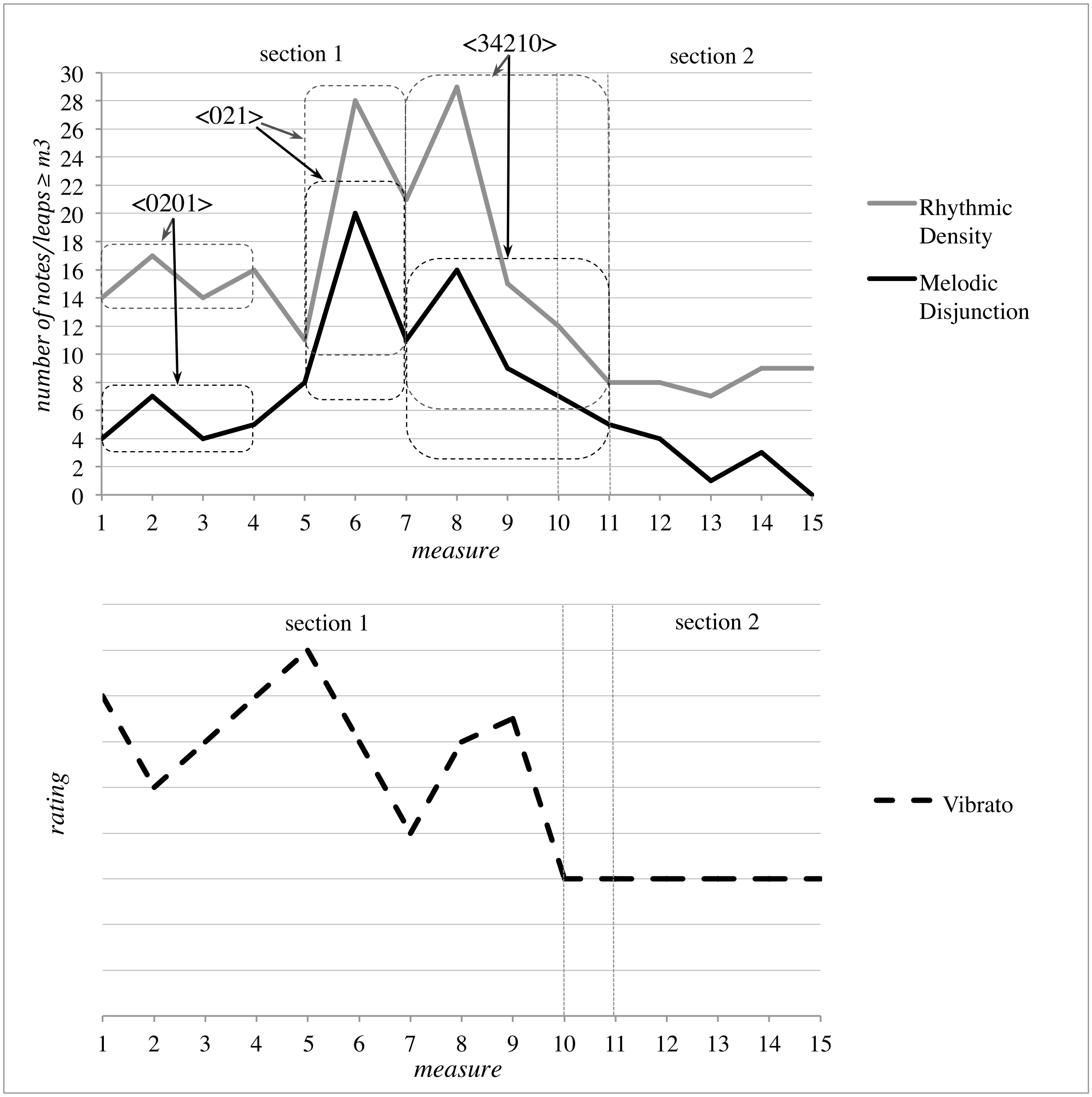

Figure 4-6: Rhythmic density (number of notes per measure) and melodic disjunction (number of leaps greater than or equal to a minor third per measure) compared with ratings for vibrato in *From the Grammar of Dreams,* Movement V.

The first section, through m. 10, has a melodic contour with frequent leaps and changes in direction, most of which occur in conjunction with the use of grace notes[159] (see Figure 4-7).

159. These grace notes and melodic leaps contribute to what Saariaho has described as a depiction of bird song. (Komsi, "*From the Grammar of Dreams:* Kaija Saariahon sävellys Sylvia Plathin tekstiin," 21; cited in Oskala, "Dreams about Music, Music about Dreams," 57.)

The rhythmic density is relatively high, with numerous grace notes squeezed in-between eighth notes, triplets, and the occasional longer or shorter durations. (There is no indication of tempo; rather Saariaho indicates that each measure should last approximately five seconds, implying some freedom for the performer to stretch beats when necessary to fit in all of the notes.) The melodic contours of this first section are also characterized by a tendency to center on a specific pitch (this pitch varies), around which the voices leap.

Figure 4-7: Excerpt from *From the Grammar of Dreams*, Movement V, with rhythmic density (number of notes per measure), melodic disjunction (number of leaps greater than or equal to a minor third per measure) and ratings for vibrato.

The melodic contours change dramatically in m.11, where the second section begins. The grace notes disappear, as do the leaps and direction changes with which they were associated. The durations of the non-trilled notes also become slightly longer, and without the numerous grace notes there is a significant slowing down of the rhythm. There is still an element of centricity in the contours around specific pitches, though in most of the phrases it is to a lesser extent than in the first section.

The relationship between rhythmic density and melodic disjunction also changes from the first section to the second section of the fifth movement. For almost the entire first section, the two elements share the same contour segments. In mm. 1-4, both rhythmic density and melodic disjunction follow the cseg <0201> (see Figure 4-6). Then in mm. 5-7, both elements follow the cseg <021>. Finally, in mm. 7-11 (going into the first measure of section 2), the two elements both follow the cseg <34210>. While the entire contours for rhythmic density and melodic disjunction are not identical throughout the first section, they are clearly closely related. Areas where the rhythm is faster generally correlate to areas where the melody follows larger leaps. In the second section, that relationship no longer holds. There is no direct similarity between the contours of rhythmic density and melodic disjunction in the second section, further demarcating a difference between the two sections in this movement.[160]

160. While a greater number of notes can create a false indication of melodic disjunction just by increasing the number of horizontal intervals between notes, the fact that rhythmic density and melodic disjunction do not correlate in the second section shows that it is the size of the leaps, not just the number, that changes from the first section to the second section.

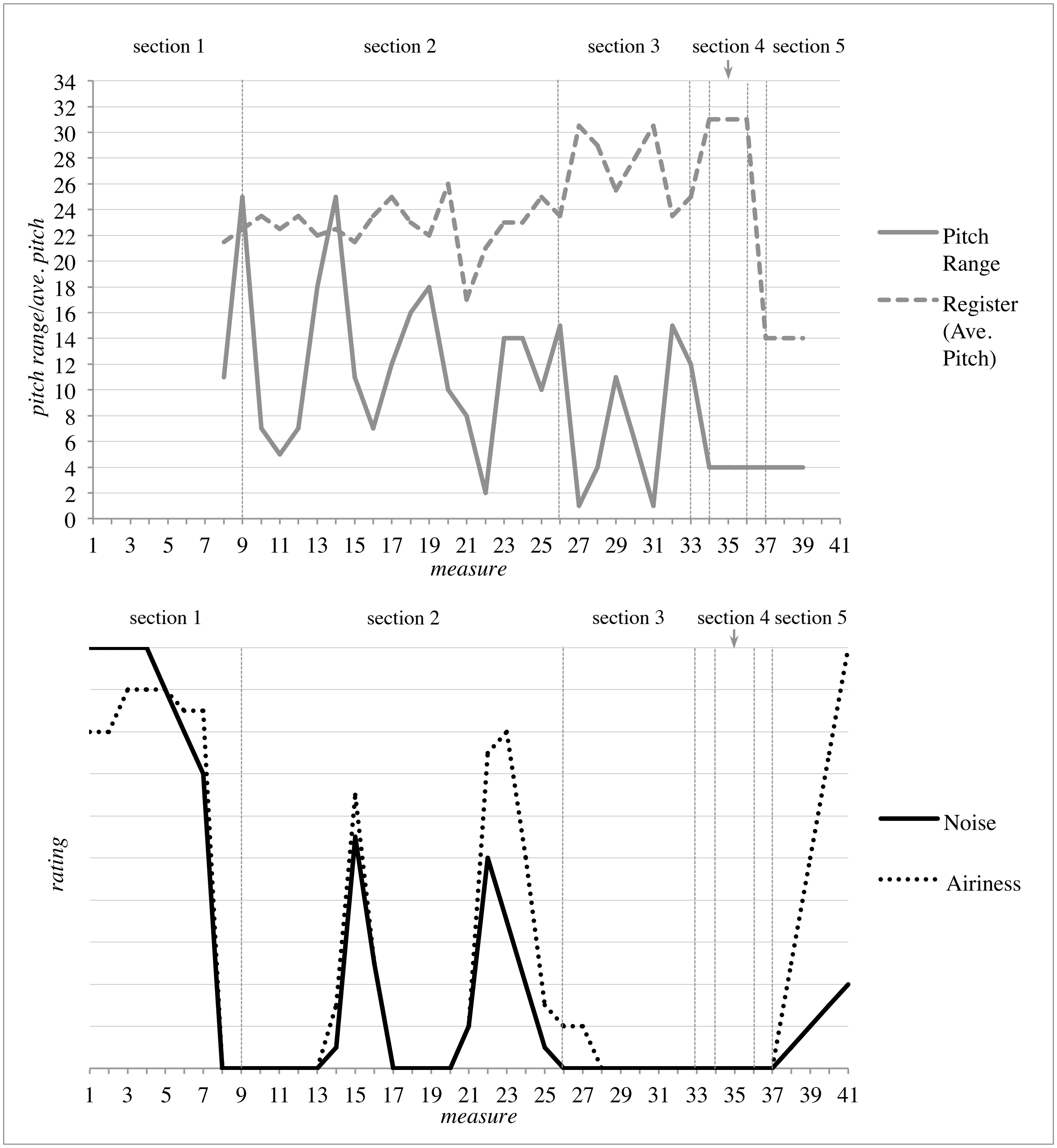

Figure 4-8: Pitch range and register, compared with ratings for noise and airiness, in *From the Grammar of Dreams,* Movement IV.

The fourth movement also exhibits synchronicities between different musical elements as they relate to the form of the movement. In the last chapter, I discussed the symmetry between the dimension of noise in the beginning, and the dimension of airiness at the end. I hear the fourth movement in five distinct sections—the elevated level of noise (and airiness) in the beginning occurs in the first section, and the corresponding elevated level of airiness (and to a lesser extent noise) occurs in the fifth section. In addition, surges of noise and airiness occur in the second section (see Figure 4-8). In addition to these timbral changes, Saariaho creates changes in register, pitch range, harmony, and pitch classes that align with the timbral indications of form while also marking one further division within the movement.

The division between the second and third sections coincides with changes in timbre, register, and harmony. The second section, mm. 9-26, includes two surges of noise and airiness. Beginning in m. 26, the noise disappears while the level of airiness comes down dramatically, preparing to disappear two measures later. Also in m. 26, the register shifts upwards (see graphs in Figure 4-8). At the same time, the harmony changes from p.c. 3,4,6,8 (s.c. (0135)) to p.c. 6,7 (s.c. (01); see an excerpt from the score in Figure 4-9) [161].

A change in register, pitch range, and harmony indicates the beginning of the brief fourth section at m. 34 (see Figure 4-10). Here the voices move to a higher register, and the pitch range decreases. At the same time, the harmony changes from p.c. 1,3,6,7 (s.c. (0146)) to p.c. 5,6,9 (s.c. (014)). This harmonic change marks a shift from harmonies that made frequent use of the subset (016) to the exclusive use of s.c. (014). This is the one point in this movement where I hear a distinct section change indicated through changes in harmony and register without an accompanying change in timbre.

161. As in Chapter 3, the repetitions of m. 37, in which the singers gradually change from singing to whispering, are represented graphically as extra measures; this extends the movement from 38 to 41 measures.

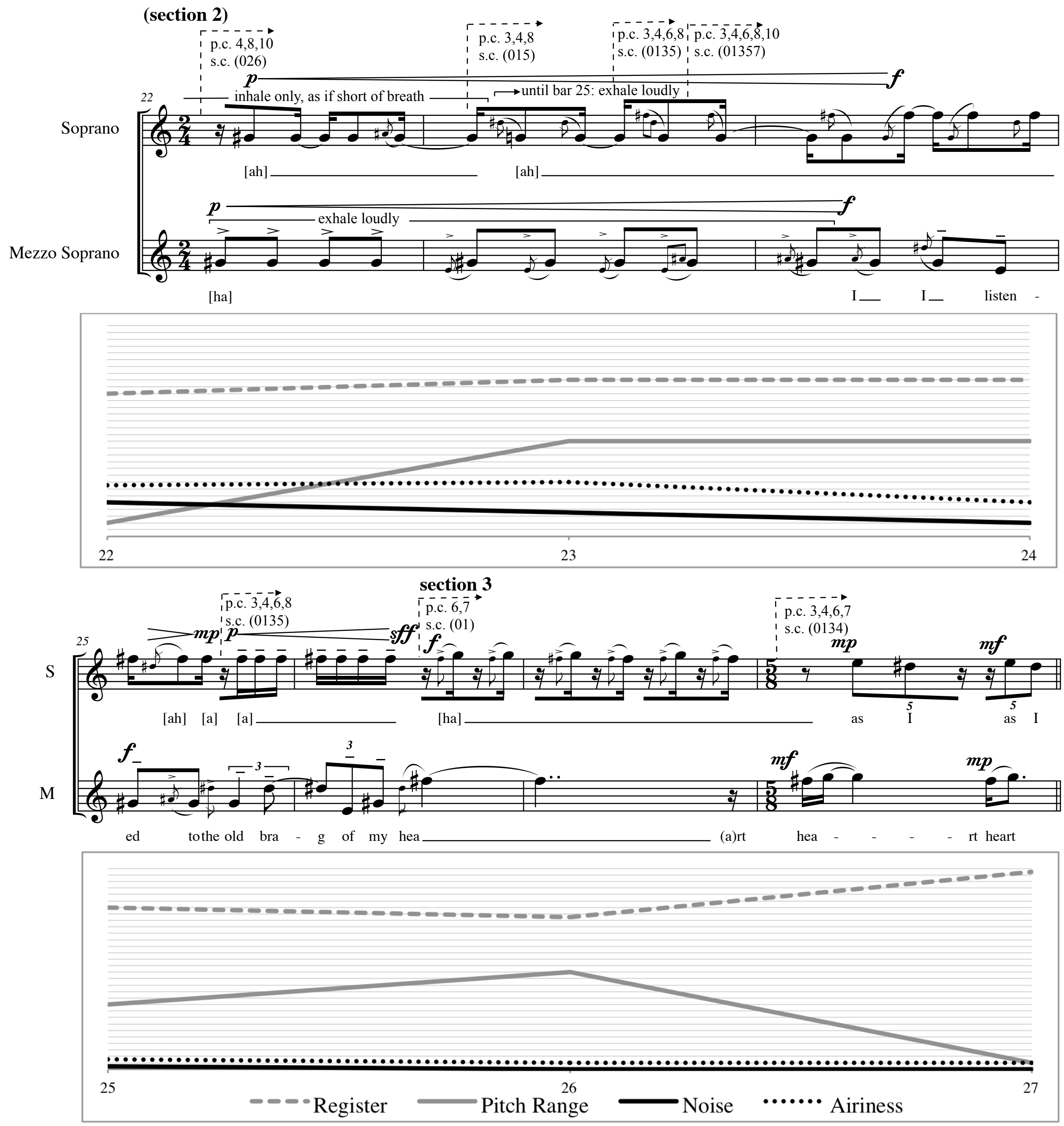

Figure 4-9: Excerpt from *From the Grammar of Dreams,* Movement IV, with indications of register and pitch range and ratings for noise and airiness.

Figure 4-10: Excerpt from *From the Grammar of Dreams*, Movement IV, with indications of register and pitch range and ratings for noise and airiness.

The beginning of the fifth and final section (at m. 37) is marked by changes in timbre, register, and pitch classes (see Figure 4-10). Here the register suddenly shifts much lower, while an increase in noise and airiness ensues. The harmony remains on s.c. (014), although the change from p.c. 5,6,9 to p.c. 0,3,4 is significant in the context of the movement's relatively slow rate of pitch class changes. An average of only 1.2 new pitch classes are heard in each measure,[162] reflecting the tendency for the same pitch class and often the same pitch to be heard in consecutive measures. Throughout the fourth movement, changes in register, pitch range, harmony and pitch classes interact with changes in noise and airiness to demarcate the movement's form.

4.3 Timbral and Non-Timbral Text Expression and Dialogue

In the first movement, changes in timbre and text treatment that create a progressively more similar relationship between the two voices are assisted by changes in melodic contour and register. As discussed in the previous chapter, the soprano begins in a leading role and the mezzo soprano begins in a supporting role, with the soprano singing text while the mezzo soprano sings only vowels. As the movement progresses, the mezzo soprano assumes greater importance and shares the role of text expression as the two parts become increasingly similar. The levels of vibrato progress from being high in the mezzo soprano and low in the soprano in the first section, to relatively low in both voices in the second section, and finally to alternating between extremely high and low as the two voices take turns singing the same trill in the third section. The levels of brightness progress from opposite overall contours in the first section, to similar overall contours in the second and third section.

162. This average number of new pitch classes counts the changes from one measure to the next, not cumulatively, starting after pitches are first heard in m. 8.

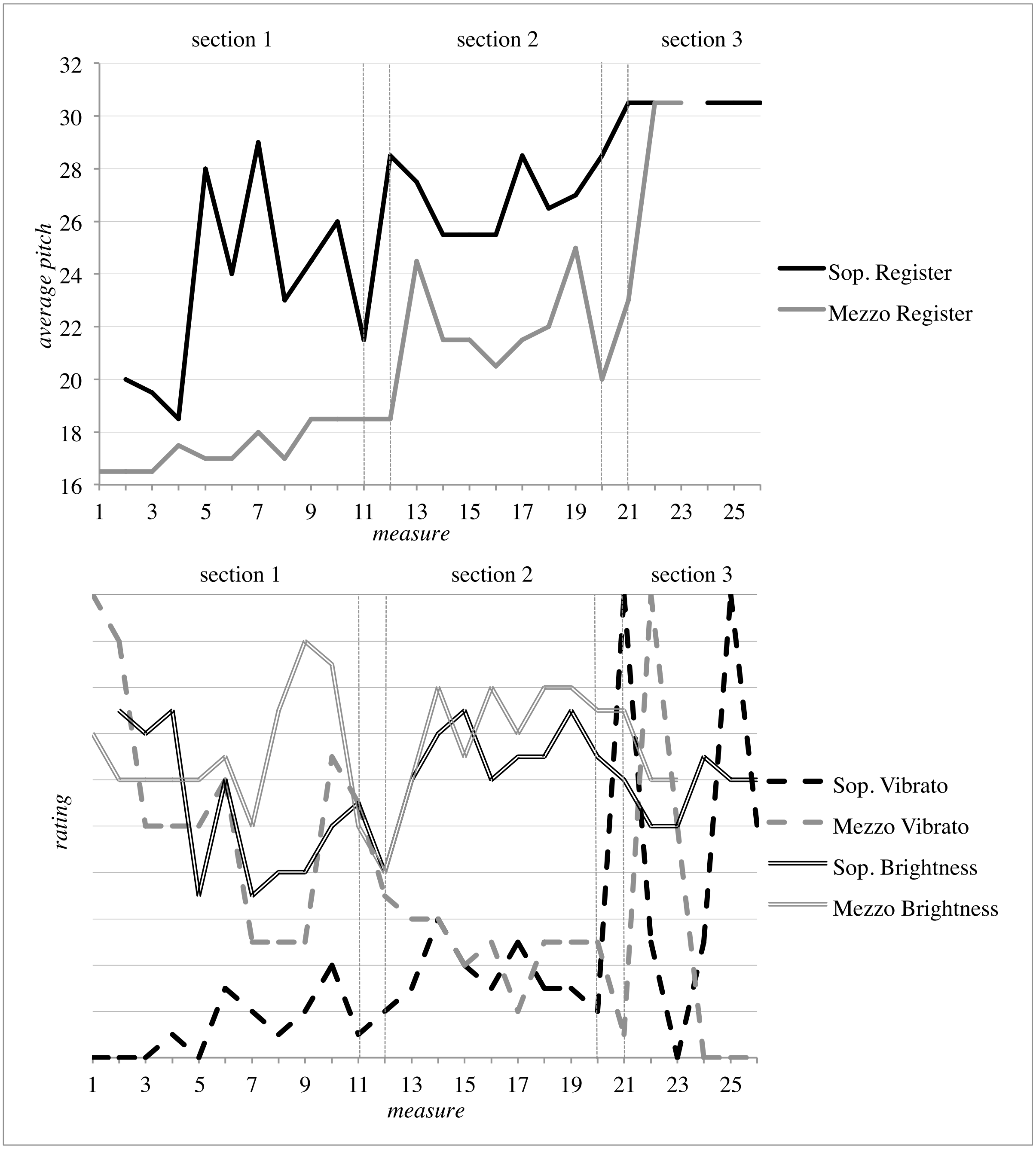

Figure 4-11: Register (average of the highest and lowest pitches for each measure) within each voice (top), compared with ratings for the dimensions of vibrato and brightness, within each voice (bottom); in *From the Grammar of Dreams,* Movement 1.

These changes in timbre occur alongside changes in register, as seen in Figure 4-11.[163]

163. I determined register measurements by averaging the highest and lowest pitches in each measure, using the same pitch-numbering rubric as in the pitch range measurement described previously.

The soprano sings in a higher register than the mezzo soprano in the first section, allowing the soprano part to stand out. In the second section, the soprano is still in a higher register, but now there is a lot of overlap between the registers of the two voices. By the third section, the timbral similarities are matched by a shared register, specifically shared pitches, in the two voices.

Changes in melodic contour also parallel the changes in timbre and register. As the mezzo soprano's trills of the first section disappear in the second section, and the registers of the two voices start to come together, both of the voices' lines become more melodic. For the soprano, this means the short interjections of sung notes in-between rhythmic speaking become longer sung phrases. The melodic contours of the soprano part change from mostly short <01> phrases in section 1 to longer and more varied contours in section 2, and then are limited to trills in section 3 (see Figure 4-12).

	measure(s)	sop. contour(s)	sop. prime(s)
section 1	3-6	<01>	<01>
	10	<01>, <120>	<01>, <120>
section 2	12	<01>	<01>
	13	<1230>	<120>
	14	<01>	<01>
	15	<2451230>	<120>
	16-17	<4512124530>	<120>
	18-19	<3612450>	<120>
	19	<0123>	<01>
	20	<0123>	<01>
section 3	21-26	trills	

Figure 4-12: Melodic contours and melodic contour reductions in the soprano part of *From the Grammar of Dreams,* Movement 1.

Figure 4-13: Excerpts from *From the Grammar of Dreams,* Movement I, with ratings for vibrato and brightness and indications of register (average pitch).

In the score, these changes in register and melodic contour are seen from the first to the second section, and from the second to the third section (see Figure 4-13). In an excerpt from section 1 (Figure 4-13, Excerpt 1), one can see the relatively low register of both voices and the limitation of the soprano to brief ascending <01> melodic contours. In an excerpt from section 2 (Figure 4-13, Excerpt 2), both voices (especially the mezzo soprano) sing in a higher register. The soprano has progressed from short interjections to singing wide-ranging ascending and descending phrases. The mezzo soprano's melodic contours have also changed from the first section to the second section—whereas in the first section she circled around the E4 and F4 pitches of the opening trill, in the second section the mezzo soprano's melodic contours are both more varied and more similar to those of the soprano. By the third section (see Figure 4-13, Excerpt 3), both voices' melodic contours are identically limited to a high-register single trill. Saariaho manipulates register, melodic contour, and vibrato to unify the texts of the two voices into one, the metaphorical experiences of the older Plath and the real experiences of the younger Plath merged into a single expression of memories that cannot be forgotten.

4.4 Overall Design and Planning

For Saariaho, decisions about the progression of individual musical elements are often made as part of her pre-compositional planning. Saariaho illustrated such plans graphically for *Verblendungen,* her 1984 work for orchestra and tape, in an essay from 1987 (see Figure 4-14).[164] While the elements at play here are mostly different from those elements manipulated in

164. Saariaho, "Timbre and Harmony," 107.

From the Grammar of Dreams, these images still show how Saariaho considers each element individually with an eye towards what is happening in the other elements.

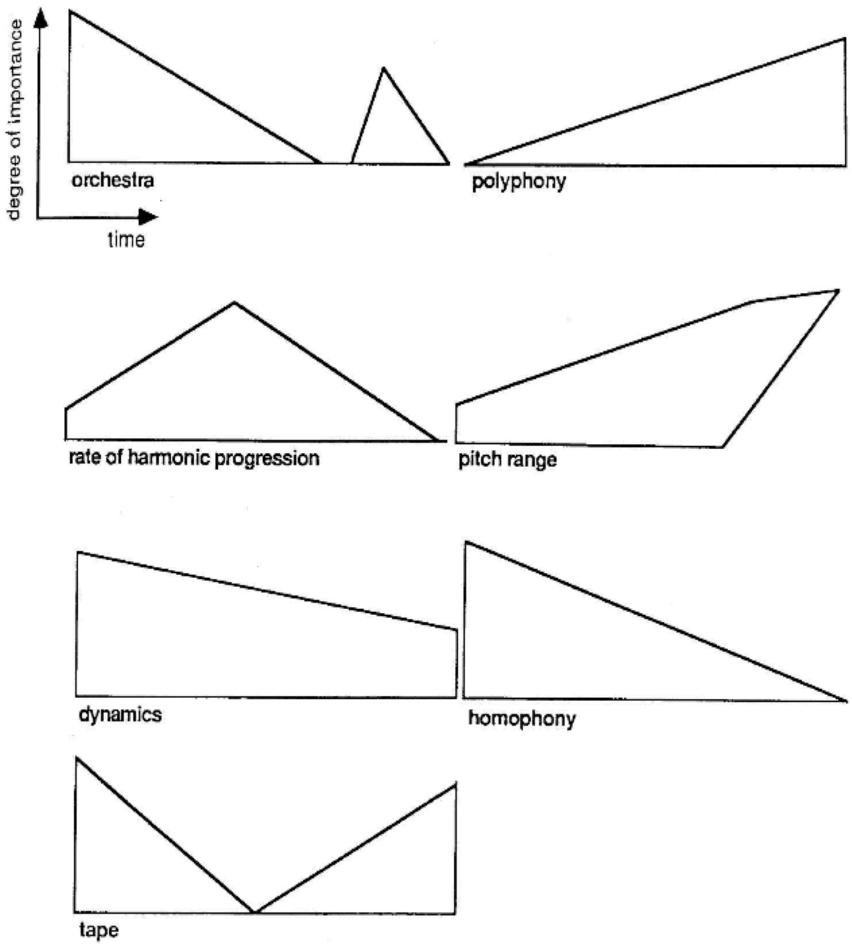

Figure 4-14: Plans for the evolution of different musical elements in *Verblendungen.*
Reprinted from Saariaho, "Timbre and harmony: interpolations of timbral structures," 107.

Even though Saariaho's compositional style has changed over time, she has maintained her process of planning the form of the work before beginning to compose the music to the present day. She explained in an interview that she makes decisions about elements such as register, timbre, amplitude, tempi, durations of sections, and the importance of certain instruments in advance. At the same time, she says that her manipulation of elements such as the use of noise vs. pure sound has become more intuitive.[165] Whether or not Saariaho explicitly plans the transformation of a certain timbre or other musical element seems to be determined by whether or not she sees the transformation as contributing to the large-scale form of the work. Of course, Saariaho composed *From the Grammar of Dreams* only four years after *Verblendungen,* so it is likely that her process still involved the explicitly planned manipulations of both timbral and non-timbral parameters that she used in creating the earlier work.

In *From the Grammar of Dreams,* the interaction of both timbral dimensions and other musical elements is often more complex than in *Verblendungen* of a few years earlier. Nevertheless, it is still helpful to look at a graphic overview of *From the Grammar of Dreams* in the style of Saariaho's sketches for *Verblendungen* (see Figure 4-15). Some similarities are apparent between the progressions of timbral and non-timbral parameters within movements. In the first movement, vibrato and register follow the same trajectory. In the fifth movement, rhythmic density and melodic disjunction follow a similar shape as vibrato for the second half of the movement. One noticeable contrast between timbral and non-timbral parameters is that of noise and harmonic rhythm in the second movement, as discussed in this chapter. A similarity is seen between the timbral dimensions of airiness and noise in the fourth movement, and the non-timbral parameters of harmonic rhythm and rhythmic density both follow generally increasing trajectories throughout much of the third movement.

165. Saariaho, interview with the author, March 7, 2012.

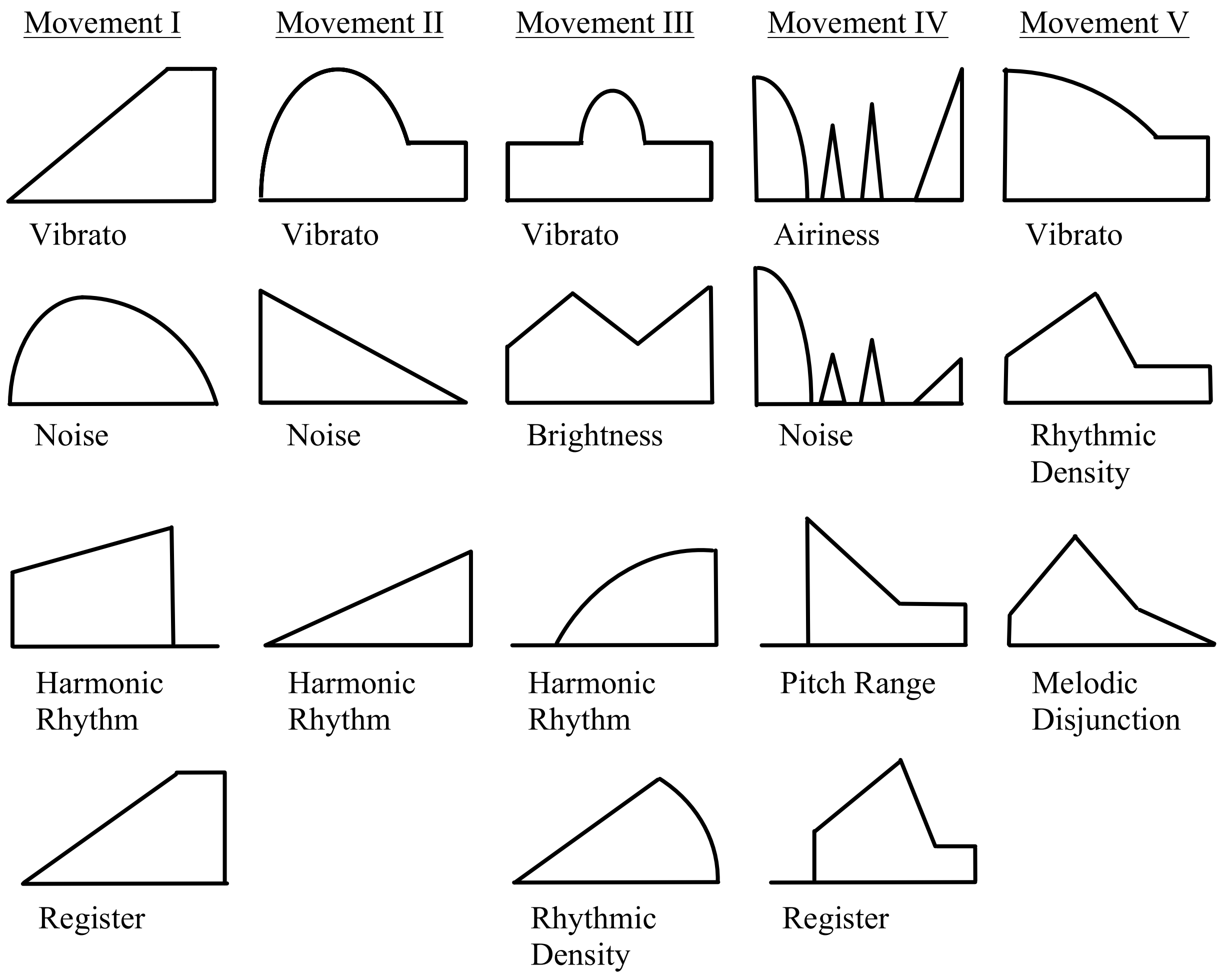

Figure 4-15: Overview of the most important timbral and non-timbral dimensions throughout all five movements of *From the Grammar of Dreams.*

Returning to the initial questions of tension and release, delineation of form, and text expression, it is apparent that timbral and non-timbral elements are important in all three aspects of *From the Grammar of Dreams*. Non-timbral elements emphasize and perhaps enhance the timbral tension and release heard on a local level in the fourth movement, while a non-timbral element contrasts with the large-scale timbral tension and release heard in the second movement. Timbral and non-timbral elements work in coordination to create the formal structure in both the fifth movement and the fourth movement. In the first movement, timbral and non-timbral elements work together to express the unifying relationship of the two voices' texts. While timbre clearly plays a large expressive and functional role in this work, non-timbral musical elements do contribute significantly to the compositional design.

Chapter 5: Conclusion

In *From the Grammar of Dreams*, Saariaho manipulates timbre for both expressive and structural purposes, in combination with non-timbral musical parameters. The expressive purposes fall into two categories—localized tension and release, and text expression. The structural purposes also fall into two types—tension and release on a larger scale, and formal section division and echoes. All four purposes served by timbral changes occur in combination with changes in non-timbral parameters.

How do these conclusions about Saariaho's use of timbre in this work relate to her compositional techniques over the course of her career? While similar detailed study of Saariaho's other compositions necessary for definitive comparisons is outside the scope of this dissertation, I will attempt to place Saariaho's use of timbre in *From the Grammar of Dreams* within the context of her earlier and later works based on Saariaho's own discussions of her techniques, analyses by other scholars, and my own observations. Following this discussion, I will explore possibilities for future timbre-focused research in music theory and psychoacoustics.

5.1 Timbral Explorations: Late 1970's to Early 1990's

In a comprehensive study of Saariaho's vocal works, Anni Oskala traces Saariaho's use of non-traditional vocal timbres to *Suomenkielinen sekakuorokappale* (*A piece for a mixed choir in Finnish*; 1979),[166] which sets Finnish names taken from an almanac. In this work,

166. Translation by Susan Sinisalo, translation of program note by Kaija Saariaho, "Study for Life–Yellows, Suomenkielinen sekakuorokappale," Finnish Music Information Center, 1988; cited in Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 90.

Saariaho specifies notation for many distinct vocal sounds, most of which were unprecedented in her music. These include speaking, whispering, mumbling, and *parlando* singing on "different degrees of specification of pitch levels;"[167] as well as inhaling and exhaling, oral clicks, howling, whistling, sighing, and effects such as "imitation of stormy wind by blowing" and "fast r-shrieks in the highest register ad lib, hysterically."[168] The use of these vocal techniques and effects marks a departure from Saariaho's extensive use of normal singing in her earlier vocal works,[169] and sets the stage for the variety of vocal timbres in *From the Grammar of Dreams. Suomenkielinen sekakuorokappale* is also Saariaho's first vocal work to involve gradual transitions from one phoneme to another,[170] and the first time Saariaho specified the amount of vocal vibrato (*senza vibrato* and *molto vibrato*) outside of an onomatopoeic effect,[171] both of which techniques occur extensively in *From the Grammar of Dreams.*

By Saariaho's account, her explorations with using timbre as a "progressive element" began with *Im Traume* (*In Dreams,* 1980, for cello and piano) and *Sah den Vögeln* (*Saw the Birds,* 1981, for ensemble and live electronics).[172] She describes *Im Traume* as keeping harmony stable, while tensions are created by noise elements in instrumental extended techniques and by textural contrasts.[173] *Sah den Vögeln* is the first work in which Saariaho employed dynamic changes in specific parameters including timbre in the conception of the

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167. Oskala, "The Voice in Kaija Saariaho's Music, 1977–2000," 57-58.
168. Ibid., 58.
169. Ibid., 51-57; Oskala places this new direction in Saariaho's vocal writing as occurring after her year-long break from writing for the voice, as imposed by her teacher Paavo Heininen, which apparently had a significant positive effect on her compositional development.
170. Ibid., 59.
171. Ibid., 67.
172. Saariaho, "Timbre and Harmony," 94-104.
173. Ibid., 97-104.

form, and she describes "…curves of tension for each parameter—harmony, texture, dynamism, shifts of electronically-related color."[174] This description, along with her chart showing parameter changes in specific sections of the work,[175] shows some commonalities between the techniques used for *Sah den Vögeln* and *From the Grammar of Dreams.* Already, she used changes in timbral and non-timbral dimensions to create tension and demarcate the form. According to Oskala, *Sah den Vögeln* also shows further development of Saariaho's technique of gradual phoneme transformations,[176] as well as her first use of a vocal "timbral transition" (from whispering to speaking),[177] both techniques that she would use in *From the Grammar of Dreams.*

While Saariaho characterizes the transitions in both *Im Traume* and *Sah den Vögeln* as "abrupt,"[178] *Vers le Blanc* (*Towards White*, 1982, for electronics) was radical in the extreme gradualness of its harmonic and timbral changes, which are so slow as to be almost imperceptible.[179] While actual voices are not involved, Saariaho used the computer to interpolate between formant structures of specific phonemes,[180] laying the groundwork for the vowel transformations in *From the Grammar of Dreams.*

Verblendungen (*Dazzlings*, 1982, for orchestra and tape)[181] combines formal timbral and non-timbral parameter control with gradual transformations. Saariaho describes the function of the parameter changes as a source of interest within the "impossible" overall form of decreasing energy: "Such a formal impossibility forced me to exploit all of the parameters in as

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174. Ibid., 97.
175. Ibid., 96.
176. Oskala, "The Voice in Saariaho's Music, 1977-2000," 61.
177. Ibid., 63.
178. Saariaho, "Timbre and Harmony," 104.
179. Ibid., 104-105.
180. Ibid., 105.
181. Translation from Oskala, "The Voice in Saariaho's Music, 1977-2000," 77.

dynamic a way as possible in order to keep the music moving."[182] Tension and release on a large scale is heard in the transformation of the tape part from a high level of noise to a low level of noise as it ends in "a quasi-orchestral luminosity made up of violin sounds;"[183] meanwhile, a contrasting building of tension due to noise occurs in the orchestral part. It seems that her conception of the non-timbral parameters involves the creation of more localized tension, and therefore also its release. Both localized and large-scale tension and release due to timbral and non-timbral transformations occur in *From the Grammar of Dreams.*

After a period of mostly incorporating the voice only in electroacoustic media in 1982-1986,[184] as well as calling for vocal utterances by instrumentalists, Saariaho showed a renewed interest in writing for the acoustic voice in 1987-1991.[185] Shortly after composing *From the Grammar of Dreams,* she explained how she was no longer "blocked with the voice"—"I've come to a new point where I accept that I can find new expressions by speaking, whispering, maybe some other ways, while not destroying the singing either."[186]

From the Grammar of Dreams is one of four works for live singers in this time period, the others being *Piipää* (*Silicon head*, 1987, for soprano, tenor, and both live and pre-set electronics),[187] *Grammaire des Rêves* (*Grammar of Dreams,* 1988-89, for soprano and ensemble), and *Nuits, adieux* (*Nights, Farewell,* 1991, for vocal quartet and live electronics).[188] Oskala recognizes *From the Grammar of Dreams* as the first of these vocal works to use breathiness (or airiness in the voice, as I have described it) as a continuum, a technique that

182. Saariaho, "Timbre and Harmony," 107.
183. Ibid., 122.
184. Oskala, "The Voice in Saariaho's Music, 1977-2000," 80.
185. Ibid., 90.
186. Robert Maycock, "Finnish Whispers," *Classical Music* (January 14, 1989).
187. Translation of *Piipää* from Oskala, "The Voice in Saariaho's Music, 1977-2000," 96.
188. Ibid., 90; Saariaho created an additional version of *Nuits, adieux* for vocal quartet and mixed chorus in 1996.

Saariaho continued in *Grammaire des Rêves*, and refined with her most specific gradations of breathiness in *Nuits, adieux*.[189] *From the Grammar of Dreams* also included Saariaho's first use of a gradual transition between speaking with breath sounds and singing, a technique that she continued to use in *Grammaire des Rêves* and *Nuits, adieux*.[190] In addition, in these three works Saariaho refined her control of vocal vibrato, as heard in *From the Grammar of Dreams*.[191]

5.2 Development of a Mature Style: Early 1990's to the Present

Saariaho has spoken of a turning point after the completion of two works from 1990 that she considers to be one large-scale work, *Du cristal* (*From Crystal,* for orchestra) and *…à la fumée.* (*…Into Smoke,* for alto flute, cello and orchestra). As she explains, "It crystallized my ideas concerning musical form, evolution, and transformation. It was really [a] large-scale work…and it finished a certain period in my compositional life, I feel, and started another one."[192]

In a recent dissertation in which he puts *Solar* (1993, ensemble) within the context of Saariaho's changing style, Marc Aled Hutchinson summarizes development of Saariaho's style in the 1990s as follows:

> "The 1990s saw a gradual shift in her style: works such as *Château de l'âme* (1995) and *Oltra mar* (1999) show the increasing presence of regular metre and tonal allusions, as well as a more clearly sectional handling of form and a somewhat distanced but more textually specific approach to expression. This stylistic evolution

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189. Ibid., 91-92. Oskala also traces this use of breathiness to Saariaho's flute writing calling for breath tones and mix of breath tones and normal tones, starting in the early 1980's (92).
190. Ibid., 93-94.
191. Ibid., 94-95.
192. Saariaho and Service, "Meet the Composer: Kaija Saariaho in Conversation with Tom Service," 12.

is perhaps best seen as a process of clarification and simplification leading to the composition of her first opera, *L'amour de loin* (2000)."[193]

Oskala points out Saariaho's movement away from text intelligibility, as exemplified in *From the Grammar of Dreams,*[194] in the 1990's. Whereas Oskala places *From the Grammar of Dreams* within Saariaho's explorations on an "axis of intelligibility" in regards to text-setting, she sees the works from the mid 1990's on as having a renewed focus on the vocal function of clear text declamation. Rather than abandoning her fragmentation and layering techniques that rendered text intelligible, she started to limit these techniques to the voices that have an accompaniment function, leaving the text mostly intact and clearly understandable in the voice having a text declamation function. This "two-function approach" is first seen in *La Dame à la licorne* (*The Lady and the Unicorn,* 1993, for electronics) and *Château de l'âme* (*Castle of the Soul,* 1995, for soprano, women's chorus, and orchestra); and after *Trois Rivières* (*Three Rivers*, 1994, for percussion quartet and electronics), Saariaho always included the text intact in at least one vocal part.[195]

Saariaho's biographer, Pirkko Moisala, sees the time after *…a la fumée,* including her only ballet *Maa* (*The Earth*,[196] 1991, ensemble and electronics), as a "transitional period," in which Saariaho distanced herself from transitions and worked on creating dramatic events.[197] Saariaho also describes a change in her compositional direction at this point: "After [*Du cristal*

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193. Hutchinson, "Redefining Coherence: Interaction and Experience in New Music, 1985-1995," 126.

194. Oskala, "The Voice in Saariaho's Music, 1977-2000," 87-89.

195. Ibid., 99-104; see pp. 20-21 for a full explanation of her "axis of intelligibility," which Oskala uses to describe transformations between clear, intact text-setting and techniques that obscure the ability of a listener to hear the text and its meaning.

196. Translation by Oskala, "The Voice in Saariaho's Music, 1977-2000," 168. According to Juhani Nuorvala, the Finnish word *maa* can also mean *land, country* or *world* ("Programme Note: Kaija Saariaho: Maa (1991)," Chester Novello website, http://www.musicsalesclassical .com/composer/work/7235).

197. Moisala, *Kaija Saariaho*, 27.

…à la fumée], I stopped thinking only in terms of linear transformation and started looking for more dramatic solutions and situations for my music."[198] Moisala identifies this period as the fifth of seven discrete periods, followed by a sixth period in which Saariaho's work shows more identifiable musical gestures, linear developments, and melodic importance.[199] Moisala hears reoccurring musical gestures as contributing to the overall coherence of *Amers* (*Navigation Beacons,* 1992, for cello, ensemble and live electronics) and *Solar* (1993, for ensemble) in this period after the transitional one, part of a "greater concern for forms based on themes and motifs."[200]

Moisala hears in *Château de l'âme,* of this sixth period, a development of the melodic aspects of the music along with a retention of timbral variations as an important element.[201] Liisamaija Hautsalo also hears melody as becoming a more important part of Saariaho's musical language in *Château de l'âme,* as well as in *Lonh* (*Distant*, 1996, for soprano and electronics).[202] Kiimo Korhonen and Risto Nieminen point to Saariaho's new emphasis on melody in *Château de l'âme,* in addition to *Graal Théâtre* (*Sacred Theater,* 1994, for violin and orchestra).[203]

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198. Saariaho and Service, "Meet the Composer," 12.
199. Moisala, *Kaija Saariaho*, 27.
200. Ibid., 38.
201. Ibid., 40.
202. Hautsalo, "Whispers from the Past: Musical Topics in Saariaho's Operas," 111.
203. Kimmo Korhonen and Risto Nieminen, "Saariaho, Kaija (Anneli)," *Grove Music Online*, *Oxford Music Online*, Oxford University Press, http://www.oxfordmusiconline .com/subscriber/article/grove/music/45895. Korhonen finds *Château de l'âme* to be particularly melodic, as he explains, "the melodies branch out into long, expressive arches." (Kimmo Korhonen, "Composer Profiles: Kaija Saariaho in Profile II," trans. by Timothy Binham and Susan Sinisalo, *Music Finland* website, 1998, http://composers.musicfinland.fi/musicfinland /fimic.nsf/0/9CB2A3412AC56803C2257537003D9159?opendocument.)

Moisala's sixth period includes larger orchestral and vocal works,[204] such as *Oltra Mar* (*Across the Sea,* 1999, for chorus and orchestra), sections of which Saariaho would place in her first opera *L'amour de loin* (*Love From Afar,* 2000). *Oltra Mar* makes occasional use of large timbral transformations, as in the sixth movement "*Souvenir de vagues*" ("Memory of Waves"), which consists of a single wave-like gesture with transformations along the timbral dimensions of noise, airiness and brightness. Other movements of *Oltra Mar* exhibit the motivic repetition, increasing melodic importance, and movement towards metric regularity and tonal centers of this time in Saariaho's career.

Moisala sees Saariaho's seventh and current period as beginning with the composition of her opera, *L'amour de loin* (*Love From Afar,* 2000, for soprano, mezzo soprano, baritone, chorus, orchestra and electronics), and she characterizes this mature style as lyrical and dramatic.[205] Saariaho's works in this period often use the dramatic form of opera, such as the operas *Adriana Mater* (*Mother Adriana,* 2005, for soprano, mezzo soprano, tenor, baritone, chorus, orchestra and electronics), and *Emilie* (2008, for soprano, orchestra and electronics), as well as the similarly dramatic form of oratorio, *La Passion de Simone* (2005-2006, for soprano, chorus, orchestra and electronics). Moisala notes that *Adriana Mater* is particularly dramatic, given that it is an operatic tragedy.[206]

While Saariaho wrote much for the voice at the beginning of the millennium, her increased focus on melody also found its way into her instrumental writing. As Moisala explains, "While working on the vocal lines of her first opera, Saariaho had noticed that her way of writing for cello and flute had begun to resemble her writing for the voice: a stronger

204. Moisala, *Kaija Saariaho*, 27.
205. Moisala, *Kaija Saariaho*, 27. Written in 2009, Moisala's "current" is five years ago, close to the present day in the scheme of Saariaho's career.
206. Ibid.

melodic thinking had come to play a more important role also in her instrumental writing." Thus the flute concerto *Aile du Songe* (*Wing Dream,* 2001, for flute and string orchestra with percussion) was the first piece she wrote after *L'amour de loin.*

In sum, the developments in Saariaho's compositional style since the early 1990's encompass changes in her approach to melody, form, harmony, rhythm, and text setting. Her current style involves greater importance given to melody, including re-occurring melodic motives and gestures; this relates to her use of forms based more on repeated motives and themes and less on large-scale transformations. She also often uses dramatic forms. In terms of harmony and rhythm, her current style often involves tonal centers and an audible sense of meter. Finally, her approach to text setting now incorporates clear text declamation.

All of these developments are departures from *From the Grammar of Dreams,* which was composed not long before a shift in Saariaho's style beginning in the early 1990's. In her later works, timbre is less likely to have the formal importance that I found in *From the Grammar of Dreams.* Structural importance in her later works may be more likely to be found in elements such as motivic repetition and the dramatic framework of theatrical works. Such an exclusively timbre-focused approach as in this study may therefore be less useful in examining Saariaho's later works.

Timbre is, however, still an integral part of Saariaho's writing. As Saariaho explains, her earlier explorations in timbre and harmony did find their way into her later style: "I felt when I wrote [*L'amour de loin*] that everything I had written up to that moment was somehow in that piece. All the material, my approach to harmony, to texture—all of it was there."[207] Her use of timbre is now subtler. In regards to the timbral dimension of noise, which she

207. Saariaho and Service, "Meet the Composer," 13.

refers to as the "sound-noise axis," Saariaho says, "I think it's present in my composition and in my orchestration, but [at a] quite intuitive level."[208] Timbral transformations such as those heard in *From the Grammar of Dreams* may no longer be at the forefront of Saariaho's music, but they are still woven into the fabric of her compositions.

5.3 Going Forward: Future Research

It is inevitable that research in a relatively new area such as timbre will yield more questions than answers. I therefore conclude my study of Saariaho's use of timbre in *From the Grammar of Dreams* with ideas for further research in both music theory and psychoacoustics.

First of all, *From the Grammar of Dreams* may be further explored from different perspectives and with different analytical approaches. I only touched on the dramatic element of the two voices and the stories they are telling, both independently and together. Focusing on the drama in the work would be an interesting approach. One could also delve into the details of Saariaho's harmonic language. I discussed harmony mainly in the context of harmonic rhythm and major harmonic shifts. There is still much to explore in Saariaho's use of pitch and harmony in *From the Grammar of Dreams* that is outside the scope of this dissertation.

Might this method for analysis be useful for approaching vocal works by other composers? I would be particularly interested in looking for transformations along the dimension of brightness in composers who use vowels as a source of compositional interest and variety in vocal music. Fruitful examples might be Caroline Shaw, whose Pulitzer Prize-winning *Partita* uses specific vowels extensively and calls for vocal techniques to achieve certain timbres in the ensemble. Toby Twining's manipulation of vocal colors and overtones

208. Saariaho, interview with the author, March 7, 2012.

through vowel changes would also be appropriate for this type of analysis. It also would be interesting to re-visit vocal works that have already been the subject of much scholarship from this perspective, such as György Ligeti's *Aventures* and *Nouvelles Aventures.*

Analyzing vocal works in different languages raises the question of how language influences the timbral dimensions. The dimension of brightness is shaped largely by the vowels sung, which would vary greatly from one language to another. A vocal work in Portuguese, for example, may have an overall darker sound than one in English. The dimension of noise would also be affected, as languages have different norms for the frequency of consonants and whether or not multiple consonants are placed consecutively without an intervening vowel. German, for example, challenges many singers with its consecutive consonants, and a German vocal work would likely have a higher level of noise than an English vocal work in a similar style. One might pursue this question of language's influence on timbral dimensions by comparing vocal works in different languages, and perhaps analyzing a vocal work that employs more than one language. One such possibility would be Eric Banks' choral work *Sarasvati*, which alternates text in Sanskrit and English.[209] Sanskrit's dark vowels and retroflex approximants (consonants in which the tongue tip curls backwards) contrast with the brighter vowels of English in this work.

How useful would this method be for instrumental acoustic works or works for voice or instruments with electronics? I expect that the timbral dimensions would need to be adjusted for both the specific work and the specific type of instrumentation. The dimensions of noise and brightness would probably remain in any application of this approach, whereas the dimensions of airiness and vibrato may be less likely to deserve attention in an instrumental

209. Eric Banks, *Sarasvati,* score, 2008, http://ericbanks.com/wp-content/uploads/2012/04/sarasvati2011combo1.pdf.

work. Electroacoustic works may call for a discussion of any number of timbral dimensions that are unlikely to be perceptually salient in acoustic works. A score-based analysis of an electroacoustic work would represent only part of the overall sound; it would be necessary to supplement such an analysis with a recording-based analysis.

There may be other reasons to incorporate recording-bases analyses even in analyses of acoustic vocal works. It would be interesting to compare my score-based approach with one that is recording-based. Such a recording-based analysis could either use computerized techniques to analyze the spectrum such as John Dribus' use of FFT analysis of noise content,[210] or John MacCallum and Aaron Einbond's use of different FFT-based analysis tools to measure roughness;[211] or, it could be listening-based, such as Mazzoli's assignment of stability ratings.[212] Such recording-based analyses would allow for comparisons of interpretations by different performers. This could yield interesting results, considering that singers frequently make choices about the brightness and amount of vibrato in specific passages or specific notes for expressive purposes.

Further research in psychoacoustics is needed to better understand how timbral transformations in musical contexts are perceived by listeners. To what extent do others hear changes along the timbral dimensions that I specified as relevant to *From the Grammar of Dreams*? Comparing the dimensions of brightness, airiness, noise and vibrato, are some more perceptually salient than others? I can imagine an experiment in which excerpts from a few acoustic works by different composers are played for participants many times, and the

210. Dribus, "Characterizing Noise and Harmonicity."
211. John MacCallum and Aaron Einbond, "Real-time Analysis of Sensory Dissonance," *Computer Music Modeling and Retrieval: Sense of Sounds: Lecture Notes in Computer Science,* 4969 (2008), http://eprints.hud.ac.uk/15448/.
212. Mazzoli, "Emerging Musical Structures."

participants are asked to use a Continuous Response Digital Interface to record real-time judgments about a different timbral dimension upon each hearing of an example.[213] The degree of similarity across the different subjects' judgments would be a measure of universality for the perception of each timbral dimension.

It would also be interesting to test the generality of Saariaho's assertion that her experience with electronic music increased her attention to the details of sounds overall.[214] This could be done by devising a study with participants who have varying degrees of experience with electronic music, as well as varying degrees of musical experience. I suggest five categories of listeners—individuals without any musical training, amateur musicians with and without experience in electronic music, and music professionals with and without experience in electronic music.

There is still scant research on timbre perception with real musical examples. Such research is necessary in order to understand how the complexities of actual musical sounds, in the full variety created by contemporary composers, are perceived. These examples should include a variety of instrumentations including the voice, with examples of acoustic, electroacoustic, and electronic works. Going forward, there is still much to be explored in the details of timbre perception that has the potential to guide future analysis of music by Saariaho and other composers, and to influence composers who create music in which timbral transformations are expressively and structurally important.

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213. See Madson and Fredrickson, "The Experience of Musical Tension," for a full explanation of the Continuous Response Digital Interface, which they used to measure the perception of musical tension. In brief, it involves a dial that can be turned by a participant throughout the listening process.

214. Pierre Michel, "Entretien avec Kaija Saariaho" ("Interview with Kaija Saariaho"), 12-13; also noted in Oskala, "The Voice in Kaija Saariaho's Music," 95-96.

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