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Creating an Unbroken Line of Becoming in Live Music Performance

Bonnie B. McAlvin
The Graduate Center, City University of New York

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CREATING AN UNBROKEN LINE OF BECOMING IN LIVE MUSIC PERFORMANCE

by

Bonnie McAlvin

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

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Bonnie McAlvin

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 Music Arts.

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THE CITY UNIVERSITY OF NEW YORK
ABSTRACT

Creating an Unbroken Line of Becoming in Live Music Performance

by

Bonnie McAlvin

Advisor: Norman Carey

The dissertation provides an approach to the pedagogy of musical expression in applied music study. The pedagogy deals primarily with grouping, in terms of (1) its relationship to meaning, (2) the physiology which supports it, (3) the Gestalt laws of similarity and trajectory which model it, (4) the parameters of unmarked performance nuance (vibrato, articulation, etc.) which can be used by a performer to project it, and (5) the state of continual evolution which characterizes it in the diachronic context of music. Exercises are provided which support a student’s mastery of the mechanics of grouping, and this mastery is put to work in an adaptation of the work of the great Russian acting teacher, Constantine Stanislavski. Mapping of embodiment schema in the manner of Lakoff and Johnson (1980) is asserted as a useful interface between grouped pitch objects and meaning; mappings are utilized by the instrumental music performer in the same manner as Stanislavski taught his acting students to utilize given circumstances. The discourse situates all of these skills in a gradually-emerging present; the exercises challenge the student to achieve what Stanislavski calls an unbroken line—a spontaneous and unique line of continually-restructuring narrative that evolves in real-time.
What initially motivated this work was a desire to explain a sensation that I experienced when performing, particularly when collaborating with other musicians. I can best describe the sensation as a type of structural haze, a confluence of structural potentialities that dissipates as pitch function reveals its synoptic self at the end of a phrase. The haze and release has been present at various moments since I was very young, but it became more pronounced during the years when I began studying Schenkerian analysis. I believe that this is because Schenkerian analysis provided me with a means of explicitly documenting pitch function. I immediately enjoyed the practice of graphing a surface, but I found that depending on where I was in a piece of music, the slurs changed. As I progressed through an analysis, slurs crossed over one another and re-arranged themselves. I found that the sensation of structural haze and release—which has always been an important attractor for me toward playing music—was well-reflected in this unconventional practice of continually crossing and un-crossing slurs.

Much of the work of this dissertation has been that of finding ways to communicate the notion of the becoming of pitch-functions within a gradually unravelling network, and to identify all of the aspects that might be coming together to cause the sensations of structural haze and release. I’m not sure if the sensation will be communicated through the words and pictures of this project, and I am sure that due simply to limits in scientific knowledge, the physiology behind it is not as well described as I’d perhaps naively planned. However, I know from experience in teaching that the exercises that emerged throughout the many stages of this dissertation’s own becoming yield robust advantages to the students who explore them. I am grateful to the doctoral music program at the CUNY Graduate Center for having had the
opportunity and the atmosphere in which to explore the ideas. Thank you to the committee, first and foremost, for all of their work and support.

Thank you to Norman Carey, in whose Schenker I class I began filling the first of many notebooks which would fuel later research. Thank you for, as my advisor reading so many words and asking so many questions, and for not occluding my excursions into neuroscience yet challenging me to make clear to the reader how that information is relevant to a discussion of music. How can you possibly thank someone for helping you to find your own voice, develop it and to speak it? Such a lesson is not compensable. But I can strive to do this for my own students, and the exercises of this dissertation are part of that work. For the heightened desire that emerges from this debt, I am very grateful.

Thank you to Poundie Burstein for providing access to literature that crosses slurs without dismantling their descriptive power, for supporting my ventures into music cognition and for showing me through both words and actions that research regarding music performance, while deluged in notions of the feminine and all that that entails, is important work. Thank you to Joe Straus for encouraging me through his own work and his musical space course to develop my inclination to draw maps of the universe, and for his generosity and his frankness on so many projects and applications since. Thank you to Aaron Kozbelt for his much-needed contributions to the theoretical discussions in the dissertation, for believing in the project and for challenging me to more clearly conceptualize what an empirical validation of the two tiers of analysis would look like.

Thank you to the students of the various music programs at the Graduate Center for being a talented, supportive and dedicated group of people. I particularly would like to thank H. Roz
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I would also like to thank Robert Dick, who first introduced me to Stanislavski’s work and the magic *what if* that has helped me to see so many moveable doors, and to flutists Katie Van Zant, Casey Read, Kennedy Burgess, and Erin Barrett for their input into the exercises that are presented here. Thank you to Jacqueline Martelle for all of her insight and encouragement, which has gone far beyond her professional duties, to Steve Fox for all of his support during the early years of my doctorate and for helping me to rise to the challenge of developing a reputation as a performer, and to Gil Tippy for his support in re-orienting the work and preparing for the defense. Finally, thank you to Sammy, who has listened to more than his share of failed becomings.
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I.1 INTRODUCTION

This dissertation concerns itself with grouping in live music performance and its impact upon the gradual unveiling of musical structure in a unique performance. The project presents a way of conceptualizing the impacts of fine, unmarked performance nuance such as vibrato and articulation upon grouping, and each chapter includes a number of exercises toward the pedagogy of grouping and musical expression. The exercises are based on and adapt the work of the great Russian actor and director Constantine Stanislavski. They aim to develop a performer’s expressivity and ability to create what Stanislavski called an “unbroken line” of becoming.\footnote{Stanislavski (1936), p. 125.}

Through the exercises, a teacher can guide the student toward a command of the tools of unmarked nuance, a deeper and more accessible expressivity, and finally, tools for not just coping with but capitalizing upon human variability and the challenges of collaboration.

The exercises are dispersed across four chapters according to their topic, and are progressive. The first chapter concerns grouping; the exercises at the end of the chapter ask the student to use unmarked performance nuance (vibrato, timbre, dynamic, and timing) to project grouping. The second chapter is about schema-mapping; the exercises ask a student to anthropomorphize the pitch grouping objects they learn to project in Chapter 1, using embodiment schema presented in Lakoff and Johnson (1980) as intermediators of non-verbal narrative. These schema include UP/DOWN, CONTAINER, BARRIER, and SOURCE/PATH/GOAL. Chapter 3 presents Stanislavski’s method of teaching actors. The exercises transfer the method into instrumental performance pedagogy, asking the student to experience and express an empathy toward pitch groupings which are anthropomorphized using the schema mappings.
explored in Chapter 2. Chapter 4 asks the student to do so in real-time, allowing variability in human performance and collaborative disagreement to continually re-shape pitch groups. The exercises of this final chapter ask the student to be not only a creator of narrative, but a listener and supporter of its continual becoming. They scaffold the performer toward allowing themself to invite inspiration from their own human error and from their collaborators, in the manner that Stanislavski advocated. As such, they mark the highest level of achievement for the exercises.

Many of the exercises utilize orchestral flute literature. However, vivid examples of the various schema-mappings that are discussed in the dissertation are easy enough to find in any repertoire. Therefore, other repertoire can easily be used in substitution. A desirable quality of a substitution in early exercises is that of simplicity, or non-ambiguity. The exercises are progressive; later exercises can achieve a level of complexity without undermining clarity. Each exercise is followed by a collection of appropriate materials from the literature with suggestions for mapping that are helpful for getting started, but they are not meant to be exhaustive; they leave room for the student to work at locating mappings of their own.

Work should be repeated using all of the different materials until mastery of each skill is achieved. Additionally, there are times where a return to previous materials is specified. Continually returning to exercises and materials will help the student to make the steep learning jump that is asked in moving from the relatively modular exercises of Chapters 1-3, to the significantly more complex exercises of Chapter 4, where mappings overlap into a tapestry of continual becoming. Whenever a student returns to a previous exercise, their work should be characterized by new creative activity. Some students become attached to their previous work and resist expanding it. However, the highest aim is a flexibility to allow a narrative to become
itself anew every time a piece is performed. Working creatively with old exercises functions to foster this flexibility. Students who feel compelled to preserve their past work can be encouraged by keeping a notebook, where they can document their work. Their past work can remain intact, providing them with the safety that such a document can provide, but room for development lies in the empty pages ahead.

Like most new skill sets, the exercises begin with a conscious set of instructions. In repeating them, students will gradually shift their tools for expressivity from an explicit knowledge to an implicit one. Work at the beginning may be characterized by intentional, thoughtful actions and decisions. The goal of later work should be to become capable of acting without thinking (so to speak) and instead responding unconsciously to the musical sounds that are emerging.

The exercises tend to be verbally-oriented. However, the exercises can be condensed into fewer words, translated into pictures, and/or offered in smaller doses spread over more lessons in order to include students with less tolerance for or skill in verbal communication. There is no timeline recommended, as students will vary dramatically in their rate of progress through them. To garner the most progress, each of the exercises should be repeated several times over many meetings, using all of the materials.

I.2. CONTRIBUTION

The dissertation asserts a strong correlation between nuance and the meaning a listener might receive, and this is explicated, and perhaps even defended to an extent, through the
theoretical discussions that begin each chapter. An application toward a formal empirical study regarding the relationship between performance nuance and musical meaning is proposed in the Closing Remarks at the end of the dissertation. However, the dissertation’s main goal is to outline a set of pedagogical exercises that are dispersed throughout the chapters. The exercises train performers to surrender themselves to a narrative that is emerging beneath their fingers, and provide that narrative whatever it needs in order to emerge with a well-formed structure. If nurtured properly, the narrative is a living, breathing, and truthful thing that is not of either the score or the performers, but rather is a third thing: a third entity that provokes itself. Most importantly, it is neither a replica nor a failed replica of yesterday’s successful rehearsal, of the teacher’s version, or of the .mp3 file on the student’s playlist.

Neither does the dissertation advocate for chamber music as a compromise between collaborators. Rather, it advocates for a living, breathing, emerging experience that is continually generated by collaborators via their responses to it. In the same way that Stanislavski’s triad asks and prepares an actor to listen to their own empathic response, the performer is not asked by these exercises to tell a story, but rather, is asked to listen to the story that emerges—and provide that story with whatever it needs in order to proceed. There is no forcing the narrative, it must be given freedom to develop as it must, much like a teacher who is working to develop a child’s agency: at points, the child must be guided explicitly and at other points, the child must be given a space in which to decide for themselves how best to act. During these moments, the teacher must simply listen to the child and help the child to see how their actions have an impact, without passing judgement on that impact. This develops the
agency of the child. So too, does this strategy develop the agency of a narrative: at times, it needs to be guided, at times it needs to be a guide.

Although it deals heavily with narrative, something this dissertation does not contribute is any reinforcement whatsoever of the notion that a grand or putatively absolute narrative can be found in a given work; the narratives presented are presented simply because they hold the potential for inviting inspiration, as Stanislavski asks. Additionally, the dissertation doesn’t differentiate in any substantial way between what is traditionally labelled program music and what is traditionally labelled absolute music.

When we have achieved mastery over listening and nurturing, we become caretakers of what Stanislavski calls truth on stage. Truth has the ability to shock and console even ourselves the performer when it is given its freedom. When this happens, the performer is not acting shocked, consoled, or betrayed. Neither are they merely representing these emotions through a vivid timbre or even through a deliberate use of grouping. The performer is experiencing the activities which shock them, console them or betray them; their feelings and responses are true and immediate, and their truthful responses feed back into the narrative, nurturing it in real-time as it asks to be nurtured.

Some performers and students will find that the exercises yield a fascinating way of conceptualizing nuance, and that they fertilize a satisfying exploration of some of their oldest repertoire. Some might find in the exercises a useful way of inviting inspiration and/or a useful way to learn to accept the inspiration that their collaborating partners provide for them. Others might value the exercises as a bridge from fearful or distracted performance into a more resilient
focus and bolder or more curious musical exploration. For some, the exercises will open up a space where their own unique musical voice feels at once unequivocally relevant.

The exercises will be especially useful for a student whose expressive voice has been stifled by fear, humiliation or lack of belief in their own relevance. Because the exercises present verbal labels as external mediators, the exercises provide a safe, systematic entry to expressivity for gifted musicians who fear humiliation in the face of exposing their inner selves. They are also especially useful in distracting students whose attention tends to roam into lands of worry and/or prisons of “can’t.” Finally, even healthy, confident and naturally expressive or expressively-skilled musicians can use the exercises as a means of finding out what else lies dormant in their repertoire.

In my experience as a teacher of many different students from many different backgrounds, some students respond readily to grouping changes, without the facilitation that a verbal label can provide. They need only an implication of narrative and begin to respond expressively to various groupings. Other students, however, benefit from a deliberate investigation into the various narratological alternatives for a phrase, and over time, expressivity develops. We tend to think of expressivity as a musical gift—you either have it or you don’t. There is of course a subset of students for whom expressivity seems to remain on the other side of an uncrossable border. These students might perform a crescendo skillfully, but they do not engage with the crescendo as if it is truthful. When asked to invent a nuance scheme on their own, some of these students are at a loss for how to begin. There are many species of musical talent, and not all musically gifted students are naturally expressive or inventive: there are plenty
of musicians who are musically gifted in terms of absolute pitch, relative pitch, absolute time, fluidity of timing in finger motion, seemingly natural body resonance, ability to conceptualize rich textures, etc. These highly-gifted musicians should not be dismissed as unexpressive or mechanical without fair access to tools that would help them to access and to develop their expressivity.

To close this introduction, classical music performance pedagogy—particularly in the United States—has been harshly criticized in recent decades for failing to nurture creativity. Our substantial tools and methods for aural training and technical development can be balanced using these, and similar activities toward a study of living expressivity. Through these types of tools, the student can learn to find and exercise choice, and in so doing, develop their own unique, empathic voice which responds to changing conditions and nurtures an emerging narrative as it begs to be nurtured.
CHAPTER 1
CREATING PITCH GROUP OBJECTS

Unmarked performance nuance includes any use of volume, timbre, timing or gap which is not explicitly marked in a score, and thus will vary from performance to performance. These parameters serve as signals for elements of similarity, proximity and continuation. They work hand-in-hand with text-based parameters such as pitch profile, rhythmic duration, harmonic membership and metrical position as agents of Gestalt grouping. This dissertation focusses on the former because they are not as easily or as often addressed in the literature as the text—based parameters cited above, but can be just as powerful. The dissertation asserts first that a listener groups pitches into pitch-group objects based on disjunctions (and the lack thereof) along these parameters and second, that the way in which the listener groups can predict aspects of narrative. Pitches that are either adjacent or non-adjacent can be heard in relationship to one another, and the relationships which are heard are an agent of meaning. As such, the performer’s choices regarding volume, timbre, articulation, timing and gap are in a position to constrain meaning for a listener to a sizeable extent.

Adjacent pitches group more easily than non-adjacent ones, because of the Gestalt law of proximity. However, with effort and/or support from aspects of the text such as register or the use of rests, it is possible to group pitches that are not adjacent to one another. The dissertation strives to demonstrate this phenomenon, outlining both the performer’s and the listener’s roles in the process of structuring pitch data into meaning. It also strives to scaffold student performers toward an effective use of grouping, toward the development of their unique expressive voice, and toward a state of deep focus and fluid resilience during live performance. Exercises in
grouping are dispersed throughout for the teacher of applied music who wishes to help their students achieve these goals. Section 1.1 defines grouping and puts it into context with the related phenomena of structure and meaning. Section 1.2 provides a ruleset for grouping and some analyses which illustrate it. Section 1.3 provides the teacher of applied music with exercises toward helping their students to gain a technical command of grouping.

All of the work of chapter 1 might be applied in isolation to the work of Chapters 2 through 4, merely by guiding the student through some type of analysis on a score, and challenging the student to project that analysis. For example, a student might do a Schenkerian analysis of the surface of a piece, and strive to use the grouping ruleset to project a certain pitch structure for a phrase. Or, a student might do a set-class analysis for a piece and strive to place pitches into audible set-class relationships with one another. The work of Chapters 2 through 4 then, work to bring that analysis to life in the student’s imagination.

1.1. GROUPING, STRUCTURE, AND MEANING

Grouping is an emergent phenomenon—a coincidence of the physical process of reverberatory activity. Reverberatory activity is the physical process by which working memory remembers what it is working on, and is the process that is central to all of cognition. It is the phenomenon wherein a signal continues to be represented, regardless of its continued representation or disappearance in the world.

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1 Examples of this type of work are provided in the section “Analysis as generator of grouping/narrative” in the Closing Remarks. (See Figures 5.1-5.3.)

2 Often, grouping is assumed to occur in the realm of the mental, not the physical. An important presupposition of this dissertation is that the line that is sometimes drawn between mental and physical is illusory; all mental activity is physical.
The geography of the brain is such that deeper cortical levels represent more synoptic understandings of a scene than areas that are closer to the sense organs. Robust reverberatory activity competes well for entrance at successively more inward cortical locations, while a waning reverberatory activity does not. What creates the difference between robust activity and waning activity is a process known as priming, which depends on the combinatoriality of the various elements that are competing to belong to a percept. Combinatoriality, as defined in Jackendoff (2007), is a measure of how well things combine within complex, multivalent networks of potential meaning. Jackendoff explains that (linguistic) “inferences cannot arise simply by adding up the meanings of the words in the sentences: the meaning of each individual sentence is the product of the way the meanings of the words combine, guided by syntactic structure.” When things are combinatorial, they hold the potential for being in some learned relationship with one another. For example, the notes E and C are combinatorial in various ways: they share membership in a C major triad, they form an ic4, they are the tones of the local pharmacy’s doorbell, etc.

If two pitches coincidentally reverberate at the same time, robustly enough to compete well and gain entrance to the deeper, more synoptic levels of the cortex, they can group with one another. The process is self-reinforcing. Items that enter these areas are then promoted further by feedback loops that increase reverberatory activity in the lower levels. In this way, the big picture, known as integration, modulates its parts.

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3 This has been found to be true for listening, somatosensation, and vision. See Hasson (2008).

4 The phenomenon of priming occurs naturally, continuously guiding our moment-to-moment perceptions toward an integrated whole. Priming can also be manufactured, and used to control for certain variables. In psychology research, priming is used to constrain test subjects’ answers. For instance, if a psycholinguist is interested in a word that can have multiple meanings, they can constrain their subjects’ responses by priming the meaning they are interested in before presentation of a target stimulus. This amplifies the meaning they are interested in, over and above the meaning they are not interested in.

Combinatoriality, of course, comes in many species. Two tones hold combinatorial potential any time they share something in common: the same instrumental voice, the same pitch, membership within a common chord or a stepwise motion. The potentialities proliferate the more parameters that are shared among tones. It is a complex fabric of priming that yields integration. Therefore, it is much more practical to approach the discussion of grouping from the standpoint of disjunction. This is where the segmentation literature (beginning with Tenney [1961]) situates itself, as does the empirical literature surrounding Lerdahl & Jackendoff (1980).

Before we discuss those literatures, Figure 1.1 puts the phenomena of grouping, structure, and meaning into context with one another. The three are inextricably bound, and this mutual dependency is depicted by bi-directional arrows. Grouping is being defined here as a self-reinforcing coincidence of robust reverberatory activity. Structure is defined as a set of relationships that bind parts into wholes. Structure entails the qualia that obtain between the parts of a group: do they share membership in a pitch group such as the C major triad, or the local pharmacy’s doorbell? Structure emerges when pitches cluster around one another, binding in various relationships to one another. If a set of relationships can be produced that accommodates the combinatorial properties of the objects being viewed, those objects can become grouped.

The third component of Figure 1.1 is meaning. The nature of the relationships that structure parts into wholes affords meaning, and an object is said to have meaning only when an attitude is formed. The bidirectional arrows of the figure assert that grouping imparts meaning only with recourse to the mediation of structure, and equally, that a received meaning can prime a listener to perceive a particular grouping—again, with recourse to the mediation of structure.
The earliest formal work in grouping was done by the Gestalt theorists, and is based upon various species of similarity, and its counterpart, disjunction. The work was an inquiry into how we group the whirlwind of data in our environment into discrete objects and actions. Primary questions included:

1. Can we define conditions for grouping?
2. Given our current knowledge, can we theorize fruitfully regarding the physiology that constrains or even determines grouping?
3. Can we predict and constrain limits for each of these conditions?

The utility of grouping as a phenomenon is illustrated well in terms of sidewalk-walking. When we walk on a busy sidewalk, among others who are walking at various and varying speeds in various and varying directions, we are called to negotiate a path through a space whose shape is constantly fluctuating. Our path can either follow, surpass, or fall behind the general flow of traffic. The easiest strategy in navigating the space is the former: to fall into tempo behind someone who is walking in our desired direction. By walking at the same tempo in the same direction, we can create a group with those walkers, and generally, other walkers will recognize that group. They are less likely to walk in and among its parts without first assimilating themselves into the group, by meeting the conditions of walking at the same speed, in the same direc-

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>STRUCTURE</th>
<th>MEANING</th>
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<tbody>
<tr>
<td>reverberatory coincidence</td>
<td>relationships that bind members of groups into groups</td>
<td>attitudes that are afforded by relationships</td>
</tr>
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Figure 1.1. The inter-relatedness of grouping, structure, and meaning

tion. If we need to get someplace in more of a hurry than the walkers around us, it is necessary to strategize a series of passes. It might mean walking around walkers or groups, which requires us to make a prediction regarding their future trajectories.

One signal for this type of prediction is to discern the trajectory of walkers’ arm swings and gaze. These signals function to group space into a territory—the walkers’ intended future territory. This is an example where the Gestalt law of continuation is manifest.

If we are truly in a hurry, we might need to borrow some space from another walker—a negotiation that in most cases takes place entirely non-verbally, via arm swings, head angle and gaze, among other signals. Once the space has been negotiated, a pass is possible. If other walkers fail to grant this requested space, it might be necessary to steal space, by violating a group of walkers or a space that has already been grouped into a future territory.

The process of grouping occurs at many levels: objects, parts of objects, and actions are all discerned and predicted in this way. Albert Bregman describes the process of grouping in terms of clustering and assigning properties. Bregman (1990) deals with experience at the level of what he calls *streams*, which he describes as

A computational stage on the way to the full description of an auditory event. The stream serves the purpose of clustering related qualities. By doing so, it acts as a center for our description of an auditory event. By way of analogy, consider how we talk about visible things. In our verbal descriptions of what we see, we say that an object is red, or that it is moving fast, that it is near, or that it is dangerous. In other words, the notion of an object, understood whenever ‘it’ occurs in the previous sentence, serves as a center around which our verbal descriptions are clustered.7

Bregman continues,

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7 Bregman (1990), p. 10.
We can observe this when we dream. When, for some reason, the ideas of angry and dog and green are pulled out from our memories, they tend to coalesce into a single entity and we experience an angry green dog and not merely anger, greenness, and doggies taken separately. Although the combination of these qualities has never occurred in our experience, and therefore the individual qualities must have been dredged up from separate experiences, those qualities can be experienced visually only as properties of an object. It is this ‘belonging to an object’ that holds them together.\(^8\)

This dissertation describes structuring in a similar way: when we structure a series of pitches into meaning, we attach them to one another via potential relationships. Relationships can include higher than/lower than, neighbor to, passing through, in the same scale as or not in the same scale as. The Gestalt laws function to assemble these structures, using timbre, volume, timing and gap as signals, in tandem with the text-mandated signals (such as register, melodic profile, orchestration, proximity/adjacency, metric identity, and harmonically-prescribed groups, etc.) with which much of the segmentation literature deals.

Any parameter can function as a grouping signal, if that parameter provides a perceivable disjunction. In real-time perception, attributes compete as a network: as musical context is revealed, attributes volley for signal strength, and networks of pitches assemble into malleable relationships of varying stabilities. When the center of the cluster is supplanted by a new center due to changing reverberatory activity, all of the relationships that bind pitches to the center of the cluster rearrange themselves, into a new structure that is defined by new relationships around a new center. Structure is necessarily unstable, and continuously becoming. This continuous state of becoming is a result of a limited capacity for reverberatory activity.

\(^8\) Ibid, pp. 10-11.
Bregman calls the forces of a competition “forces of belongingness.” He explains: “perceptual organization comes from this competition, and is a consequence of the distribution of forces across the whole perceptual field, and not the properties of individual parts in isolation.”

That is, the properties of a pitch—its combinatorial properties within some pitch system (such as tonality), but also its timbre, volume, gap and timing—do not in themselves enforce structure; rather, a competition among all of these elastic elements spurs the potential for grouping, and the competition is the engine behind the imposition of structural relationships that afford meaning.

The literature on grouping is really a literature on segmentation, grounded in various species of disjunction. James Tenney (1961) presented one of the first published algorithms for measuring disjunction, grounded in Wertheimer’s early work in Gestalt theory: “The very process of unit-formation necessarily implies relative separation from other units—or from other parts of the perceptual field.”

Tenney identifies a whole as a clang, explaining that, “we may now formulate the factor of similarity, with specific reference to musical perception, as follows: in a collection of sound-elements (or clangs), those which are similar (with respect to values in some parameter) will tend to form clangs…, while relative dissimilarity will produce segregation, other factors being equal.” A clang coheres when it is not separated from its other parts.

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9 Ibid, p. 11.

10 Ibid, p. 20.

11 James Tenney’s Meta Hodos was originally published by the Inter-American Institute for Musical Research, Tulane University, New Orleans in 1964. An adaptation was later published as Meta-Hodos-Hodos in the Journal of Experimental Aesthetics 1.1, 1977. This is now distributed as a separate publication (Lebanon, NH: Frog Peak Music), in several editions. However, in Tenney and Polansky’s 1980 article, “Temporal Gestalt Perception in Music,” the authors explicitly cite Meta-Hodos with a publication date of 1961. Therefore, any citation referring to Meta Hodos throughout this dissertation is referenced as Tenney (1961), and page numbers refer to the second edition of Meta-Hodos-Hodos (Lebanon, NH: Frog Peak Music). This quotation can be found on page p. 31 of that second edition.

A series of events separates into groups via disjunctions. Tenney and Polansky’s 1980 algorithm is based upon the concept of clang that was presented in Tenney (1961): large intervallic distances in the parameters of time, pitch and intensity create disjunctions, and smaller distances along these parameters cause a time-span to cohere, into what they call a temporal gestalt.

However, Tenney and Polansky (1980) express an important dissatisfaction regarding Tenney’s 1961 discussion:

The principles were not ‘operational,’ but merely descriptive. That is, although they [segmentation analyses] were able to tell us something about the temporal gestalts whose boundaries were already determined, they could say nothing about the process by which that determination was made. They described the results of that process, but not its mechanism.\(^{13}\)

The 1980 work aims to provide this missing mechanism, by shifting the emphasis from the clang, or unified group, to the boundary that separates groups. The authors claim that the issue is resolved “by a shift of emphasis from the unifying effects of proximity and similarity to the segregative effects of temporal separation and parametric dissimilarity…” The shift of emphasis from similarity and grouping toward disjunction and boundary formation provides a quantifiable means of analyzing segmentation, post-hoc. However, the theory is still descriptive, in that the mechanism for grouping is still cast in terms of disjunction, or the negative image of a group. What is revealed in a segmentation analysis—group boundaries, disjunction and similarity—do not in themselves account for the grouping process. The mechanism that is missing from the 1961 work is still missing in the 1980 work.

\(^{13}\) Tenney and Polansky (1980), p. 207.
Fred Lerdahl and Ray Jackendoff’s 1983 *A Generalized Theory of Tonal Music* doesn’t claim to posit a mechanism for grouping; rather the work is intentionally aimed toward a post hoc description of potential group boundaries.¹⁴ Lerdahl and Jackendoff (1983) was also based on the Gestalt findings, and was modeled after then-recent work in linguistics. Lerdahl and Jackendoff (1983)’s rule sets are based on disjunction and violations of unity or sameness.

Grouping Preference Rule 2, for example, deals with proximity:

Consider a sequence of four notes \( n_1 n_2 n_3 n_4 \). All else being equal, the transition \( n_2-n_3 \) may be heard as a group boundary if:

(a) (Slur/Rest) the interval of time from the end of \( n_2 \) to the beginning of \( n_3 \) is greater than that from the end of \( n_1 \) to the beginning of \( n_2 \) and that from the end of \( n_3 \) to the beginning of \( n_4 \), or if

(b) (Attack-Point) the interval of time between attack points of \( n_2 \) and \( n_3 \) is greater than that between the attack points of \( n_1 \) and \( n_2 \) and that between the attack points of \( n_3 \) and \( n_4 \).¹⁵

Grouping Preference Rules 3-6 deal with various species of similarity. Grouping Preference Rule 3, for instance, states:

Consider a sequence of four notes \( n_1 n_2 n_3 n_4 \). All else being equal, the transition \( n_2-n_3 \) may be heard as a group boundary if:

(a) (Register) the transition \( n_2-n_3 \) involves a greater intervallic distance than both \( n_1-n_2 \) and \( n_3-n_4 \), or if

(b) (Dynamics) the transition \( n_2-n_3 \) involves a change in dynamics and \( n_1-n_2 \) and \( n_3-n_4 \) do not, or if

(c) (Articulation) the transition \( n_2-n_3 \) involves a change in articulation and \( n_1-n_2 \) and \( n_3-n_4 \) do not, or if

(d) (Length) \( n_2 \) and \( n_3 \) are of different lengths and both pairs \( n_1-n_2 \) and \( n_3-n_4 \) do not differ in length.¹⁶

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¹⁴ Lerdahl and Jackendoff (1983), p. 3-4.

¹⁵ Ibid, p. 345.

¹⁶ Ibid., p. 345.
Hasty (1981) shifts the discussion from disjunctions in the observable score to the processes of attention in an individual listener. He intimates that disjunction raises awareness: “a change of value in a particular domain creates a discontinuity—a difference which isolates distinct objects for our attention.” However, the connection between disjunction-motivated awareness and the phenomenon of grouping still eludes us: just how does “isolating distinct objects for our attention” yield groups? 1.1.2 answers to this problem.

1.1.2. A MECHANISM FOR GROUPING

The connection that this dissertation asserts between the rousing of awareness and grouping is that of priming. The central point is that the rousing of attention that is accomplished by disjunction has physiological consequences that lead indirectly to grouping. This physical consequence was introduced earlier: *reverberatory activity*. A disjunction foregrounds items with which the disjunction binds, by enhancing reverberatory activity for those blinded items. Consider again the geography of the cortex, wherein synopsis occurs in locations far from the sense organs. A clear correlation has been observed between distance from sense organs and the synoptic/myopic binary for many of the modalities. Integration is competitive: when a disjunction foregrounds items that are combinatorial, those items prime one another; this enables successful entry into the deeper cortical levels, where progressively more-synoptic percepts are built.

Disjunction plays a large role in the process of selecting what should reverberate. This is adaptive: a disjunction signals that which is/was not expected, promoting the allocation of atten-
tional resources. However, the element of combinatoriality is integral to *sustained* reverberatory activity. Reverberation is only sustained when the object it foregrounds has high combinatorial potential within a continually evolving scene. Items with high combinatorial potential will help to promote one another; this process is termed *priming*.

When priming occurs, changes occur at the synapses of networks that represent items associated with a stimulus. The synapses change such that it becomes very efficient for that set of associations to continue being elicited. For example, if you are looking at a stack of money and the word *bread* comes up in conversation, there is a higher probability that you will think of the colloquialism *bread as money* than if the concept of money had not been elicited. Since money *has* been recently elicited, its associations are efficient to sustain. The concept of money has been primed.

As another example, if a western listener finishes listening to a piece that uses pitch class C very often and in locations that emphasize the pc, and (after a short pause) the tones C and E sound from the microwave in another room, there is a high probability that you will conceptualize the tones as scale degrees 1 and 3 within the larger system of C major. Since C major has been recently elicited, its associations are efficient to sustain.

Priming works in two temporal directions. When two categorically-related items are presented (some item A followed by some related item B), item A proactively primes the future item B and item B retroactively re-ignites the back-related item A. For example, if a listener perceives a distinct vibrato on a tone and this vibrato soon re-occurs on a not-too-distant pitch, the

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18 Meyer and Schvaneveldt (1971)
19 Zucker and Regehr (2002)
two pitches treated to the vibrato can prime one another. Their coincidence of robust reverbra-
tory activity will allow them to group.

Priming is promiscuous: many species of disjunction can prime a listener to be receptive
to reverberation, and many species of combinatoriality can reinforce the reverberation. Howev-
er, continued context accumulation ensures that priming is gradually pruned to support only
those items that assemble into an integrated whole. It is the combinatorial potential in a scene
that prunes unlikely associations. The pruning process unifies what is ordinarily highly di-
verse—the heard signal—into a percept. However, an important part of this dissertation is the
idea that percept is not a stable phenomenon. Because of the promiscuity of both disjunction and
combinatoriality, priming is constantly fluctuating. This forms the basis for structural play.

Any parameter that provides a disjunction can serve to prime the listener to notice that
parameter and items that are associated with one another by that parameter. Figure 1.2 illustrates
the Gestalt law of similarity in terms of a five-note pitch set, \{v, w, x, y, z\}. The symbols repre-
sent vibrato and a extended duration, respectively. The figure demonstrates the Gestalt law of
similarity. The figure models two things: the separation of pitches v and x from the larger net-
work, their subsequent grouping. Network \{v,w,x,y,z\} will take the form of musical pitches
shortly, in section 1.4. For now, the concept is presented in the abstract, in order to avoid a
lengthy discussion of how registral change, harmony, meter, and other non-variable (text-man-
dated) aspects of a network can constrain grouping.

\[
\begin{align*}
\{v, w, x, y, z\} & \quad\rightarrow\quad \{v, w, X, y, z\} \\
\end{align*}
\]

 Figure 1.2. The Gestalt law of similarity models (1) the separation of v and x
from the larger group \{vwxyz\}, and (2) their grouping via proactive and retroactive priming.
Figure 1.3 presents a different scenario for the pitch set. The signal strength of vibrato and extended duration compete. This is an example of a network which, over the course of context accumulation, will potently restructure many times before resolving into a synopsis, as the priming parameters of vibrato and extended duration continually usurp one another.²⁰

\[
\begin{align*}
&\{v, w, x, y, z\} \\
\to &\quad ?
\end{align*}
\]

**Figure 1.3.** Competition among parameters

Since both priming and combinatoriality are promiscuous, one of the confounding issues in the segmentation literature is how parameters resolve when a conflict such as this ensues. Tenney (1961) specifies that the magnitude of a disjunction, relative to other disjunctions within that same parameter, yields a useful metric. However, Tenney and Polansky (1980) note that this still doesn’t allow for a comparison among parameters.²¹ Tenney and Polansky (1980) suggest combining multiple parameters via a multidimensional space, in order to measure a distance between two points: a distance that “takes into account the contribution of intervals in each individual parameter, but effectively combines these into a single quantity.”²² This permits multiple parameters to be reflected in an analysis. David Lefkowitz and Kristin Taavola (2000) assert that a *change in the rate of change* “provides a non-arbitrary method of determining which parameters are (and to what extent each parameter is) relevant.”²³ This allows their algorithm to

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²⁰ This is pending a listener’s ability to perceive those parametric usages.


generalize to multi-dimensional attributes such as timbre. Christopher Hasty (1981) argues that the most-reinforced disjunction wins: when parameters reinforce one another by co-locating, those parameters win the competition for strongest disjunction.24

The issue that this dissertation takes with the segmentation literature is that it attempts the impossible. It attempts to hold time still and formalize a snapshot of grouping that really can only exist in the ideal. Hasty (1981) stresses that the continual volleying of sources of disjunction form the basis of phenomenal experience of structure,25 and this dissertation takes and elaborates upon that stance.

1.1.3. DISJUNCTION AS AN UNSTABLE SET OF DEFINITIONS

The strength of a disjunction is ever-changing, due to the changing neural state of the listener. After all, the listener is being subjected to a constant stream of disjunction-rich input. This stream continuously changes the structure of the listening brain in many ways. The most relevant for this discussion is that of just-noticeable difference categories. Dora Hanninen (2012) pays heed to the difficulty of setting weights in terms of variances among listeners in just-noticeable-difference categories: “[I]ntervals in all sonic dimensions are filtered through the perceptual abilities and habits of the observer and limited by just-noticeable differences.”26 I will take it a step further and assert that the listener’s perceptual abilities are unstable because their just-noticeable differences are inherently unstable, and that this is a fundamental part of musical listening and the experience of becoming.

26 Hanninen (2012), p. 25.
Neural representations of articulation, vibrato and timbre vary in terms of fineness of distinction among categories of distinction. *Just-noticeable difference* is defined as the smallest detectable difference between a starting and a secondary level of a particular sensory stimulus. It represents a minimum change that can be perceived by a listener in terms of one parameter. To derive values for these measures, psychoacousticians test and average a large sample of listeners. It is important to stress however that these measures are averages, and are not consistent among listeners, or even within one listener over time. By studying vibrato, a listener can develop finer categories for each dimension of vibrato: its speed, its depth, its smoothness profile, and its change in spectral content. Even among what are traditionally labelled *expert listeners*, the biological reality is that just-noticeable difference is subject to the immediate needs of attention.

Figures 1.4a and 1.4b and the paragraphs below demonstrate just how variable these values can be within a single listener over time. The concept of *categories* is paramount to the discussion, as gradients in just-noticeable difference are *categorical*. A categorical gradient means that at some point during a gradual change in a parameter, change is perceived as a categorical shift, and the categories of change do not necessarily correlate with increments of change in the raw signal. A popular illustration of a vivid categorical gradient is the gradient between the phonemes $b$ and $p$. $B$ and $P$ are highly similar: the primary difference between them is *voice onset time*. In the formation of $p$, the lips form a shape, and air pressure builds behind the closed lips. The speaker releases air without vocal cord vibration at first, beginning vocal cord vibration shortly later. This moment is called *voice onset time*. The phoneme B, on the other hand requires voice onset time to be early in the process, even preceding the build-up and release of air. The timing between the air burst and the voice onset determines which of the categories—either
or $p$—will be perceived. When researchers manipulate voice-onset time synthetically, what has been found is that although the change is presented as a gentle gradient, our experience usually reflects a sudden, categorical shift from one phoneme category to the other. There is a moment when the observer hears the signal switch unequivocally from $b$ to $p$. The reader is invited to experience this phenomenon firsthand.\(^{27}\)

Categories fluctuate constantly, and this explains how a listener can adjust their hearing to accommodate a foreign accent or lisp. This is demonstrated in Figures 1.4a and 1.4b, which represent two neural states for the same network of cells.

Some details regarding the figures are necessary. Both Figure 1.4a and 1.4b contain the same number of cells, but connections between the various cells of each representation are allocated differently. It is the allocations which differentiate the categorical boundaries for the listener of Figure 1.4a from those of the listener of Figure 1.4b. The figures each represent three levels of hierarchical processing. The highest level is represented by the largest circles, and represents the most synoptic level of the heuristic. The smaller circles provide input to the larger ones, and this is represented by arrows. The representation is simplified for heuristic purposes, in that all of the arrows leave small nodes and arrive at larger nodes, and represent *excitatory* synapses; none of them are *inhibitory*. (The synapses don’t function to inhibit the receiving neuron, they function to support the receiving neuron and prepare it to fire.) In reality, smaller nodes can be stimulated by each other, and can even in rare cases be reciprocally stimulated by higher level nodes. In addition, many neural contact zones function to inhibit a receiving cell’s ability to fire. These options have been excluded from Figures 1.4a and b for simplicity’s sake.

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\(^{27}\) To experience this phenomenon firsthand, the reader is invited to view the following video excerpt, cued 3:06 to 3:28: [http://www.youtube.com/watch?v=xY6DBIsI5I](http://www.youtube.com/watch?v=xY6DBIsI5I)
The arrows in the picture represent places where efficient connection is possible between a firing small node and a receiving large node. Theoretically, any cell could fire at any other cell. This promiscuity is constrained however, by various structural elements of both firing cells and receiving cells. For instance, a cell membrane is dotted with tiny channels, called *ion channels*. Ion channels allow ions to enter a cell. It is a surge in ion exchange which motivates a neuron to fire, so a location with a high density of channels has the most likelihood of dispersing neurotransmitter. In addition, receiving cells form pimple-like structures called *dendritic spines*. Dendritic spines increase the surface area of the cell, encouraging the ability to absorb neurotransmitter in those locations. The arrows indicate locations where these structural enhancements (density of ion channels and increased surface area) encourage efficient connections.

The small nodes (on the far left of both 1.4a and 1.4b) are capable of fine distinctions in a parameter; each of their respective receptive fields is tiny. The larger nodes take their input from multiple tiny nodes, so their receptive field is larger, and categories among these nodes are *less fine*. If two (or more) small cells fire efficiently at a medium cell, the medium cell will fire. This means that the fine distinction between the small cells is partly lost to the medium cell: a range that represents all of the small nodes’ combined ranges comes to be represented. The medium cells, in turn, serve to stimulate the largest node to the right, which generalizes even further. The result of these tiers of generalization is a categorical gradient of just-noticeable difference.

In Figure 1.4a, the ratio from receptors to next-generation cells is exactly four to one. However, at any given moment the points of efficient contact between cells can change. Ion channels, as well as other structural enhancements, are generable and expungible. Therefore, neurons can constantly relocate their points of efficient connection and can generate new combi-
nations of connections within a fraction of a moment. Hence, Figure 1.4a can be re-structured into Figure 1.4b in that fraction of a moment. In Figure 1.4b, the ratio of small, fine nodes to medium nodes is different from that of 1.4a. Therefore, what constitutes a category at the medium level differs among the two neural states.

![Figure 1.4a](image1.png) ![Figure 1.4b](image2.png)

**Figures 1.4a,b.** Hierarchical processing into categories of just-noticeable difference, and re-structured categories of just-noticeable difference

The objective of Figures 1.4a,b is to illuminate that categorical boundaries are malleable within a single listener. Since categorical boundaries define the conditions for what constitutes a disjunction, it follows that what constitutes a disjunction is also malleable within a listener.

In order to recognize this biological reality of fluctuating definitions of disjunction, the ruleset for deriving probable heard groupings incorporates flexible definitions for what consti-

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tutes a disjunction. This ruleset is presented and discussed in section 1.2, from the standpoint of a set of tools for performers. An important challenge in music performance is conveying vivid grouping, and in order to accomplish this, a listener’s definitions of disjunction needs to be controlled to as high a degree as possible. Performers who wish to be extremely persuasive and/or unambiguous with their grouping should be very attentive that the parameters of volume, vibrato, gap, etc. reinforce one another to a high degree, and that categories are distinct enough that they are perceivable by a sizable portion of their audience.

1.2. A RULE-SET FOR GROUPING

The formalized rule-set for deriving projected structure in live performance is presented below, as Figure 1.5. It is an extension of the disjunction-based literature centered around Tenney and Polansky (1980) and the preference rule format of Lerdahl and Jackendoff (1983). However, it extends this work beyond the realm of text-based score analysis by incorporating fluid performance elements such as vibrato, timbre, articulation, gap, and timing into the analysis of grouping. The ruleset is oriented toward a performer’s active creation/encouragement of groups, rather than toward a post-hoc analysis. That is, the formalized rule-set could be applied computationally to a performance of an excerpt to derive likely groupings and structurings for

29 This is of course the curse of the segmentation literature: that the inability to assert sure values among parameters makes text-based, and even recording-based analysis impossible.

30 Lerdahl and Jackendoff (1983) allows that a performer might “tip the balance” in a case where the printed score could yield ambiguity. See p. 63. However, the Gestalt infrastructure of Lerdahl and Jackendoff (1983) doesn’t prohibit the reader from adapting its concepts to address issues that differ among performances. One author who has formally proposed such an adaptation is Alan Dodson. Dodson (2002) presents phenomenal micro-accent to account for a performer’s use of agogic or dynamic accent to “tip the balance” toward a stable understanding of meter in the case of ambiguity. Lefkowitz and Taavola (2000)’s “change in the rate of change” provides a means of quantifying the more challenging parameters that are relevant in performance, such as timbre and vibrato.
that performance, allowing for all the most likely preference rule outcomes. This might be followed up empirically by priming listeners to notice various parameters, and asking if their hearing correlates in any way with the highly probable structures that are derived. Such an empirical validation is outlined in the Closing Remarks. However, the primary usage asserted by this dissertation is pedagogical: the rule set can be used to strengthen a performer’s ability to project groupings, structure, and, as will be proposed in Chapter 2, narrative. Some exercises in applying the ruleset are provided in section 1.4.

The rule-set is grounded in two elements: the elicitation of attention, and the sustenance of attention. Disjunction and the absence of disjunction comprise the first element; combinatoriality/potential for priming comprise the second element.

The first element will be elucidated first. Disjunction and the absence of disjunction are illustrated in Figure 1.6. Three strategies can be implemented to create, support, or suppress potential disjunctions: matching, trajectory, and disjunction. Matching entails using a similar or same dynamic, spectra and/or vibrato on any two or more pitches, as in Figure 1.6a. A trajectory

<table>
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<tr>
<th>A pitch groups into relationship with non-adjacent pitches when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• a disjunction precedes, follows or characterizes the note (a salient dynamic, timbre, vibrato speed, depth or smoothness profile, a gap/silence), and</td>
</tr>
<tr>
<td>• a similarity or trajectory of salience re-instates the pitch’s reverberatory activity via retroactive priming, and/or</td>
</tr>
<tr>
<td>• a similarity or trajectory of salience proactively primes the pitch.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A pitch’s reverberation ceases before next-level grouping when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• no disjunction precedes, follows or characterizes the note, and/or</td>
</tr>
<tr>
<td>• no similarity or trajectory re-entices the pitch’s activation.</td>
</tr>
</tbody>
</table>

Figure 1.5. The rule-set.
is formed by varying some parameter in a systematic way, such that it changes in predictable increments per predictable unit time: rates and increments of change can be linear, logarithmic, or any other predictable series such as those of Figure 1.6b. The condition that has the opposite effect of matching and trajectory is disjunction, which is outlined in Figure 1.6c. A disjunction comprises any change in any parameter, or any change in the rate of change for any parameter, that defies an increment-size or rate of change that has recently been established. A lack of disjunction entails a state of matching or trajectory. A disjunction occurs for example when a performer treats a series of pitches to a trajectory of decreasing volume, but interrupts this trajectory with a pitch of suddenly much higher or lower intensity. Another example might be a trajectory which decreases vibrato speed at the rate of 1 increment per unit time, but suddenly begins decreasing at a rate of 3 increments per unit time. A particularly powerful type of disjunction is the silence-gap. Silence-gaps open up a space wherein there is less competition for attention: a moment’s pause before or after a pitch gives that pitch a non-competitive environment in which to reverberate.31 Some silence gaps are mandated by a written rest mark in the score. Other silence gaps are performance-specific: a wind player inhales; a string player lifts her bow.

Matching, trajectory, and disjunction come in many varieties and can be either simple or composite. For example, a very popular use of trajectory is a crescendo or decrescendo. Another use is an accelerando or ritardando. Trajectory can also be created using articulation strokes: pitches of equal textual durations (for example, running eighth notes) become gradually longer, or gradually shorter. These strategies for creating a trajectory can be combined in various ways to support one another. The simplest types of disjunction that are relevant to this study include

sudden changes in volume or spectral content, or the use of a silence gap. More composite species of disjunction include a change in vibrato speed or vibrato depth, a change in the quality or rate of change of spectral content that is employed by a vibrato, or a change in the pattern of spectral ratio changes applied to each tone (articulation).

Figure 1.6 was devised using a diatonic ascent from scale degree 1 to 5 in order to illustrate the second element of Figure 1.5: the sustenance of attention. A strong disjunction that cap-
tures attention but is not followed by some associated disjunction within some window of time wanes, due to the absence of retroactive or proactive priming. The absence of priming allows new information to overtake an event. To reiterate, tones prime one another any time they share something in common. This can include text-based parameters such as membership in the same scales, or performance-based parameters such as vibrato quality. The priming potential between events proliferates the more parameters that are shared among tones: if parameters reinforce one another, a grouping is strongly projected. In Figure 1.6, the tonic triad of C major uses performance nuance to reinforce the learned grouping \{C, E, G\}.

1.2.2. GROUPING AMONG ADJACENT VS. NON-ADJACENT PITCHES

Two types of group can be formed by manipulating the conditions of matching, trajectory and disjunction: groups among adjacent pitches, and groups formed from non-adjacent pitches. The principles are the same for both groups, except that the law of proximity makes groups among adjacent pitches much more efficient to project and hear.

Groups formed of adjacent pitches are achieved via a lack of disjunction. This occurs when pitches either match or form a smooth trajectory with their adjacent pitches. Theoretically, if many pitches occur in a row without any salient disjunction in the timbre, vibrato, volume, ar-

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33 Using these parameters in a way that is contrary to text-based combinatoriality is a great exercise, and might in cases yield a lovely ambiguity, and in others reveal an text-borne combinatoriality that was not initially evident. However, a grouping that isn’t supported by disjunctions inherent in the text is probably less likely to yield persuasive grouping than a grouping that is.

34 “Easier” here refers to a hypothetical. To claim that grouping is unequivocally easier among adjacent pitches clearly discounts the technical idiosyncracies of playing various instruments. Some pitches match more easily than others; on most instruments, there is a type of “wolf” tone or analogue to the wolf tone that does not assimilate into groups easily, without a special set of actions on the part of the instrumentalist.
ticulation or timing, or any text-mandated elements such as melodic profile, register, or harmony, etc., then something external to the world signal would need to be imposed upon the pitch series in order to structure it.\textsuperscript{35} Otherwise, it would group indiscernibly to infinity. Of course, a music without disjunction is not a likelihood. However, the hypothetical scenario serves to illustrate the effect of a salience-matching or to some extent, a trajectory.\textsuperscript{36}

Groups formed by non-adjacent pitches are achieved against the law of proximity in diachronic terms, via disjunctions that either match one another or form a trajectory with one another. The disjunctions function to separate pitches from the ongoing stream of pitches and generate robust reverberatory activity. If a reverberating pitch then associates with other pitches that share a similarity or partake in a trajectory along some parameter, it will retroactively and proactively prime those pitches, ensuring that they compete well together. The most vivid connections among non-adjacent pitches occur when multiple parameters are matched or graduated in isolation.\textsuperscript{37} Ambiguity and/or variability in perception can be created intentionally, if desired, by using parameters independently of one another or in contrast to text-based grouping signals (such as register, metrical location, or harmonic membership).

The two types of group (grouping among adjacent pitches and grouping among non-adjacent pitches) are also at the mercy of text-mandated groupings. For example, if a performer matches every pitch in a whole-tone pitch group that first ascends then descends (as happens in Figure 1.7a), pitch profile will serve as a grouping agent. If a performer does the same with a dis-

\textsuperscript{35} Ordinarily, this imposition is meter. It’s been found that in the absence of disjunction, meter will always be imposed in sets of 2 or 3. Therefore this example is truly a hypothetical. See Essens and Povel (1985).

\textsuperscript{36} Categorical just-noticeable difference can impose disjunction on a smooth trajectory, regardless of the world signal.

\textsuperscript{37} This agrees with Hasty (1981)’s assertion that disjunction weights increase when they co-locate with another disjunction.
atonic scale that ascends for one octave, the learned segments whose boundaries lie at scale degrees 1, 3, 5, and 8 will function as grouping agents due to membership vs. non-membership in the tonic arpeggio (Figure 1.7b) or the asymmetry of the diatonic system would group scale degrees 1-4 and 5-8 (Figure 1.7c). If a duration series uses the pattern long-short-short-long-short-short, the long notes will perceived as beats and the short notes would group in either a forward or backward direction, toward a long (Figures 1.7d, 1.7e).38

The types of disjunction outlined in Figure 1.7, along with written rests and mandated slurs and dynamics comprise most of the segmentation literature. I suspect that this is because these text-based elements are in theory stable from performance to performance—or at least appear stable on paper. Items that vary in performance on the other hand are difficult to document and are short-lived: they may only occur two or three times in a work’s two-hundred year history. Nevertheless, performance variables impact grouping during live listening, and an analysis that leaves them out is incomplete. Timbre, volume, and vibrato can function in the manner of Lerdahl and Jackendoff (1983)’s GPRs 3 (change) and 4 (intensification), and a silence-gap can function in the manner of GPR 2 (proximity).39

Figures 1.7 a-e. Some types of text-based groupings

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38 The study that famously defined the conditions under which this phenomenon occurs is Leon van Noorden’s unpublished doctoral 1975 dissertation.

1.3. TWO NUANCE ANALYSES

Two analyses of disjunction, matching and trajectory demonstrate the rule-set, for two performances of the same excerpt from BWV 1033. The analysis relies on an idealized listener, who behaves in the way a human listener behaves: he/she is subject to changing states of priming due to accumulating context, and therefore enjoys continually-evolving preference rule outcome tendencies, just as a listening human does. However, in this theoretical context, the listener’s priming is considered to be controlled—making their grouping predictable based on aspects of the sound signal. The idealized listener is equipped with sufficiently-fine categories of just-noticeable-difference in each of the parameters of vibrato (speed, depth, etc.), timbre (spectral content, changing spectral content) and volume (for all pitches within the relevant pitch range). Finally, the listener is idealized in the sense that they use elements of timbre, volume, vibrato, timing and gap as primary grouping signals; this is opposed to a listener who is intent upon hearing a pitch-meaning based structure (for example, a Zug) and whose top-down mechanisms amplify parts of the signal that are otherwise not prominent in the world signal.

The pitch network is a figure from J.S. Bach’s BWV 1034 for flute and keyboard. The continuo halts, and traditionally, the fragment \{BACBABG\} that precedes the D of the melodic reiteration is taken out of time, as a mini-cadenza. It is therefore not strongly subject to the constraints of a well-formed meter or harmonically-based metrical subdivision. These conditions (unmetered and unharmonized) are optimal for viewing pitch network structure that emerges from fine performance nuance. This is because meter and harmony are powerful grouping agents. In an unmetered and unharmonized bit of music, the listener relies more heavily upon
nuances to structure groups. The two performances that will be discussed treat the figure in opposing ways: one moves the listener up through pitch space, the other moves the listener down through pitch space before returning up.

![Figure 1.8. A figure from BWV 1034. Pitches are numbered diachronically, 1-8, in order to facilitate discussion.](image)

### 1.3.2. PERFORMANCE #1: UP

Performance #1 can be heard at [https://archive.org/details/SupplementalFile1UP](https://archive.org/details/SupplementalFile1UP). The performance uses a trajectory of volume through the 1\(^{st}\), 3\(^{rd}\) and 8\(^{th}\) pitches: B, C and D. These pitches move up through the diatonic scale. The performer suppresses the 2\(^{nd}\) pitch in the network (A) by first using a lighter color than adjacent B and C, and then forming a trajectory from this lighter color into the darker color of (C). Then, the performer hurries through the 6\(^{th}\) and 7\(^{th}\) pitches into the D (pitch 8), in effect suppressing the competing possibility (which is explored in performance #2: down through pitch space). Energy increases toward the end of the figure, rein-

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40 In cases where a meter and/or explicit harmony govern a listener’s understanding of structure, nuance can function as a reinforcing, contradicting, or in many cases, ambiguity-resolving. Dodson’s (2002) extension of Lerdahl and Jackendoff (1983) acknowledges two types of phenomenal accent that are at the discretion of the performer, and that function to resolve a textual ambiguity. Dodson names his phenomenal accent categories *dynamic micro-accent* and *agogic micro-accent*. Dodson (2008) uses this extension to correlate performances with various Schenkerian middlegrounds.
forcing the concept of up through pitch space via a motion up through loudness space and up through tempo space. There are no silence-gaps in the figure, and this encourages a sense of connection between the opening B (pitch 1) and the D of the melody proper (pitch 8). Because the C (pitch 3) matches spectral dynamic and vibrato with B (1) and D (8), and because it forms a stepwise motion between B and D through diatonic space,\textsuperscript{41} C (pitch 3) is a logical stepping stone between B (pitch 1) and D (pitch 8) for our idealized listener.

![Figure 1.9](image)

**Figure 1.9.** The performer encourages a sense of UP through B and C to melody note D.

1.3.3. PERFORMANCE #2: DOWN

Performance #2 can be heard at [https://archive.org/details/SupplementalFile2DOWN](https://archive.org/details/SupplementalFile2DOWN).

The performance uses a silence-gap between pitches 7 and 8 (G and D) to constrain our idealized listener’s understanding of pitch connections. The gap accomplishes two things simultaneously. First, it marks \{G\} as a salience: since no notes follow \{G\}, \{G\} can reverberate in memory. Second, it separates the figure, which can be understood as an interpolation, from the \{D\} of the melody proper, encouraging a sense of end function for the interpolation, in essence closing group \{B,A,C,B,A,B,G\}, thus separating it from \{D\}.

\textsuperscript{41} Narmour (1990) applies the law of continuation to predict musical path, deviation from path, and therefore affective response to deviation.
Two trajectories place pitches 1, 5 and 7 (B, A and G) into a trajectory: first an increase in spectral brightness which peaks at A, and then a decrease in spectral brightness. The decrease reinforces the motion down through pitch space with a motion down through a timbre space. A separate trajectory of increasing speed groups pitches 2, 3 and 4 \{ACB\}, despite their non-step-wise status (the performer challenges the law of continuation). The trajectory of increasing speed culminates on pitch 5 (A), which is then extended. The increased duration of pitch 5 encourages its emergence from the group established by the timing trajectory. Pitch 6 (B), on the other hand, is subsumed by the larger motion \{-AG\}, despite its text-borne inclination to function as a disjunction due to change of direction. This is because pitch 5 (A) is the object of a trajectory, and pitch 7 (G) is the last event before a gap. Pitch 6 is merely a pitch of similar spectra and vibrato, sandwiched between these two privileged notes. Pitch 6 matches, and therefore groups with its adjacent pitches. The reverberation of B, A and G yield a perception of motion down through the diatonic scale. The performance further reinforces this motion via a motion down through tempo space and volume space.

In the performances of Figures 1.9 and 1.10, matching and trajectory function to subsume pitches within groups formed among their adjacent pitches. Disjunctions of various species

Figure 1.10. The performer encourages a sense of down, through B, A, G before re-embarking on melody.
bring pitches to the fore, creating larger scale motions of up and down, respectively. Both performances use speed trajectory to suppress elements: hurrying through a series of notes has the effect of discouraging reverberation for those pitches. In places where pitches were given some space to spread out in memory, the opposite effect was achieved. Both performances also use trajectories through other spaces—volume spaces and timbre spaces—to reinforce a pitch motion that is simply not impeded by things that might obscure it, such as a text-borne disjunction that is allowed to express itself, a gap, or an unsystematic or non-reinforcing use of timbre or dynamic.

1.4. EXERCISES IN GROUPING

This section provides the first of several exercises toward the pedagogy of musical expression that are dispersed throughout the dissertation. As explained in the Introduction, many (although not all) of the exercises are taken from the flute repertoire, but one can apply these concepts to all of the wind and string instruments, and to some degree the piano and pitched percussion instruments. The goal of the first stage of exercises is to learn to group pitches that are not necessarily adjacent to one another. The function of grouping, in essence, is to constrain the promiscuity of priming with as much persuasiveness as can be garnered. The greater command a performer holds over the devices of grouping, the greater potential they hold for encouraging structure for their listeners. The tools of grouping are based on the rule-set of Figure 1.5: matching, trajectory, and disjunction for each of the parameters of dynamic, vibrato, timbre, and timing. Exercises 1 and 2 deal with matching and Exercise 3 deals with trajectory. Ability to create disjunction is in practice a natural byproduct of these three exercises. Exercise 4 deals with the more complex task of creating groups-within-groups.
The exercises pose some difficult technical hurdles, which should be conquered as necessary. For example, if a grouping asks the student to match the volume of the short-tubed C to the long-tubed D, there is a great deal of finessing to be done, since the air pressure needed to play a C is so drastically different from the air pressure needed to play D at the same timbre. Similar hurdles can be found for all instruments. If it is the first time the student is conquering these technical hurdles, the exercises should move much more slowly than if they’ve already worked out how to achieve this. In addition, as explained in the introduction, positive feedback regarding a creative choice that was made should always be given first, followed by some silence. Critical feedback regarding the technical work that needs to be done should be presented as a separate feedback.

1.4.2. EXERCISE 1: USING MATCHING

The goal of Exercise 1 is to create groups among non-adjacent pitches by using matching. That is, the student is asked to use a single parameter to create like-timbrres or like-volumes, etc. on several notes through the excerpt of Figure 1.11. The likenesses will function to group these pitches and reveal a large structure among non-adjacent pitches.

Figure 1.11. The pitch group for Exercise 1

42 The fingering for C creates a short air-tube length because the final closed hole of the flute is very close to the head joint. The D, on the other hand, closes keys that are very far from the headjoint, thus creating a long tube of air before pressure dissipates at the final closed hole. This means that on the flute, blowing strength and angle will differ drastically for the simple stepwise motion C to D.
Three suggested groupings of Figure 1.11 are provided below, as Figure 1.12. All three
groupings encourage the pitches of Figure 1.11 to group into ascents from scale degree 1 to ei-
ther scale degree 3 or 5. However, the locations of the large-scale stepwise ascents differ. For
example, the first grouping (Figure 1.12a) groups the first, second, fifth and eighth pitches into
an ascent to scale degree 5. The second grouping (Figure 1.12b) groups the first and fourth
pitches into an ascent to scale degree 3. The third grouping (Figure 1.12c) groups the first, sec-
ond, third, and eighth pitches into an ascent to scale degree 5. Once these three groupings have
been practiced, the student should invent and explore alternative groupings. At all times, care
should be taken to isolate the parameters, as it is easy to revert to a favorite parameter.

The student should aim to accomplish the groupings of Figure 1.12, as well as their own
groupings, in all the keys. One objective is technical: to develop skills in each of the parameters
for each of the keys. This is in line with the teaching of the great acting teacher Constantine
Stanislavski, upon whose work all of the exercises of this dissertation are based. Stanislavski
demanded of his students a fluid versatility; this is expounded in Chapter 3.

An equally important goal, which is also in line with Stanislavski’s work, is to develop a
student’s ability to explore groupings and reflect upon them. The student should be guided to-
ward wondering which of the parameters seems the most powerful or the most subtle in this con-
text: for each of the groupings, as well as for each of the keys used. The reflecting part of the
exercise, which might be aided with a recording device, draws their attention to the grouping
they are projecting, and also prepares the student for the intense listening that will be required of
them in the exercises of later chapters.
A matching exercise: three different groupings, to be practiced in a variety of keys, taking care to isolate parameters.
1.4.3. EXERCISE 2: MIXING PARAMETERS

Exercise 2 builds upon the matching work of Exercise 1, but asks the student to mix parameters, in two, three, four and five-way crosses. For example, how does slur plus dynamic compare to slur plus tenuto, or slur plus vibrato, etc.? At this point, the tenuto might be fruitfully replaced with a staccato marking, and this might motivate some engaging exploration of more possibilities.

Figure 1.13 presents pairs of parameters that might be explored at this stage. Complete exhaustiveness is not the highest priority, but it might be helpful for some students to work systematically using the parametric pairings of Figure 1.13. Some students will be discouraged by such a systematic way of exploring, and others will find safety and direction. The teacher should respect those preferences, as they will likely be the student’s favorite means of exploring for all of the exercises, and the student’s comfort level may be challenged to a high degree in some of the later exercises. Developing a sense of safety in method for these early exercises is key to achieving more flexibility later. At the same time, the student’s exploration should be comprehensive; the teacher should be aware of what’s been explored and what’s not been explored, and guide the student toward combinations that seem important, but have been skipped.

<table>
<thead>
<tr>
<th>slur—dynamic</th>
<th>dynamic—tenuto</th>
<th>tenuto—vibrato</th>
<th>vibrato—gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>slur—tenuto</td>
<td>dynamic—vibrato</td>
<td>tenuto—gap</td>
<td></td>
</tr>
<tr>
<td>slur—vibrato</td>
<td>dynamic—gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>slur—gap</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1.13.** Exploring two-way crosses systematically.
1.4.4. EXERCISE 3: CREATING A TRAJECTORY

Exercise 3 asks the student to create groups by using trajectory. A trajectory is a type of similarity, in that increment of change and direction are similar across the life of a gradient along some parameter. For example, a simple example of trajectory is a crescendo. The volume and/or spectral content of the sound increases at a constant or logarithmic rate across several tones. Other usages of trajectory include vibrato: vibrato might become more rapid at a constant or logarithmic rate, or it might deepen to a constant or logarithmic degree.

Figure 1.15 provides two different trajectory-based groupings for the excerpt of Figure 1.11. The symbols are shown in graduated sizes/increments and the size of the marking relates to its intensity. For instance, a normal-sized tenuto mark should be less tenuto than an exaggerated (longer) tenuto mark. For parameters that are not simple binaries that can be easily reflected with a single icon (such as vibrato, which encompasses speed, depth, and another measure which could be called “severity” and reflects the shape of the vibrato pulse/the relative lengths of troughs and peaks respectively), the student should begin exploring more options. For example,
a longer vibrato mark might mean a deeper vibrato, or it might mean a quicker or a slower one. The student should be guided through all of these options, and asked to reflect upon their impact.

Both of the sets of Figure 1.15 reflect the same larger grouping, but their peak is in a different location. The student should be asked how this seems to impact the music. For instance, how does the location of the peak change the internal grouping? Does it feel different to hear or to play it one way or the other? If they are able to provide an answer, the teacher should be supportive of their thought, even if it is clumsy or vague. If the student is not sure how to communicate an answer, it is sufficient at this point that they think about it for a moment. The student will be asked more specific questions regarding scale degrees, implied harmony and meter in later exercises. Figure 1.15 should next be performed using a variety of combinations of trajectory, perhaps using the pairings of Figure 1.13 or 1.14. Once Figure 1.15 has been worked out, Exercise 1 should be re-visited.

All of the groupings that were explored in Exercise 1—especially the groups that were devised by the student—should now be explored using trajectory. A variety of peaks should be
explored for each of the groupings, as well as a variety of keys. The student should be encouraged to reflect upon the impact of changing the grouping, as well as moving the peak. It can be useful to contrast an Exercise 1 rendition (matching) with an Exercise 3 rendition (trajectory).

1.4.5. EXERCISE 4: CREATING A GROUP WITHIN A GROUP

Exercise 4 is a high level of grouping; it asks the student to create a group within a group. That is, a small group should be apparent within a larger group. This can be accomplished by nesting two trajectories, but separating them from one another by a disjunction. For example, Figure 1.16 is an example of a group within a group, followed by three renditions that aim to project that grouping, using a mix and match of parameters. These renditions should be practiced first.

Figure 1.16. Exercise 4, creating a group within a group
Then, student and teacher should brainstorm together another set of nuances. The primary rule to keep in mind is that pitches will group if there is a lack of disjunction. Two parameters can effectively be used as either trajectories or matchings, and tucking one of these inside the other can project a group within a group. Another useful strategy is to offset the group using a gap, but provide some continuation from the smaller, internal group into the larger, containing group. In Figure 1.16, the group that is targeted is \{EDEFE\} and the smaller group that is contained in this group is \{EDE\}(pitches 3-4-5) within the larger \{EFE\} (pitches 3-6-7). The figure shows the targeted grouping, followed by three strategies for projecting that grouping. The area of primary interest is outlined in gray.

For now, the third and fourth measures of the exercise can simply be slurred. The F on beat four of measure 2 will likely function to connect the first two measures to the third and fourth measures, by virtue of the diatonic ascent. This is an example of a text-based grouping. A performer has some capability to override a text-based grouping if desired, but for the purposes of this exercise, we will take advantage of the ease with which \{CDE\} connects via \{F\} to \{G\} and the ease with which \{GFEDC\} groups. The student’s attention then, should be focussed primarily on the area of interest.

After practicing each of the renditions of Exercise 4, the student should be asked to reflect on that set of nuances. How does the set of nuances serve to project a group within a group? How does nuance work to separate the larger, containing group off from the rest of the excerpt (anything that is not in the area of interest)? How does the set of nuances function to place the internal group in relationship to its larger group? The act of reflecting functions as a tool of assessment and a bridge to deeper communication for the teacher, and develops an analyt-
ical stance within the student which will guide them in generalizing their new abilities of listen-
ing and grouping toward other contexts.

When the student has attained some understanding of the principles by which groups can
become hierarchically tucked within larger groups, they should begin devising their own strate-
gies for projecting other groupings-within-groupings for Figure 1.16 (re-locating the area of in-
terest). Through guided experimentation with clear feedback, understanding of this difficult
concept will strengthen, and more importantly, the student’s confidence in their ability to explore
will grow. A confidence in exploration is the paramount goal of all of the exercises.

1.5 CHAPTER SUMMARY

This chapter proposed that nuance can support or suppress various pitch paths that are
potential in a text, encouraging the use of a concept of up or down, respectively, as an agent of
structure. Exercises were explored regarding how to accomplish the encouragement and sup-
pression of various paths, and how to hierarchically nest paths so that long streams of pitches can
be placed into relationships. Two important things are missing from these exercises as presented
so far: (1) how can grouping project meaning, and (2) how does the diachronic presentation of
grouping impact its meaning. Chapter 2 introduces the concepts of schema and embodiment
schema to answer to the first question and Chapter 3 puts these concepts to use in terms of Con-
stantine Stanislavski’s work. Chapter 4 will then develop the discussion regarding the diachrony
and meaning.
CHAPTER 2

SCHEMA-MAPPING, ANTHROPOMORPHIZING PITCH GROUPINGS

Chapter 1 discussed the physiology of grouping and presented a disjunction-based rule-set for deriving and projecting grouping among non-contiguous pitches, using aspects of performance nuance such as timbre, vibrato, volume and gap. One usage of the rule-set might be to derive probable groupings for a performance, and view the pitch relationships that emerge saliently from those groupings, for the sake of insight into how the performance holds together. This would answer squarely to John Rink’s call to action at a special session at SMT in 2012.

John Rink asserts that an analysis of a performance—including the post hoc analysis of nuances that the ruleset of this dissertation empowers—should work toward helping us to understand how that performance “holds together”, not simply to view the nuances for the sake of viewing nuances.¹ Another usage (the primary application of this dissertation) is to strengthen a student’s ability to project a structure of their choosing. However, grouping itself functions not as an end, but as a means toward understanding how different performances can encourage different narratological understandings of the same text.

Toward that end, this chapter proposes that schema mappings of the type discussed by George Lakoff and Mark Johnson (1980) function to structure pitches into meaning when properties of heard pitch groups coincide with the properties of a given schema. Schema are understood as agents of structure, and as such, facilitators of meaning.² For instance, a listener who

² This dissertation assumes the Helmholtzian, constructivist approach to perception (Hochberg 1978). The constructivist approach assumes that memory and learning are necessary for perception. This is in contrast to the ecological approach (Gibson 1979), in which memory is not necessary: the brain simply “picks up” information as it comes.
hears pitches to be moving in a generally upward direction is using the UP/DOWN schema and all its associations to discern the motion up and to understand what it means to go up. More to the point, it is asserted that by correlating perceiveable pitch groups with the schema mappings discussed in this chapter, the performer can assemble a type of internal, non-verbal narrative while performing. This narrative’s value for a performer is asserted primarily by chapter 3.

The term narrative, which is used often and ambiguously in conversations pertaining to performance, is used here quite literally: when a pitch group correlates with a schema mapping, that mapping is said to structure the pitch group into something that is narratologically meaningful. For example, a pitch group that ascends takes on a set of important meanings simply because it ascends, rather than descends. When the pitch group ascends and reaches its highest point in a neighbor and is followed by a descent to the structural tone to which the neighbor is neighbor, that peak’s dissonance and subsequent drop into resolution functions to structure that pitch group into something that is narratologically meaningful: we climb to a barrier, and we settle into that barrier’s release.

The theoretical discourse of this chapter seeks to acquaint performers and teachers with the concepts of schema and of schema-mapping and communicate their power in learning to conceptualize music as narrative. The exercises aim to develop a student’s mapping skills and their ability to empathize with pitch groups using mapping as an agent of anthropomorphization.

Section 2.1 presents a survey of selected definitions of schema, from its origins in the writings of Immanuel Kant, through discussions by Frederic Bartlett and Jean Piaget, and moving toward Donald Hebb’s proposed neural underpinnings, termed cell assemblies. It then focuses on a qualified concept of schema proposed by Mark Johnson and George Lakoff, called em-
bodiment schema. Section 2.3 discusses some relevant embodiment schema and includes six narrative analyses. Section 2.4 provides some pedagogical exercises toward helping a student of music performance to anthropomorphize pitch-group objects, using schema mappings as mediators of meaning.

2.1. SCHEMA-MAPPING

This dissertation applies the work of linguist George Lakoff and philosopher Mark Johnson, as well as the music-theoretical work that draws upon this literature by authors Candace Brower, Janna Saslaw and Joe Straus to help student performers engage resiliently with the music they play. This section begins with a discussion of what schema are, and how they function to transform things that do not in isolation hold any inherent meaning—such as photons, vibrations, or free-floating chemicals—into meaningful experiences. Once the reader is better acquainted with the concept of schema and with the special type of schema called embodiment schema, several selected embodiment will be illustrated in musical terms. Throughout the discussion, it is hoped that the value that embodiment schema provide for a performer—as tools for developing a type of empathy between a performer and sound—will be gradually asserted.

Mark Johnson echoes Immanuel Kant by defining imagination as not simply a platform for artistic endeavors undertaken by artists, but as a basic, central, and obligatory agent of our experience. “Imagination is our capacity to organize mental representations (especially percepts, images, and image schemata) into meaningful, coherent unities.”

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as a mediator between the world and an observer, by structuring sensory input in a meaningful way. Much of Lakoff and Johnson’s 1980 work, *Metaphors We Live By*, deals with a defense of metaphor as an obligatory generator of all aspects of understanding. “Understanding is never merely a matter of holding beliefs, either consciously or unconsciously. More basically, one’s understanding is one’s way of being in, or having, a world.”⁵ Lakoff and Johnson (1980) present the function of metaphor in the following way:

Metaphor is for most people a device of the poetic imagination and the rhetorical flourish—a matter of extraordinary rather than ordinary language. Moreover, metaphor is typically viewed as a characteristic of language alone, a matter of words rather than thought or action...[We] have found, on the contrary, that metaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act is fundamentally metaphorical in nature.⁶

For Johnson’s (1987) *The Body in the Mind*, schemas are the primary tool by which the imagination structures incoming information, by facilitating cross-domain mapping. Schema-mapping reduces the mass of information entering our receptors to discreet parts of a formed scene. These discreet parts are called schema, and the act of finding them in a scene is called schema-mapping. The act of schema-mapping makes the mass of information intelligible, and behaviorally-informative.⁷

The concept of schema has a long history in explaining the process of generalization between separate, non-identical objects. The concept was formally introduced by Kant in his *Cri-

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⁵ Lakoff and Johnson (1980), p. 137.
⁶ Ibid, p. 3.
⁷ The concept of schema was famously explained in the opening to Gjerdingen (1988). Gjerdingen provides a list of misspellings of his last name, and explains that the reason his name is so often misspelt is that its combination of consonant letters doesn’t coincide with any common combinations of consonants in the English language.
tique on Pure Reason, under the name transcendental schema. For Kant, schema answers the question, “(how is) the application of a category to appearances, possible?” Kant wonders how it is that the appearance of an object can summon the network of meanings that it does. He writes that,

Obviously there must be some third thing, which is homogenous on the one hand with the category, and on the other hand with the appearance, and which thus makes the application of the former to the latter possible. This mediating representation must be pure, that is, void of all empirical content, and yet at the same time, while it must in one respect be intellectual, it must in another be sensible. Such a representation is the transcendental schema.

Kant identifies a third thing, which mediates between the world and our experience, by setting conditions that are, or are not, met by a real-life object. One example of schema proposed by Kant was the dog. This schema comprises a multi-dimensional assessment that results in the recognition of a dog. Some of the conditions that contribute to the recognition of a dog are four legs, barks, and hairy. Another, qualitatively different example of schema that Kant provided in the Critique was a triangle. There are several varieties of triangle: acute, right, obtuse, small, large. A triangle can be linked to external information: one can observe a red triangle, a blue triangle, a shiny triangle, or a fluffy triangle. Any of these instances of a triangle can function to

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8 Kant (1787), [180-187]. All Critique citations refer to Kant’s 1787 edition of “Transcendental Doctrine of Judgement” (Book II), and “Transcendental Logic” (Second Part), translated by Norman Kemp Smith.

9 Ibid, [180].

10 Ibid, [181].

11 This understanding of schema can be seen to have evolved into categorization theory, headed by Eleanor Rosch in the 1970s.

12 This type of schema can be said to have evolved into current geon theory, which is associated with American psychologist Irving Beiderman’s theory of Recognition by Components. A third type of schema Kant discusses includes abstract phenomena, such as causality, substance, and community.
structure a perceived scene. For instance, if a window is viewed from an angle, its image strikes the retinal wall in the form of a triangle, as does the image of a pine tree.

Kant explained that, “it is schemata, not images of objects, which underlie our pure sensible concepts. No image could ever be adequate to the concept of a triangle in general. It would never attain the universality of the concept which renders it valid of all triangles, whether right-angled, obtuse-angled, or acute-angled…the schema of a triangle can exist nowhere but in thought.”\textsuperscript{13} Kant’s schema transcended the individual, existed \textit{a priori}, and was “awakened” by an individual’s experience.\textsuperscript{14}

For Sir Frederic Charles Bartlett (1886-1969), schema is not a thing, but a process. “A schema is not a passive framework, or patchwork, but an activity.”\textsuperscript{15} Bartlett was a psychologist at Cambridge who was primarily involved with the study of memory. At the time, memory studies were dominated by the use of \textit{nonsense syllables} and \textit{nonsense phenomena}. Mid-career, Bartlett made a very important decision to depart from the work of his highly-influential teacher Hermann Ebbinghaus, by refusing to use nonsense syllables in his study of memory. Bartlett was convinced that memory was not “merely duplicative,”\textsuperscript{16} and that the use of nonsense phenomena in a memory study resulted in rote memorization, which he felt was not an accurate simulation of how recall and recognition actually occur in an observer. Bartlett’s data revealed that an observer’s pre-existing attitude toward an object or an aspect of an object guided their recognition of that object.

\textsuperscript{13} Kant (1787), [B180].
\textsuperscript{14} Ibid, [92, 93].
\textsuperscript{15} Bartlett (1932), p. 203.
\textsuperscript{16} Ibid, p. v. For an account of Ebbinghaus’ work, see also pp. 3-7.
Bartlett called the activity of collecting responses and thus developing an attitude, *schema*.\(^{17}\) For Bartlett, “Schema refers to an active organization of past reactions. [Schemas] have to be regarded as constituents of living, momentary settings belonging to the organism, or to whatever parts of the organism are concerned in making a response of a given kind, and not as a number of individual events somehow strung together and stored within the organism.”\(^{18}\) Bartlett calls the schema an organized mass of experiences, and the experiences that form the mass are defined in terms of the physiological response that characterizes his subjects’ understanding of the experience. Bartlett thus draws the schema out of Kant’s realm of the pure, and places it in the developing physiology of the individual.

For both Kant and Bartlett (and, as will be seen, for Jean Piaget), the process of perception has two components. Kant describes “*sensibility*—through which objects are given to us, and *understanding*—through which the objects which are given to us are thought.”\(^{19}\) Bartlett separates the perceptual process in a different way: the perceptual process comprises “two different, but related functions: that of the sensory pattern, which provides a physiological basis for perceiving; and that of another factor which constructs the sensory pattern into something having a significance which goes beyond its immediate sensory character.”\(^{20}\) Thus an observer’s response to an object is a product of two stages: that of sensation, and that of association with a mediating entity. Kant called this the transcendental schema; Bartlett called it, simply schema.

\(^{17}\) Ibid, p. 201.

\(^{18}\) Ibid, p. 201.

\(^{19}\) Kant (1787), [62].

\(^{20}\) Bartlett (1932), p. 188.
The Swiss biologist and psychologist Jean Piaget (1896-1980) held a view of schema as a thing—as opposed to Bartlett’s understanding of schema as process. In doing so, he was able to differentiate between two distinct processes that can occur in perception: assimilation and accommodation. In assimilation, a sensation is assimilated to a pre-existing schema. Equilibrium is a state in which information assimilates effortlessly into an organism’s existing schemas. Disequilibrium occurs when information doesn’t assimilate, thus motivating a process of accommodation. Accommodation sparks a revision of an existing schema, in pursuit of equilibrium. Upon revising a schema and reaching equilibrium, the organism or part is said to have learned.\footnote{Jean Piaget (1971), pp. 1-13.}

Piaget, as well as Bartlett, emphasized that the process of learning is recursive: Low-level parts of an organism, such as individual neurons, learn by the same process as the organism itself, and the process is at both levels adaptive. The organism or low-level part, when presented with new information, alters itself to accommodate the new aspect of its environment. By describing schema in recursive terms, Piaget draws the concept of schema out of the realms of psychology and philosophy, and into the realm of physiological process.

Canadian psychologist Donald Hebb (1904—1985) also worked toward this end.\footnote{Hebb (1949) was widely recognized for years to come as one of the foremost contributions to modern knowledge.} His theory aimed to engender a cooperation among workers in the previously-disconnected fields of psychology and neurobiology. His work dealt primarily with vision. Like Kant, Bartlett and (later) Piaget, Hebb separates perception into two processes: sensation and understanding. Hebb separates these processes physiologically, by differentiating among neural stimulations in an area of the visual cortex called Area 17 (sensation), from the total stimulations occurring in the cortex.
during a visual activity (*understanding*).\(^{23}\) Hebb differentiates Area 17 (now known as cortical region V1) from the total stimulation because in a mature perceiver, axons connect topographically (without crossing) from the retina directly to Area 17. Area 17 thus forms a topological mirror of retinal wall stimulations, and for Hebb, represents a raw signal.\(^{24}\) From Area 17, charges go to a small region in Area 18, and from this small region of 18, they are sent to a number of other areas throughout the cortex.\(^{25}\) These connections (leaving Area 17) are not topological, and are in some cases very distant. Hebb’s major contribution was to devise a model that explains the process by which these distant, and seemingly random connections arise over the course of an individual’s development—something he called *cell assembly*.\(^{26}\)

Hebb’s primary heuristic is the triangle. His theory describes how and why a novice perceiver’s understanding of a triangle in a visual scene differs from that of a mature perceiver, and describes a process by which a novice learns this figure-schema, in physiological terms. (Hebb’s concept of novice includes newborns and congenitally blind adults whose sight had been surgically restored.)

Hebb theorizes that when a novice perceiver views their environment, neurons in Area 17 shoot randomly at neurons in an adjacent Area 18. Subsequently, neurons in Area 18 shoot randomly elsewhere. At this stage, an observer is said to be experiencing an amorphous visual

\(^{23}\) Area 17 is more popularly known as the *visual cortex*.

\(^{24}\) In modern times, the distinction of raw signal is considered highly problematic, due to known efferent modulation of the primary receptors in all sensory modalities. Raw signal is currently recognized to differ among individuals, depending upon attention and prior training. Thus, *raw signal* is distinct from both *signal in the world* and that set of potentially-perceivable signal conditions that we call *objective reality*.

\(^{25}\) These places include the following: back to 17, to all parts of Areas 18, 19, 20 and to the contralateral 18.

\(^{26}\) It is important to note that Hebb himself doesn’t refer to the cell assembly as a neural correlate for schema, but in current usage, cell assembly is used to describe a group of neurons, that, in performing a specific, trained sequence of interactions, represent a particular percept or concept.
scene. After some time spent practicing the activity of viewing, neurons from Area 17 begin to shoot a well-ordered and stable pattern that is unique to the scene being viewed. At this stage of selective firing, the observer is said to perceive a form. The physiological difference between the novice and the mature perceiver is that the novice’s synaptic connectivity is homogenous among potential connections. All synapses are equally resistant to allowing a charge to cross. This homogeneity results in random firing. In the mature perceiver, levels of synaptic connectivity among potential connections differ: some synapses are crossed more easily than others, resulting in selective firing. This selectivity develops very slowly, as a result of repeated fixations on a figure. The most invariant figures in a novice’s environment are learned first. Repeated invariances in stimulation (due to repeated fixations) result in the growth of synaptic knobs (now known as dendritic spines) in certain locations. These knobs function to constrain random firing into a selective, well-ordered firing pattern.

Invariance in stimulation pattern results in the growth of synaptic knobs. Hebb proposes that prolonged stimulation at a particular location on a neuron (reverberatory activity) causes electrical charges to draw the inner content of a cell into a bulge. He explains that, “a repeated stimulation of specific receptors will lead slowly to the formation of an ‘assembly’ of cells that can act briefly as a closed system after stimulation has ceased; this prolongs the time during which the structural changes of learning can occur and constitutes the simplest instance of a representative process (image or idea).” Hebb proposed that the synaptic knob was a result of prolonged electrical activity and that it functioned to increase the surface area of a dendrite, making it more likely to fire. A well-ordered firing pattern results in perception of form, replacing the

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28 Ibid, p. 60.
amorphous state that accompanies random firing. His theory of how synaptic knobs form is now regarded as an important basis for learning.

In Hebb’s sense, a schema can be defined as a stabilized firing pattern that develops among cells of varying remoteness, where stability is achieved due to a high level of synaptic selectivity. This synaptic selectivity occurs as a result of a high level of invariance in stimulation phase sequences.

Hebb also extended his theorizing to account for schema-mapping. According to Hebb, once a cell assembly is formed, it will fire in full even in the absence of certain parts/attachments. Below is Hebb’s Figure 12, a triangle without an apex.

![Figure 2.1. Hebb’s Apexless Triangle AB(C)](image)

Hebb explains that if a novice perceiver fixates first on C, no knowledge is available to them regarding the figure. However, in fixating on A followed by B (or vice versa), the perceiver’s trained cell assembly will result in the recall of c (Hebb’s notation for the internal, imagined

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29 The qualifier of stabilized does not mean that cell assemblies are permanent. There is a continuum of stability, that is grounded in those physical processes that impact synaptic potential, some of which are more transient (such as neurotransmitter allocation and the location of ion channels), and some of which are less transient (such as protein-structural changes).
C), in the absence of stimulus C.\textsuperscript{30} An internal, imagined c will result because that aspect of triangle ABC has been trained; angles A and B act as a stimulus which trigger the missing learned aspect. The next section deals with a specific type of schema, called \emph{embodiment schema}.

2.2. EMBODIMENT SCHEMAS

The exercises at the end of this chapter assert that a performer’s understanding and engagement with a specific type of schema—\emph{embodiment schema}—can be especially fruitful, because embodiment schema mappings are readily anthropomorphized and can therefore effectively bring an analysis to life in the imagination of a performer. This section discusses that embodiment schema and illustrates its mappings.

Johnson (1987) presents the following definition for \emph{schema}: “in order for us to have meaningful, connected experiences that we can comprehend and reason about, there must be pattern and order to our actions, perceptions, and conceptions. A schema is a recurrent pattern, shape, and regularity in, or of, these ongoing ordering activities.”\textsuperscript{31} Johnson places the ontology of schema in an individual’s physical interactions with their environment. He calls this specific type of schema \emph{embodiment schema}.\textsuperscript{32}

\textsuperscript{30} Hebb thus uses his theory to argue against Gestalt belief in innate completion. Hebb explains that, “here is an instance of Gestalt completion, but derived as an associative process (not an innate one)...It could only happen with a simple and thoroughly familiar figure (or thoroughly familiar part of a complex and unfamiliar figure).” Hebb notes that, “this agrees with the experimental facts.” (p. 104).

\textsuperscript{31} Johnson (1987), p. xiv.

\textsuperscript{32} Lakoff and Johnson (1980), p. 3. The project of providing evidence for embodiment schema as agents of perceptual structuring reaches back to 1979, when linguist George Lakoff and philosopher Mark Johnson embarked on a research plan that sought patterns of usage for thousands of English words. The theory that prompted and guided their research was that words and word usage simultaneously both \emph{reflect and constrain} our experience. Therefore, a given language could function as a corpus of study and would reveal aspects of how its speakers think. “Since communication is based on the same conceptual system that we use in thinking and acting, language is an important source of evidence for what that system is like.”
Embodied image schema are understood (1) to derive from physical experience of one or more modalities of sensation, (2) to operate continuously, at a very deep level, unifying all of our accruing experiences, and (3) to function as a basic, pre-conceptual categorization unit, from which a dense tree of mappings develops over the course of a person’s life.33 Johnson (1987) formally defines an embodiment schema as “a recurring, dynamic pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience.”34

Johnson (1987) specifies the ontology of embodied image schema as follows: “These patterns emerge as meaningful structures for us chiefly at the level of our bodily movements through space, our manipulation of objects, and our perceptual interactions.”35 The experiential basis of an embodied image schema is grounded in our physicality and physical interactions with our environment. “Our reality is shaped by the patterns of our bodily movement, the contours of our spatial and temporal orientation, and the forms of our interaction with objects.”36 Johnson’s understanding is most readily illustrated in the following extended quote, which discusses the embodiment schema he calls FORCE:37

We begin to grasp the meaning of physical force from the day we are born (or even before). We have bodies that are acted upon by ‘external’ and ‘internal’ forces such as gravity, light, heat, wind, bodily processes, and the obtrusion of other physical forces. Such interactions constitute our first encounters with forces, and they reveal patterned, recurring relations between ourselves and our environment. Such patterns develop as meaning structures through which our

34 Ibid, p. xiv.
37 I follow the convention in the music-theoretical literature regarding schema, of capitalizing all references to specific schemas.
world begins to exhibit a measure of coherence, regularity, and intelligibility. Soon, we begin to realize that we, too, can be sources of force on our bodies and on other objects outside of us. We learn to move our bodies and to manipulate objects such that we are centers of force. Above all, we develop systems for interacting forcefully with our environment—we grab toys, raise the cup to our lips, pull our bodies through space. We encounter obstacles that exert force on us, and we find that we can exert force in going around, over, or through those objects that resist us.  

The FORCE schema forms a tree of associations that serves to structure incoming sensations. By applying a FORCE schema to a changing visual scene, the motion of one object can be interpreted as the cause or result of another object’s motion.

According to embodiment schema theory, our schemas develop early in life, and as experienced observers, we begin to map schemas onto more abstract objects. For example, the CONTAINER schema structures things such as time and space, in that we use the schema to understand things such as days/months and rooms/towns. “We are physical beings, bounded and set off from the rest of the world by the surface of our skins, and we experience the rest of the world as outside us. Each of us is a container, with a bounding surface and an in-out orientation. We project our own in-out orientation onto other physical objects that are bounded by surfaces. Thus we also view them as containers with an inside and an outside.” Lakoff and Johnson (1980) offers an example of a mapping of the container schema in the form of a clearing in the woods: “A clearing in the woods has something we can perceive as a natural boundary—the fuzzy area where the trees more or less stop and the clearing more or less begins. But even

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39 It is likely that associations within our language facilitate this conceptual mapping to a high degree.

40 Lakoff and Johnson (1980), p. 29.
where there is no natural physical boundary that can be viewed as defining a container, we impose boundaries—marking off territory so that it has an inside and a bounding surface—whether a wall, a fence, or an abstract line or plane.”\textsuperscript{41} The container schema helps us to organize the information that is borne in the opposition of “trees” vs. “absence of trees”, by condensing and economizing the information that creates this opposition (light vs. the absence of light, visible distance vs. blocked vision, etc.) according to rules that are internal and peculiar to the container schema.\textsuperscript{42} Those rules are expressed by Johnson as follows:

(i) The experience of containment typically involves protection from, or resistance to, external forces.
(ii) Containment also limits and restricts forces within the container.
(iii) Because of this restraint of forces, the contained object gets a relative fixity of location.
(iv) This relative fixing of location within the container means that the contained object becomes either accessible or inaccessible to the view of some observer.
(v) Finally, we experience relative transitivity of containment. If B is in A, then whatever is in B is also in A.\textsuperscript{43}

A rule that applies to inside the container of a clearing is that there will be more light—whereas inside the container of woods (outside the container of clearing), there will be less light. Because we can structure a dramatic crossing of the boundary from less light to more light (or vice-versa) in terms of a schema that holds different rules for normalcy inside vs. outside, the crossing of the boundary is made less surprising, thus conserving energy and attentional resources.

Johnson’s later work discusses the concept of relations among schemas, such as transformations and superposition. He summarizes: “we experience our world by means of various

\textsuperscript{41} Ibid, p. 29.
\textsuperscript{42} Johnson (1987), p. 35
\textsuperscript{43} Ibid, p. 22.
image-schematic structures whose relations make up the fabric of our experience, that is, of our understanding.” Johnson explains that schema coincidences overlap with one another, functionally interact with one another, and are superimposed upon one another, likening the superimposition to a fabric.

The concept of a schematic fabric is perhaps most explicitly conceptualized in terms of the geon theory of Irving Biederman. Geon theory asserts that a visual representation is formed via recognition of the various geons (geometric components) that fill the field of view. For example, an observer recognizes a prototypical house due to his/her perception of two geons: a square topped by an isosceles triangle. The interaction of the two shapes form a fabric. The rest of the geon-schematic fabric may be composed of cylinders topped with spheres (trees), distant triangles (mountains), etc. The various geometric shapes coincide with learned geons that are stored in the observer’s memory; without these learned geons and the associative trees that come to emanate from them, perception of the scene will not occur.

A schematic fabric of more abstract mappings might be conceptualized in terms of overlapping CONTAINERS. For instance, Figure 2.2 shows an instance of overlapping CONTAINERS for five constituents. All of the constituents except C are part of two groups. Each group is governed by a different set of rules, and when two groups co-habitate (for example \{BDE\} and \{ADE\}, interface rules are formed to resolve ambiguity and/or conflict. Disparate levels of schema serve to provoke one another, and an observer views their schematic fabric at varying levels over time: sometimes attention zooms in on an elemental part, other times attention shifts

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to a schema that accommodates a wider context. Rules and interface rules engage in a continuous, multi-leveled activity of reconciliation.

The theory of pitch network structure proposes that coincidences among heard pitch groups and learned schema function to embed narrative into a musical performance. Once pitch group information is constrained by its correlation with a schema, some relationships that are potentiated by that information are revealed, and an attitude can be formed toward the information: meaning can be experienced. For example, the next sections aim to correlate projected groupings with four embodiment schema which have been of interest to the music-theoretical community in recent decades: the UP/DOWN, CONTAINER, SOURCE/PATH/GOAL, and BARRIER schemas.  

2.2.2. THE UP/DOWN SCHEMA

The UP/DOWN schema, or the VERTICALITY schema, denotes relations along a linear domain, whose extents represent extremes from one another along some dimension of measurable criteria. For instance, you can move UP or DOWN a pecking order; your bank account balance can become higher or lower; your weight can go UP or DOWN.

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Brower, (2000), Larson (2012), Saslaw (1996), Straus (2012) are the seminal literature to be borrowed from.
Candace Brower (2000) grounds the UP/DOWN schema in our experience of gravity: “the downward pull of the force of gravity causes us to interpret the ground as both a point of origin and a maximally stable position. The closer we are to the ground, the more stable we feel ourselves to be.”47 She explains that, “we experience bodily tension whenever we extend the body upward in opposition to the force of gravity, and likewise we experience relaxation when we allow the body to fall back downward.”48 She summarizes: “the VERTICALITY schema correlates stability with vertical height.”49

Steve Larson (2012) acknowledges this correlation by claiming that pitches have a tendency to succumb to gravity: pitch groups that ascend go against gravity.50 Both Larson and Brower argue that when it operates, the UP/DOWN schema relates a sense of what UP or DOWN means to us as physical beings who are subject to gravity. When used to structure a complex sound environment, the schema contributes to a sense of both relative stability and the force required to defy gravity when moving UP along some domain.

Larson also identifies a musical force of inertia—the tendency for a pitch group to continue in the same UP or DOWN direction as it previously moved. Inertia works opposite or in tandem with gravity.51 If two contiguous pitches in a series form an upward motion, there is some innate mechanism by which we assume the third pitch will continue to move upward. A change in direction constitutes what Leonard Meyer would call information, and according to the

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51 This work is an outgrowth of the implication/realization model of Meyer and then Narmour.
expectation-based theory on which Meyer and Larson base their respective work, it is information which makes music meaningful.\textsuperscript{52}

Both gravity and inertia gain their meaning from a binary of norm vs. other. The norm for gravity is that UP requires effort. To go up effortlessly is a special event; therefore an effortless UP takes the form of other. The norm for inertia is that a motion will continue in the same direction as it has already begun; its other, a change of direction.

It is useful heuristically to restrict a metaphor analysis of the UP/DOWN continuum to a set of two mapped interpretations of UP and two mapped interpretations of DOWN: floating up, climbing up, falling down and settling down. The four potentialities are shown in Figure 2.3, which represents the associations of UP/DOWN as differentiated along two dimensions: pain/fear and intent. The dimensions will be seen as a source for emergent, pre-conscious narrative.

<table>
<thead>
<tr>
<th></th>
<th>Climbing UP</th>
<th>Floating UP</th>
<th>Falling DOWN</th>
<th>Settling DOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implication of pain or fear</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Implication of Intent</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Relationship with gravity</td>
<td>norm</td>
<td>other</td>
<td>norm</td>
<td>other</td>
</tr>
<tr>
<td>Relationship with inertia</td>
<td></td>
<td></td>
<td>depends on precedent</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.3.** Four qualitative dimensions for the UP/DOWN schema

Experiences of UP can either incur cost/effort, or they can incur no cost/effort. Effortful experiences of UP include associations of climbing or pushing against gravity. Effortless experiences of UP fall outside norms, and tend to intuit a sense of irony, or the fantastic. For example,

\textsuperscript{52} The forces of gravity and inertia work in tandem with and in opposition to a third force—magnetism—which will be discussed with regard to the SOURCE/PATH/GOAL schema. See Larson (2012), p. 82-109.
floating describes what might be felt when skating on ice, or bouncing on a trampoline. This floating experience could be experienced emotionally as invigorating, delightful, surprising, frightening, or any combination of these qualia. A climb could be followed by one or both of exhilaration or fright upon reaching some height. Floating takes less effort relative to climbing, and might be understood to happen fortuitously. Falling might be predicted to be a more painful event than settling, and might be understood to happen tragically or accidentally.

The boundaries delineated in Figure 2.3 represent qualitative networks that are excitable in a listener, when presented with sonic information that assimilates into the structuring activities of the UP/DOWN schema. The verbal labels for each of the terms climbing, floating, falling and settling need not be accessed by a listener’s direct awareness, although a strategy of mental fantasy can certainly draw a pitch-network structural narrative to the foreground of consciousness. The chart does not break down concepts of climbing, floating, falling or settling into irreducible states, as individual listeners have their own unique and evolving relationships with fear, pain and intent. For example, pain might be understood as noble or pleasurable in some contexts, while in other contexts, one might seek to avoid it at all costs. Affective response is difficult to deconstruct. Nevertheless, the insight gleaned from a close reading of the variables that impact our affective response is valuable.

An analysis using the ruleset of Chapter 1 can reveal a performance’s encouragement of pitch motions UP or DOWN, at both a local and deeper level. Examples 1.7a and 1.7b from Chapter 1 are re-printed below as Figure 2.4. In these examples, the sets of nuance from two different performances of a small figure from BWV 1034 signaled different pitch structurings. The structures encouraged by these performances differed in a distinct way: one privileged a series of
pitches that move up, while the other privileged a series of pitches that move down. Perceived motions UP or DOWN entice a web of learned/primed neural associations in an individual listener. These associations function to structure the sound into preconscious, nonverbal meaning—meaning that is borne and located in our knowledge of physical experience.

Often, a performer makes an effort to impress a sense of effort upon a listener through mimetic representation. In these cases, the listener’s understanding of either UP or DOWN can be constrained to exclude those interpretations that do not entail effort. If the performer allows a motion UP or DOWN to be ambiguous, the listener’s own current tendencies in structuring input come to the fore.

2.2.3. THE CONTAINER SCHEMA

By definition, a CONTAINER consists of a bounded entity, governed by rules unique to the space bounded by those rules. For example, the container of a D major scale is governed by a unique set of rules of pitch function. These differences, such as the difference in how a particular pitch class tends to behave in that key, mark the differences between D major and Eb major, and other scales.

53 See Gabrielsson and Juslin (2003).

The mapping of CONTAINER can be a profound tool for inciting narrative, especially when a student draws upon their own desires and projects them onto the protagonist of their narrative. When the protagonist of their narrative is IN a container such as the tonic triad, they are in a club of sorts; when they are OUT of the container, it may be because they escaped the container, they were kicked out of the container, or they simply stepped out for the time being and will return later. For most, these three circumstances will evoke a truthful empathic response. Several types of CONTAINER have been of interest to the music theory community: in tonal music these include key containers, chord containers, harmonic function containers, scale containers, scale degree containers. For post-tonal music, set classes, voice-leading spaces, and motivic/melodic profile relationships can serve to structure musical contents into containers which can be meaningful.

As an example, scale degree containers are governed by a unique set of rules; their members hold exclusivity to the functions that they fulfill. Membership in the scale degree 2 container requires that a pitch be one whole step above a pitch that exclusively fulfills the conditions of the scale degree 1 container, a step and a half above a pitch that exclusively fulfills the conditions of the scale degree 7 container, and a step and a half below a pitch that exclusively fulfills the conditions of the scale degree 4 container. This exclusivity is what differentiates the scale degree 2 container from other containers. The binary that gives the CONTAINER schema its meaning, then, is also the norm/other binary. Something can be in a container (norm), or it can be not in a container (other). The norm/other binary is the primary interface between a per-

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55 The uniqueness of the interval between and implicates this interval as the primary signal for location within a scale-degree space. See Butler (1989) for a review.
former and what is being called here an empathic response. As will be discussed in chapter 3, Stanislavski called this connection a *kinship* between actor and the role they were playing.

Saslaw (1996), Brower (2000), and Straus (2006) have enumerated instances wherein the schema of CONTAINER works in tandem with the norm/other binary to shape music-theoretical discourse. Joseph Straus notes the concept of a deformed container as prevalent in *Formenlehre*. “Through it (the CONTAINER schema) we understand that…musical forms, like human bodies, may be well-formed or deformed.” 56 A deformation of form occurs when a normal container must alter itself or be altered to accommodate a non-container element.

Janna Saslaw reads the concept of container into Riemann’s discussions of both cadence and modulation. She cites *cadence container* and *key container*, 57 and elucidates Hugo Riemann’s reading of modulation as an instance where “opposing forces (act) upon a container, with the forces of expansion overpowering those of containment.” 58

Candace Brower classifies the use of secondary dominant motion to V as container-*expansion*: the diatonic container is asked to accommodate an element which is not endemic to its unique rule system: a raised scale degree 4. 59 Brower further points out that containers function as the SOURCE and GOAL of a PATH. She invokes the BARRIER schema, which functions to delimit CONTAINERs and provide opposition in moving from one CONTAINER to another. 60

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60 Brower uses the term BLOCKAGE, as opposed to BARRIER.
Brower’s Figure 28, which denotes various aspects of musical plot in terms of the CONTAINER schema, a

![Diagram of musical plot structures](image)

**Figure 2.5.** Brower’s Figure 28: “Schemas for musical plot structure” (reprinted from Brower, 2000, p. 353.)

Brower (2000), building on Carol Krumhansl’s 1979 work, uses the graphic depiction of *nested containers* as a way to relate concepts of stability and distance. She delineates three containers: the triadic container (the most stable), the diatonic container, and the chromatic container (the least stable). She presents her Figure 12 (Figure 2.6) to represent nested containers.

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Pitch structuring activities rely heavily upon the categorizations IN vs. OUT of CONTAINERS. Most importantly, pitch networks can mingle in and out of, be caught up in, or escape from Stufe, Zug, scale, and scale degree CONTAINERS. Provided a performance of a work (or the work itself) firmly establishes a triad space, nonharmonic tones take on a meaning of other, or not in the CONTAINER. Traditional pedagogy stresses the intentional mimetic representation of other on accented non-harmonic tones, via heightened intensity of timbre, dynamic, vibrato, or the like. This heightened intensity functions as a signal to the trained listener: we are able to derive a triad space partly based upon these signals. In a context where prolongational boundaries are ambiguous—particularly in a work for a solo melodic instrument—the mimetic representation plays a role in delineating group boundaries (IN vs. OUT), along a conceptual (non-diachronic) plane in Tier 1 analysis: groups that hold together due to their shared membership in a Zug CONTAINER can emerge against contiguity.\textsuperscript{64}

Figure 2.7 is also from Brower (2000). The figure represents three pathways of motion among various containers. Each node in itself is a CONTAINER. The PATHS that connect nodes also form CONTAINERS. Three pathway-containers are represented: chromatic, diatonic,

\textsuperscript{64} In a context where prolongational boundaries are less ambiguous, such as a homophonic context, performance nuance has less of an impact upon this type of non-diachronic, conceptual grouping, because harmonic context constrains grouping to a high degree.
and arpeggiated paths. Each of these pathways forms a container: there is a chromatic container, a more exclusive diatonic container, and there is an even more exclusive arpeggiation container. This figure will be used to great extent when we track distance travelled for various pitch networks in section 2.3, and offers a convenient segue into a discussion of another mapping which is useful for inciting narrative for performers: the SOURCE/PATH/GOAL schema.

![Figure 2.7](Brower2000fig10.png)

**Figure 2.7.** Figure 10 from Brower (2000): Melodic paths, forces, and stable goals in a major key

### 2.2.4. THE SOURCE/PATH/GOAL SCHEMA

The PATH schema has three entailments: a starting point, an ending point, and all of the points intermediate between the two. A performer need only imagine their own life’s many SOURCEs, PATHs and GOALs to develop a kinship with pitch group objects they structure. Johnson (1987) explains,

> Our lives are filled with paths that connect up our spatial world. There is the path from your bed to the bathroom, from the stove to the kitchen table, from your house to the grocery store, from San Francisco to Los Angeles, and from the Earth to the Moon. Some of these paths involve an actual physical surface that you traverse, such as the path from your house to the store. Others involve a projected

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path, such as the path of a bullet shot into the air. And certain paths exist, at present, only in your imagination, such as the path from Earth to the nearest star outside our solar system.\textsuperscript{66}

The PATH schema functions to structure more abstract things such as coming-of-age, the journey toward fame, riches or love, the melting of an ice cube, or a Zug. These four abstractions share the properties of (1) having a beginning, (2) having an end, and (3) having intermediate points which separate beginning and end. The norm/other binary lends this schema meaning as well, depending where you locate yourself within a PATH. If you are at the SOURCE of a PATH, and you later find yourself somewhere other than the SOURCE, you are in a state of other. Likewise, if you have moved away from the SOURCE of a PATH, and soon find yourself back at the SOURCE, you are in a different type of state of other. Our ability to re-contextualize other as norm and norm as other means that SOURCE-PATH-GOAL meaning is necessarily transient. This important phenomenon functions as a source of play in listening, which is discussed in Chapter 4.

<table>
<thead>
<tr>
<th>Norm</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE</td>
<td>PATH</td>
</tr>
<tr>
<td>SOURCE</td>
<td>GOAL</td>
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<tr>
<td>PATH</td>
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<td>PATH</td>
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<tr>
<td>GOAL</td>
<td>SOURCE</td>
</tr>
<tr>
<td>GOAL</td>
<td>PATH</td>
</tr>
</tbody>
</table>

Brower explains that the SOURCE-PATH-GOAL schema “organizes our experience of motion, specifically goal-directed motion.”\textsuperscript{67} Brower outlines five components of the SOURCE-PATH-GOAL schema:

\textsuperscript{66} Johnson (1987), p. 113.

(1) the source, or point of origin
(2) the goal
(3) the path leading from source to goal
(4) the trajectory of motion
(5) the force propelling the motion.\textsuperscript{68}

Brower draws out eight \textit{entailments} which she believes characterize the SOURCE-PATH-GOAL schema. They are as follows:

(1) Motion is carried out by an agent who wills the motion to take place.
(2) Goal states tend to be maximally or minimally stable within a local context.\textsuperscript{69}
(3) Lower-level goals tend to be subsumed by higher-level ones.
(4) The endpoint of motion may or may not coincide with the goal.
(5) Motion may or may not follow a path leading to a goal.
(6) Other forces, including gravity and inertia, may enhance, inhibit, deflect, or block motion toward a goal.
(7) Blockage produced by other forces may be overcome by repeating the action, increasing the force of propulsion, or by seeking alternate pathways of motion.
(8) The approach to a goal tends to be accompanied by an increase in tension and arrival at a goal by relaxation and the slowing and/or stopping of motion.\textsuperscript{70}

While Brower points to the expansion of \textit{CONTAINER} as shaping our understanding of modulation, Saslaw (1996) points to the SOURCE-PATH-GOAL schema. Saslaw provides insight into Riemann’s theory of modulation by correlating aspects of his theory to the SOURCE-PATH-GOAL schema. According to Saslaw, the endpoints of a SOURCE-PATH-GOAL are the containers that “correlate to the points that start and end a modulation.”\textsuperscript{71} The tonic container is acted upon by a FORCE which drives us along a PATH to a secondary key.

\textsuperscript{68} Ibid., p. 331
\textsuperscript{69} From Brower (2000): “Entailment 2 suggests that there are two distinct types of goals, reflecting the human need for movement, activity and challenge on the one hand, and for rest, security, and stability on the other. We tend to move through life in cycles in which the attainment of one type of goal is followed by striving for the other. In leaping, we extend the body to its highest possible point, only to seek a stable landing immediately after.” p. 331.
\textsuperscript{70} Brower (2000), p. 331.
Saslaw also draws attention to Schenker’s famous quote regarding the goals and obstacles that face a structure in its journey to scale degree 1 over I. She quotes Schenker: “In the art of music, as in life, motion toward the goal encounters obstacles, reverses, disappointments, and involves great distances, detours, expansions, interpolations, and in short, retardations of all kinds.” 72 Straus (2006) echoes this and relates the SOURCE/PATH/GOAL schema to the concept of disability. “Schenker is particularly concerned about the ways in which musical motion is enabled and the kinds of musical events that impede motion or, in extreme cases, paralyze the motion altogether.” Straus explains that, “for Schenker, the linear progression is the principal source of musical continuity and coherence—the Urlinie itself is a linear progression—and it has the metaphorical trajectory of a body in motion from a source, along a path, toward a goal.” 73 Straus then quotes Schenker, “every linear progression shows the eternal shape of life—birth to death. The linear progression begins, lives its own existence in the passing tones, ceases when it has reached its goal—all as organic as life itself.” 74

Brower 2000 also cites components of Schenkerian theory as instances where the SOURCE/PATH/GOAL schema has molded the music-theoretical discussion. According to Brower, “the simplest mapping of tonal harmony onto the SOURCE-PATH-GOAL schema is the one Schenker proposed as the harmonic counterpart to the motion of the fundamental line.” The I-V-I progression embodies a source (I), a path (V) and a goal (I). 75 Brower also discusses the melodic component of the Urlinie as follows: "since it is a melodic succession of definite steps

74 Schenker (1935/1979), p. 44.
of a second, the fundamental line signifies motion, striving toward a goal, and ultimately the completion of this course. In this sense we perceive our own life-impulse in the motion of the fundamental line, a full analogy to our inner life."\textsuperscript{76} In addition, Brower characterizes the dynamic melodic tendencies of major and minor scales, such as scale degree 7’s proclivity to ascend, or scale degree 4’s attraction to scale degree 3 in the major scale, as a type of SOURCE/PATH/GOAL mapping.

Brower relates these dynamic tendencies to Steve Larson’s expectation-based theory of \textit{musical forces}\.\textsuperscript{77} Steve Larson explains that three forces “control operations on alphabets.”\textsuperscript{78} (Larson echoes the use of the term alphabets in Deutsch and Feroe [1981] to describe pitch collections that have well-defined relations, such as a major scale. For Deutsch and Feroe, an operation includes a repetition or a motion to the next higher or lower member.) Larson’s forces include \textit{gravity} (the tendency to expect a downward motion), \textit{inertia} (the tendency to expect a pitch to continue moving in the same direction as previous pitches), and \textit{magnetism} (the tendency to expect a non-chord tone to move to the nearest chord tone). Larson explains that the three forces function as a network, where forces take on greater strength in different contexts. For example, scale degree 7 moves against \textit{gravity} because its magnetism to scale degree 8, which is only a semitone away, is powerful enough to overcome the downward pull. \textit{Inertia} will be powerful insofar as \textit{magnetism} does not disrupt it: a PATH that enjoys \textit{inertia} in moving upwards and away from scale degree 2 will eventually confront \textit{magnetism}, which might motivate a halt on scale degree 8. The same path would be defying \textit{gravity} from its very beginnings, so this force

\textsuperscript{76} Schenker (1935/1979), p.4.

\textsuperscript{77} Larson (2012), pp. 82-110.

\textsuperscript{78} Larson (2012), p. 114.
(gravity) might at any moment motivate a change in direction. Larson claims that it is the continual play of these forces that enlivens melodic PATHs for listeners.79

For Evan Jones, what enlivens a PATH is the plurality of possible connections between a SOURCE and a GOAL. “The effect of being passing coincides with the juxtaposition of a maximal number of melodically fluent lines extending between points of stability.”80 Jones refers to this quality of “passingness” as pervasive fluency. Jones segments harmonic progressions and graphs them onto diatonic lattices. (See Figures 2.9 a and b below.) The endpoints of a PATH of pervasive fluency provide stability, in the same way that a Zug does. However, the endpoints of a pervasively fluent PATH are not scale degrees. They are verticalities of triads or seventh chords. All members of the SOURCE verticality embark on PATHs that arrive at all members of the neighboring stable verticality. It is the plurality of PATHs (from and to all verticality members) that gives passing chords their transitory character.

![Example 2-3. Ten stepwise lines between chords 1 and 3.](image)

**Figure 2.9a.** Jones’ Example 2-3. Ten possible paths through the chords of Figure 2.9b: \{4,8,L\} through chord 2 \{4,6,T,1\} to chord 3 \{4,8,L\}.

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80 Jones (2002) (diss.), p. 38. For Jones, points of stability lie in pc space, not necessarily in pitch space.
Another alternative definition of SOURCE-PATH-GOAL points to dissonance as GOAL, as opposed to consonance. In the overwhelming shadow of Schenkerian theory, the SOURCE of a Zug is most often conceptualized as its originating tone, and the GOAL its destination tone—usually another member of the originating Stufe. The pitches that fill the space between the Zug’s endpoints comprise the PATH. However, it is equally plausible to conceptualize not the CONTAINER-conforming endpoint of a Zug as GOAL, but the dissonance that is penultimate to that endpoint: usually a point of high tension, and a pitch which is highly subject to Larson’s magnetism. In this case, a PATH is directed squarely at a different destination (other), only to revert back to the SOURCE (norm). Figures 2.10a and 2.10b depict two definitions for GOAL.

GOAL as RELEASE

**Figure 2.9b.** Measures 12-19 of Jones’ Example 2-1 (Chopin Scherzo op. 54)

**Figure 2.10a.** One conception of GOAL for an excerpt from Mozart’s Piano Sonata No.5 in G major, K.283/189h, I, bars 1-10.
Regardless of the nuances that differentiate the preceding definitions of musical SOURCE-PATH-GOAL, the GOAL functions as what emotion theorist Edmund T. Rolls calls a secondary reinforcer.\textsuperscript{81} Primary reinforcers are emotional responses that function to directly promote survival of an organism, by providing a reward. Secondary reinforcers provide reward only after an association with one of the primary reinforcers is formed\textsuperscript{82}. For example, food-seeking activity is promoted in humans by a pleasurable stimulation in the lateral hypothalamus.\textsuperscript{83} This pleasurable qualitative response functions evolutionarily to motivate action. If a known food appears to us a few feet away, we are motivated to draw and follow a PATH from our current location (SOURCE) to the food (GOAL)\textsuperscript{84}. Our investment of energy into the PATH promises us the pleasurable experience of neural stimulation in the hypothalamus,

\begin{flushright}
\textbf{Figure 2.10b.} Another conception of GOAL for an excerpt from Mozart’s Piano Sonata No.5 in G major, K.283/189h, I, bars 1-10.
\end{flushright}

\textsuperscript{81} Rolls (2005), p. 3.
\textsuperscript{82} Rolls (2005), p. 71.
\textsuperscript{83} Rolls (2005), p. 234. See also pp. 238-240.
\textsuperscript{84} Rolls (2005), p. 297.
an emotional reward for successful reaching of the GOAL. Embodiment theory asserts that we map SOURCE-PATH-GOAL onto non-primary events in order that we can structure the events into something meaningful. In doing so, the SOURCE-PATH-GOAL schema functions to provide us with information regarding our attitude toward the events.

2.2.5. THE BARRIER SCHEMA

If the path between an observed creature and its goal is riddled with BARRIERS, we can sympathetically experience those barriers, based on our own physical experience with barriers, prolonged desire for a goal, triumph or retraction of a goal. Although the BARRIER schema tends to be cited in the literature as hostile it is, like the UP/DOWN and CONTAINER schemas, not irreducible: a BARRIER could just as easily be perceived as protective as it could be perceived as hostile. Likewise, a passing tone might evoke a sense of crossing an impediment, but might just as possibly appear to function as a helpful conduit. Metrical placement and a performer’s mimetic representation have a tremendous impact upon this qualitative association. When these are absent or ambiguous, the listener’s long and short term priming determines the mapping. Mappings need not be either/or; a passing tone might be appreciated for its whole, yin/yang relationship with its context—as both impediment and conduit.

Having laid the groundwork for an embodiment-based analysis of performance nuance, the next section (2.3) strives to reveal how meaning can be embedded in a performer’s choice of

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85 Straus (2006) likens BARRIER to paralysis (p. 105). Brower’s use of the term BLOCKAGE exacerbates the negative connotations associated with a BARRIER. Schenker’s narrative from Schenker (1935) also emphasizes BARRIER at the expense of CONDUIT: “Hindernisse, Ruckschlage, Enttauschung, weite Wege, Umwege…” (p. 5)
nuances for a given pitch network \{E, D#, G, F#, E\}. Six different performances are analyzed. They can be heard at the permanent urls that are provided.

2.3. SIX NARRATIVE ANALYSES

In this section, two tiers of analysis will be presented for six different performances of the ordered pitch set \{E, D#, G, F#, E\}. The two tiers of analysis present different types of information. The first tier of analysis reports upon fine nuance and predicts robust reverberatory activity. Since the ordered pitch set \{E, D#, G, F#, E\} correlates with a very common tonal paradigm, the robust reverberatory activity is viewed in light of the consonance/dissonance binary, and also in light of the traditional mimetic representation of the consonance/dissonance binary, wherein dissonance begs a more tense qualia than consonance. The analysis uses this information to derive potential heard structures. It thus deals primarily with grouping.

The second tier of analysis incorporates all of the narrative components that have been discussed in this chapter. Qualitative interpretations of UP/DOWN, CONTAINER distance values, and SOURCE-PATH-GOAL or BARRIER mappings are correlated with the predicted groupings in order to derive likely narrative mappings for each of the six performances. Thus the second tier deals with mappings that denote meaning.

While the two tiers are presented separately, they are in actuality highly integrated. A narrative that has been primed can modulate the raw signal in ways that will actively impact a listener’s grouping, even regardless of contradictory information in the sound signal. In the same way, we can’t say that a neighbor note holds no meaning prior to a schema mapping such as BARRIER. We can not truly disentangle either meaning from structure or grouping from struc-
ture, because physiologically they exist in a feedback circuit of associations; pitches can not group without associating themselves with one another via some system of meaning which affords combinatorial properties. Nevertheless, viewing the components in turn helps to alleviate a Tier 1 analysis from some of the more severe methodological difficulties of Tier 2 analysis. Tier 2 analysis is much more variable and subjective than Tier 1 analysis; a Tier 1 analysis is at least verifiable against a shared resource such as an AMPACT analysis of a recording. That’s not to say that a Tier 1 analysis is free from idealization by any means; this is discussed next.

2.3.2. TIER 1 ANALYSIS: GROUPING STRUCTURE

A skilled performer can use fine nuance such as vibrato, volume, timbre and gap to signal grouping and encourage structure for a listener. This structure is not inherent in either the musical text or the musical signal, but rather emerges as a listener’s reverberatory activity is pruned by retrospective and prospective priming. In short, there is no guarantee that a listener will receive any specific grouping assertion. Having said that, the performer who has command over grouping certainly holds more persuasiveness than a performer who haphazardly assigns timbre, vibrato, etc., or whose skill in modulating the parameters of volume, timbre and gap is weak.

The Tier 1 analysis reflects upon grouping according to an ideal hearing. Ideal does not pertain to ideas of best or perfect; it pertains to the ideal that a living person could attend to a performance in such a way that the analyses presented would reflect their exact experience. In order to accomplish this, the listener would need to hold specific just-noticeable difference cate-

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86 AMPACT, or Automatic Music Performance Analysis and Comparison Tool, is a set of applications that quantify different aspects of timbre and timing such as vibrato, articulation shapes, pitch onset deviations, etc.
gories, and as a result would key in to specific parameters at key moments. Probable groupings can certainly be derived using computers, based on chosen biases and pre-assigned categorical boundaries for every parameter; we could call this an objective analysis, and argue that the choice of biases and pre-set categories doesn’t impede its status as objective, although these two things certainly do impede that analysis’ status as objective. In this way the objective analysis is not truly objective, and thus, is idealized. The idealized listener of the analyses of this section could be described as a listener who is primed to notice exactly what the analyses asks them to notice, and holds exactly correct just-noticeable difference values.

A second idealization regarding meaning and its reliance upon continuity will be discussed in Chapter 4 but for the moment, it is useful enough to clarify that the analyses of this chapter are not the aim of this dissertation. They run counter to the process of becoming that will be advocated for in Chapter 4. Although they do not represent the end goal of the dissertation, the analyses offer a tangible means of conceptualizing the moments that comprise a structural becoming if those moments were excisable from the flow of continuity which gives them meaning. In Chapter 3, the type of insight reamed from these analyses will be used to create a stronger engagement between a performer and the groups he/she projects, and in Chapter 4, the performer will be asked to re-situate that insight into its rightful place—the flow of becoming.

Figure 2.11 depicts the ordered set that will be used in the analyses that follow. Perma-links for supplemental files 3, 4, 5, 6, 7, and 8 should be consulted before and while reading the analyses.

Figure 2.11. Ordered pitch set \{E,D\#,G,F\#,E\}
The six performances of ordered pitch set \{E, D\#, G, F\#, E\} differ among themselves in terms of their use of vibrato, volume, timbre and gap. For instance, network 1 nests a crescendo within a crescendo. The G of the network is the peak of timbral intensity for the inner group \{D\#, G, F\#\}. Prior to this group, the first E undergoes a crescendo of its own, tapering just enough to close the E and set the D\# apart. Despite this taper, \{D\#, G, F\#\} continues along the same trajectory that was set up by the initial E. This creates the nestedness which characterizes \{D\#, G, F\#\}. A substantial gap follows F#. That gap is preceded by taper on F#. E then re-joins the trajectory of decrescendo established by the retreat from the peak G. This performance nuance will be notated as follows in the analyses to come:

Figure 2.12. Performance detail for network 1. A nested crescendo with a gap. (To listen, see https://archive.org/details/SupplementalFile3Network1)

Network 2 differs significantly from Network 1. Here, a gap is placed early in the network, and a crescendo/decrescendo is nested within a larger trajectory of diminuendo. That’s to say that with the group of \{D\#, G, F\#\}, G is still the peak, but the trajectory of its release into F# isn’t interrupted by the onset of E. Rather, the onset of E is previewed by a slight crescendo of F#. E continues the decay predicted by \{G, F\#\}, but only after satisfying the predictions of the slight crescendo of \{F\#\}. 

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Figure 2.13. Performance detail for network 2. Two crescendi/decrescendi nested within a larger trajectory of diminuendo. (To listen, see https://archive.org/details/SupplementalFile4Network2.)

Figure 2.14 presents analyses for all six performances. Column 1 of the figure references the sound file of a performance of the ordered set. Column 2 presents three progressive ad hoc analyses of each performance: (1) performance detail such as gaps, crescendo of volume and timbre, etc. are documented, in the manner of Figures 2.12 and 2.13, (2) the groupings that emerge for some idealized listener, accompanied by the nuance that most strongly supports the grouping, and (3) a structure that can be derived once the groupings are aligned with a set of pitch meaning maps in combination with their mimetic representation. This structure is communicated in the second-to-last column, using Schenkerian notation, which reflects grouping, nested grouping, and pitch functions such as neighbor or passing. The last column on the right reduces the network to what could be called a middleground level. It represents logical relationships between non-contiguous pitches that gain enduring reverberation. Elements of their top down grouping properties take a role in this analysis: do the pitches coincide with a learned pitch arrangement such as a Zug, a neighbor or an arpeggiation? The relationships expressed in the tier 1 analysis of Figure 2.14 are based on the binary of consonance/dissonance, and the context is assumed to be tonal.
<table>
<thead>
<tr>
<th>Performance can be heard by clicking permalink:</th>
<th>Performance detail</th>
<th>Saliences emerging</th>
<th>Derived structure</th>
<th>Predicted reverberatory activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen to network 1</td>
<td><img src="image1" alt="Music notation" /></td>
<td><img src="image2" alt="Music notation" /></td>
<td><img src="image3" alt="Music notation" /></td>
<td><img src="image4" alt="Music notation" /></td>
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<tr>
<td>Listen to network 2</td>
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</tbody>
</table>

**Figure 2.14.** Tier 1 analysis for six different performances of pitch network \{E, D♯, G, F♯, E\}
2.3.2.2. DISCUSSION

A quick preview of the far right column of Figure 2.14 reveals that, for the idealized listener of Figure 2.14, networks 1-2, 3-4, and 5-6 form categorical pairs; they are highly similar. In networks 1 and 2, the outside Es are associated via a neighbor motion (lower/upper, respectively). In networks 3 and 4, the second E is embellished by a forward-directed arpeggiation (from G to E). Networks 5 and 6 are characterized by a change in function over the course of the first E, followed by neighbor motion. There are marked differences between the performances within each category. For instance, network 1 reveals a lower neighbor motion, while network 2 reveals an upper neighbor; network 3 is back-related, while network 4 points forward. Network 5 projects the lower neighbor relationship more saliently than the upper; vice-versa for network 6.

2.3.2.3. THE NEIGHBOR NETWORKS

Over the course of the performance of network 1, multiple structural possibilities come to compete. Prominent among these are the lower neighbor motion E-D♯-E, and the upper neighbor motion E-F♯-E. Only one of these interpretations is presented in Figure 2.14, although both interpretations are supportable: the lower neighbor is supported by a small spectral gap that is created by diminuendo of E prior to the onset of D♯, followed by a return to a rich timbre at D♯. The slight spectral gap opens the door to a robust reverberation for D♯.

The performer then slurs D♯ through F♯. This slur encourages the arpeggiation D♯-F♯ to emerge as a group, whose height of spectral intensity is the note G. This peak softens with a gentle trajectory into F♯. The mimetic representation of spectral intensity on G—instability—
resolving into lighter F#—stability—plays a large role in depicting the pivotal pitch G as neighbor to F#, and this upper neighbor is then promoted by a disjunction of volume between F# and E: F# decrescendos smoothly into E, but E immediately resumes a louder dynamic. This disjunction closes the \{D#-F#\} group, and also affords F# attentional resources, allowing it to reverberate.

The F# also enjoys the recency effect, wherein more recent events tend to enjoy more attention than less-recent events. As a result, both neighbors function to structure this information in real time. Ultimately, the analysis depicts the lower neighbor as the neighbor in synopsis, based on the observation that the disjunction supporting lower neighbor is slightly larger than is the gap that supports upper neighbor, relative to other events within that same parameter. It also happens deeper in the past.87

2.3.2.4. THE ARPEGGIATING NETWORKS

Networks 3 and 4 also form a categorical pair; they are highly similar. The first event that occurs in both performances is a slur from E to D#, in diminuendo. This type of diminuendo bears a traditional mimetic implication: \textit{E as dissonance to D#}. The decrescendo/slur implicates a neighbor paradigm.

However, the neighbor paradigm is not realized in networks 3 and 4—instead, the music reaches up to G, and settles back down through passing tone F# to the starting-point, E. The diminuendo between E and D# is followed by a spectral disjunction, wherein G is performed at a

\footnote{Note that because of contiguity and recency effects, it is much easier for a performer to pull off the upper neighbor reading. At the same time however, the primacy effect favors the lower neighbor reading.}
relatively high volume and a spectral content that demands attention. This disjunction of volume and timbre serves to disconnect G (and the subsequent F♯) from the lower neighbor D♯. Descent from G through F♯ to E appears as a continuous gentle trajectory of volume, color and vibrato. This trajectory in conjunction with slur, functions to group \{G-E\}.

Of the three note group, F♯ is the least likely to reverberate independently, because (1) it is subsumed inside a gentle trajectory and slur, and (2) a top-down pitch management system under-privileges scale degree 2 when it appears sandwiched between scale degree 3 and scale degree 1. It is unlikely therefore to develop its own reverberatory activity outside of its membership and function within the group. The other two pitches—G and E—vie for sustained attentional resources. E is a candidate because it is the last note of a group, and G is a candidate because it is the first note of a group. Once again, although this competition appears thoroughly resolved on paper, at this local level the impact of the two outcomes is difficult to acknowledge before a sixth pitch appears. At this moment, the outcome has a tangible impact: either of G or E will be more likely to form a robust relationship with the new sixth pitch.

2.3.2.5. THE REACHING-OVER NETWORKS

Networks 5-6 differ markedly from the previous networks. It is immediately apparent that these two performances project a higher level of intensity; this intensity is manifest in volume and timbre, and is localized within the first E. Because E crescendos into itself for both networks, it draws upon mimetic representation of the consonance/dissonance paradigm. Such a

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88 The varying definitions of the SOURCE-PATH-GOAL schema outlined in section 3.3 make this presupposition arguable. The presupposition is grounded in the Schenkerian bent on SOURCE-PATH-GOAL, wherein SOURCE and GOAL are \Stufe members. The passing is transitory and therefore is “erasable.”
drastic change in color over the course of one pitch traditionally implicates a change of function: the E begins its life as a consonance, but soon transforms into a dissonance.

The timbral intensity relaxes over different timespans for the two networks (5 and 6). Network 5 spreads the relaxation more or less evenly over the course of D♯, G, F♯ and E. The even distribution, and thus lack of sharp disjunction encourages these pitches to group, and allows the intensity of E-D♯ to linger despite the more recent context of G-F♯. The lower neighbor therefore competes more strongly. In contrast, network 6 relaxes briefly during the D♯, but quickly regains its strength at the end of D♯, dispelling more energy into the descent G-F♯-E. This marks G-F♯ in attention, supplanting the reverberatory activity of E-D♯ which previously dominated. The higher neighbor competes more strongly. As in networks 1 and 2, both the lower and upper neighbor readings function to structure networks 5 and 6, by shaping structural play. A sixth pitch has the power to reignite other possibilities, based on its own qualities.

2.3.3. TIER 2 ANALYSIS: MAPPINGS AND NARRATIVE

Of course, the structural ambiguity that is inherent in the ordered pitch series {E, D♯, G, F♯, E} is not singly resolved by performance nuance. Reverberatory activity can be and is generated internally, without any help from a performed nuance-set. Nevertheless, the nuances outlined in Figure 2.14 are audible to a listener with sufficiently fine JND values in all the relevant parameters, and these parameters are all objectively measurable. Tier 1 analysis therefore approaches a type of rigor (albeit, based upon an idealized listener with prescribed JND values and idealized states of priming/preference rule outcome tendencies).
Tier 2 presents much more of a methodological hurdle. In this tier, what needs to be idealized are entire sets of norms, associative tendencies, and causal impositions. Embodiment schema theory is grounded in physical experience, which is pervasive, and this makes the theory very attractive for a study of meaning construction. However, it has been noted that physical experience is by no means universal, and that schema mappings are highly promiscuous. A reduction of the schematic fabric to its correlations with prospective parts yields little insight without somehow accounting for how those parts fit together and what are the implications of those parts and their relationships.

For a revealing example of this methodological difficulty, consider the following question. Which component of the SOURCEgetPathGOAL schema do we consider to be the norm: the SOURCE, the PATH or the GOAL? Heinrich Schenker’s famous quote, “in the art of music, as in life, motion toward the goal encounters obstacles, reverses, disappointments, and involves great distances, detours, expansions, interpolations, and in short, retardations of all kinds”—safely locates the reader from a synoptic vantage: a place where we can understand each of SOURCE, PATH and GOAL as both norm and other. In tracking moment-to-moment experience of small pitch networks (as pitch network structure aims to do), this type of synoptic vantage point provides little advantage in differentiating what is currently being experienced as a norm and what is currently being experienced as other.

Likewise, a bank account can go UP, as can a deficit. Here, two opposite phenomena both share the structuring agent UP, but do not share nearly the same meaning. They share only

a component of meaning: a qualifier without a qualifiee. The component is necessary for deriving meaning, but certainly not sufficient.

Neither can we assume any objective meaning for CONTAINER. A parent might protect his/her child by enforcing all sorts of boundaries around the child. The child might sense security, but he/she might equally sense oppression. The difference between these two meanings lies not in the boundary itself, but within the structuring individual, who has access to more information than is derivable from the mere identification of a boundary.

Some of meaning is shaped by norms. If a motion UP occurs and we observe the norm that UP requires energy, we will expect some type of exertion to occur. If a performance portrays a sense of effort, this norm is satisfied. If the performance portrays no sense of effort, the norm is defied. These two situations do carry meaning. However, the meaning is non-existent without the external imposition of either a real or derived norm.

Another contributor to meaning is the creative assertion of cause and effect. If pitches move UP and change CONTAINERS, and it seems as if effort is being portrayed, we can assert that three dimensions of information are present in the undertaking: pitches move UP, they cross CONTAINER boundaries, and there is effort. We can then creatively assert a cause and effect onto the information and transform it into meaning: “it took effort to climb into the other Stufe.” Given a slightly different array of information: UP, stay-in-CONTAINER and effort, we can impose the following cause and effect: “we wanted to move to the other container…we tried, but we couldn’t. We are stuck.” Or the following: “at first we wanted to move to the other container: from a distance, the grass appeared greener in the other Stufe. But we’ve changed our mind.” In short, an observable schema-correlation in isolation from the owner/creator of a fabric of
schemas yields only partial insight into meaning. Methodologically, this presents a hurdle, since insight into meaning will require an imposition of pre-supposed norms and causality inferences.

By submitting a Tier 1 output to Tier 2 analysis, we are assuming then that (1) a set of norms exist for a listener, and (2) a cause/effect assertion that is not present in the information itself is creatively imposed upon the information. This non-mechanistic mediation expands the array of outcomes exponentially, making rigor much more difficult to achieve. The value then, of Tier 2 analysis is not in providing explanation for a mechanistic stimulus response, thereby explaining a function of performance nuance. Rather, the value is in revealing the parts and provoking an investigation into our own cause/effect impositions and narrative meanings. The motivation behind a Tier 2 analysis, therefore, is not a positivistic one.

In this spirit, the next section, Tier 2, correlates the Tier 1 analysis of Figure 2.14 (grouping) with the image schemas discussed in section 2.2, and intuits meaning based on an idealized structurer. What emerges from this correlation is a creative cause/effect imposition called pitch-network structural narrative. The relationship that obtains between this imposition and a set of idealized norms constructs meaning for the idealized listener.

The Tier 2 analysis and will be presented shortly. In the analysis, motions in and out of CONTAINERs will be tracked along an adaptation of Brower’s pathways of melodic motion heuristic (see Figure 2.7). Some discussion of this adaptation is necessary.

Brower’s model incorporates three separate pathways and reveals how a distance from 1 to 3 can be at one and the same time, close and far. In the diatonic space, the interval qualifies as a leap, whereas in the arpeggiation space, it is simply a step.
Browser’s arpeggiation space doesn’t account for a musical motion that moves outside of the space. A pitch group that mingles between a tonic arpeggiation space and a dominant arpeggiation space would require hopping from one arpeggiation space into another. In order to model this motion, which is absolutely necessary for tracking motion in the ordered pitch set \{E, D#, G, F#, E\}, we will use two arpeggiation spaces, and informally assign a value for a hop between the spaces. To hop from one arpeggiation space to another holds a cost that is some arbitrary value greater than a hop within a given arpeggiation. For our purposes, we’ll simply adopt arbitrary values of 1 and 2, respectively. That is, where a motion from scale degree 1 to 3 holds a cost of 1 in the arpeggiation space, a motion from scale degree 1 to 2 holds a cost of 2. The motion from scale degree 1 to 3 is simply one node along the path. The motion from scale degree 1 to 2, however, moves us outside of the arpeggiation space, into another arpeggiation space (likely a dominant arpeggiation space), and this distance holds a cost of 2.

![Diagram](image)

**Figure 2.15.** A metric for distance among members of the ordered pitch set \{E, D#, G, F#, E\}. It holds a cost of 1 to move within an arpeggio (for example, scale degree 1 to scale degree 3), and it holds a cost of 2 to move outside of an arpeggio (for example, scale degree 1 to scale degree 2).

This metric for closeness is accompanied by another metric, which deems stepwise motion closer than motion within an arpeggiation. This is Brower’s diatonic pathway from Figure

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91 This is also the case for a musical motion that moves from one diatonic space to another (from the key of C to the key of F, etc.) and a musical motion that moves in a microtonal world from one chromatic system to another. For our purposes of investigating ordered pitch set \{E, D#, G, F#, E\}, it is not necessary to hop about either microtonally-displaced chromatic containers or various diatonic containers. It is however, important to this network that we can view motion from a tonic CONTAINER [E, G, B] to a dominant CONTAINER [B, D#, F#, (A)].
2.7, and will appear on the left in the narrative analyses of this section. The ordered pitch set \{E, D\#, G, F\#, E\} does not depart from the single diatonic collection [E minor], so only a single track is needed.

![Diagram](image)

**Figure 2.16.** A second metric for distance among members of the ordered pitch set \{E, D\#, G, F\#, E\}. In this metric it takes less effort to move stepwise than to hop within an arpeggio.

It will be seen that in all cases, distance travelled within the arpeggiation space of Figure 2.15 is inverse to distance travelled in the diatonic space of Figure 2.16. This is another formidable example of the methodological difficulties pertaining to the prediction of meaning. Figure 2.17 tracks the middle ground motions for the categorical pairs (the neighbor networks, the arpeggiating networks, and the reaching over networks) of Figure 2.14 through both spaces.

<table>
<thead>
<tr>
<th>Distance values</th>
<th>within the diatonic space</th>
<th>within the arpegiation space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower neighbors (2 &amp; 5)</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>Upper neighbors (1 &amp; 6)</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>Arpeggiations (3 &amp; 4)</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>
Both metrics are provided in Figure 2.18, and are accompanied by a SOURCE-PATH-GOAL mapping and BARRIER/RELEASE analysis as appropriate. The SOURCE of a PATH is understood to be the CONTAINER from which we begin; the GOAL is to retrieve status as part of this originating CONTAINER; and the PATH asks the listener to confront one or more neighbor or passing tone BARRIERS. In Figure 2.18, neighbor tones and passing tones are assigned a qualitative label of Impediment (I) or Conduit (C). Qualitative associations of FALL (F), SETTLE (S), CLIMB (CL), and FLOAT (FL) indicate an interpretive association to any PATHs UP or DOWN that are depicted, and a FAILED BARRIER (FB) is attached to the arpeggiating networks (#3 and #4). This represents a BARRIER which fails to assert a strong or sustained resistance.

2.3.3.2. DISCUSSION

Column three reports on the categorical sets that were revealed in the Tier 1 analysis: the neighbor networks, the arpeggiating networks, and the reaching-overs. Categorical sets mean simply that these performances bear a family resemblance to one another along some dimension. However, the networks can be arranged into several meaningful categorical sets outside of their initial characterization in Tier 1 analysis. The complexity of this network and subsequent potentiality for cross-sections of categorical assessments is one of the confounding issues methodologically for Tier 2 analysis, but it is also aesthetically one of the more interesting aspects of the work. One particularly provocative example of this is that networks 1, 2, 3, and 5 are back-related, while 4 and 6 are front-related. In the back-related groups (1, 2, 3 and 5), the network func-

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92 This is the Schenkerian bent on SOURCE/PATH/GOAL schema, as outlined in section 2.2.
tions as a commentary on the initial E. In the forward-related networks (4 and 6), the network functions largely to *set the stage* for the final E. The final E is the GOAL of the network, and the activity of the network functions not as commentary upon a past event, but as preparation for an event that comes at the end of activities. The narratological cause/effect imposition here is that E needed to be prepared in (1, 2, 3 and 5), but in (4 and 6), it needed to be expanded, confirmed or explained. Importantly, if the idealized listener is pre-disposed to notice front- or back-relatedness, networks 4 and 6 will sound more alike than 3 and 4, despite their categorical likeness along other dimensions.

Another example where performances share one categorical assessment but not others is that networks 2, 3, 4 and 6 go UP before they go DOWN, while networks 1 and 5 go DOWN before they go UP. Barring a potent mimetic representation to the contrary, and if the listener is pre-disposed to understand UP as EFFORT, networks 2, 3, 4 and 6, which emphasize either the upper neighbor motion or a motion up to scale degree 3, will appear to increase in intensity before easing back DOWN, whereas the lower neighbor networks (1 and 5) will reflect a decrease.

Of the six networks, all of the networks begin and end in the scale degree 1 CONTAINER. The neighbor networks and the reaching-over networks carry us across two CONTAINER boundaries each according to the *Stufe* bias (and therefore one CONTAINER boundary according to the stepwise bias). The arpeggiating networks, on the contrary, carry us across only one boundary according to the *Stufe* bias and two boundaries according to the stepwise bias. Depending on which bias a listener is subscribing to at the moment, the arpeggiating networks will either feel as if they’ve either moved farther than the other networks, or they will feel as if they’ve moved less far.
<table>
<thead>
<tr>
<th>Performance</th>
<th>Derived structure</th>
<th>Predicted reverberatory activity</th>
<th>Containers Motion in the diatonic space</th>
<th>Container Motion in the arpeggio space</th>
<th>Emergent Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen to network 1</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td>B=Barrier R=Release FL=Float S=Settle C=Climb FB=Failed Barrier</td>
</tr>
<tr>
<td>Listen to network 2</td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td>Listen to network 3</td>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td>Listen to network 4</td>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td><img src="image15.png" alt="Image" /></td>
<td><img src="image16.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td>Listen to network 5</td>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
<td><img src="image19.png" alt="Image" /></td>
<td><img src="image20.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td>Listen to network 6</td>
<td><img src="image21.png" alt="Image" /></td>
<td><img src="image22.png" alt="Image" /></td>
<td><img src="image23.png" alt="Image" /></td>
<td><img src="image24.png" alt="Image" /></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.18.** Tier 2 Analysis of six performances of \{E, D#, G, F#, E\}

A performer’s mimetic representation can prime a listener toward an understanding of one or the other distance-map as the primary organizer of distance, by creating the illusion of dis-
tance values for each of the containers. If motion within a Stufe appears to float effortlessly (without any indication of effort or strain in the sound), the performer can promote a sense of closeness through ease. However, this closeness can in turn be interpreted by the individual listener in two different ways. They might experience it either as close, or as ironically effortless, considering the tremendous distance. The quantification of distance functions in the manner of overlapping containers—as a constant source of ambiguity and tension within a dynamic schematic fabric.

In general, networks 3 and 4 have the lowest general intensity. This implies that, for this performer, an arpeggiation warrants less effort than a stepwise motion or a reaching-over. By painting the competing CONTAINER pathways so unambiguously, the performer here primes the listener toward the Schenkerian bias: such that the distance from scale degree 1 to 3 is perceived as closer than the distance from scale degree 1 to 2.

2.4. EXERCISES IN SCHEMA-IDENTIFICATION

Schema correlations can suggest those aspects of non-verbal narrative that might be shaping a meaningful experience for a well-primed listener. For instance, a motion UP and across a CONTAINER boundary might implicate a rise in intensity, given a norm wherein the goal CON-

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93 An emergent, pre-conscious narrative might, or might not be made conscious through the mediation of what Lev Vygotsky would call private voice, or internal dialogue wherein the listener uses language to promote mappings in their pre-conscious experience into conscious experience—this is often described colloquially as fantasy. Through the use of an activity of fantasy, UP as an image schema can be explicitly associated with UP as a verbal concept in direct awareness, thus drawing the fantasizer’s attention to a single schema that emerges from the fabric to govern their experience. However, the mediation of a schema that is proposed to produce a pitch-network structural narrative occurs in a much more coincidental way: when properties of the heard pitch group coincide with properties of a learned, embodied schema.
TAINER is unstable compared to the originating CONTAINER. In this scenario, we can impose a cause/effect relationship along the lines of the following: the music climbed, from a place of rest to a place of instability. Here, the cause/effect and the norm work in tandem to transform two dimensions of information into a meaningful event. Similarly, an arrival at a GOAL contextualizes an UP/DOWN motion significantly, transforming it into an experienceable narrative.

However, the issue of the theory’s relevance to a performer is yet unresolved: if listeners differ widely, what should compel a performer to undertake the work of grouping? This issue is addressed fully in Chapter 3. For this reason, Exercise 5 simply extends the exercises of the first chapter in the direction of acknowledging schema correlations. However, most of the work regarding mapping will be done in the exercises of Chapter 3, when the issue of relevance in spite of listener differences is clarified.

2.4.2. EXERCISE 5: NAMING PITCH-GROUP OBJECTS

Exercise 5 is a naming activity. The teacher demonstrates the phrase of Figure 2.19, in a manner so that it emphasizes the upper line (E\#-F\#-G-G\#-A) unequivocally. The teacher then asks the student, “did it go UP or DOWN?” If the student is confident that they heard a motion UP, the teacher asks the student which parameters are being used to project upwardness. If the student is unsure, the teacher should constrain the student’s preference rules, by asking them to please pay attention to whichever parameter the teacher is using most prominently to project the motion UP. The teacher then performs the same phrase so that it follows the lower line (C-B-Bb-A) unequivocally DOWN, and the same question is considered.
Two things are vital at this point. First, the student should understand that this isn’t a traditional aural skills exercise, where they are asked to identify pitch motion. In a traditional exercise, the obvious and only correct answer is “both,” since the music wedges in both directions. However, the goal here is to help the student to explicitly key in on fine nuance. It is also imperative at this stage to project UP or DOWN with no ambiguity, lest the conversation become consumed with more complicated issues such as the balance of parameters. It’s not detrimental if the student organically leads the conversation in either of these directions. However, the exercises are designed to tackle issues of nuance systematically and they are presented in order of increasing complexity. Ambiguity is extremely important to the discussion, and will be addressed in the exercises of Chapters 3 and 4. At this first stage, the ability to acknowledge a single UP vs. DOWN motion is sufficient and paramount to fruitful completion of the exercises.

If the teacher’s performance is unambiguous, and the student has been coached to notice the parameter in use but is still unsure, then listening exercises are in order here to develop the student’s ability to key in to the various parameters or to develop finer categories of just-noticeable difference. These might include exercises that require the student to make ratings of more/less or faster/slower in terms of the various parameters. They might also ask the student to locate a gap within a phrase, or the peak of a trajectory. The student should be asked often to mimic a

Figure 2.19. measures 25-30 of Sonata Appassionata for solo flute, by Karg-Elert
simple nuance such as a single crescendo or a single trajectory of timbre change, each time using a trajectory of finer increments and less distance-travelled (less overall change and more gradual change). In these early stages, it is important that nuances are presented as separately as possible—not as part of a binary or complex of nuances—in order for the student to focus their attention on the parameter of interest. Later, the student will be asked to hear and mimic complex tapestries of nuance, but in order to earn admission to the more complex exercises of Chapters 3 and 4, a student should be capable of acknowledging and mimicking a trajectory or gap within a single parameter.

Assuming the student has achieved this proficiency, Exercise 5 is used simply to begin naming musical pitch-group objects. The activity lays the groundwork for the exercises of Chapter 3, in which the label that is identified in Exercise 5—such as UP or DOWN (and later, BAR-RIER, RELEASE, IN/OUT)—is used to incite an empathy between the student and the musical-grouping object, via anthropomorphization.

Naming the object also intensifies its presence in consciousness, by constraining attention toward the aspect(s) of it which affords it its name—its “UPness” or its “DOWNness.” Stanislavski, whose relevance is fully expounded in Chapter 3, describes a phenomenon wherein observing an object can catalyze further interest and more prolific creative activity surrounding the object; this is a fundamental tenet upon which Stanislavski’s concept of truth on stage is built. The intensification and desire to “do something” with a pitch-group object will compel later exercises.
2.5. CHAPTER SUMMARY

This chapter discussed the correlation of embodiment image schema with properties of pitch group objects. It proposed that correlations between heard pitch groups and image schema yield insight into listener response in musical listening, but noted that methodological hurdles as well as the promiscuity and non-universality of image schema make a relationship between heard grouping and moment-to-moment meaning difficult to verify empirically. A future plan of research is proposed in the closing remarks of this dissertation toward overcoming these problems, but the major tasks of this chapter were to convey the concept of mapping and begin the activities of schema identification which will drive the activities of the next chapter. The goal of the dissertation is to train performers to reach a higher level of inspiration in live performance, in the manner taught by Constantine Stanislavski. The next chapter presents Stanislavski’s method and an adaptation of it toward instrumental music pedagogy. The exercises will ask the student to anthropomorphize pitch group objects based on schema correlations they learned to identify in this chapter.
CHAPTER 3
TRUTH ON STAGE

The dissertation ultimately aspires to empower performers in traveling new PATHs through familiar pieces, that they might readily grasp the powerful impact of their magnificent wrong turns. Pitch network structure theory asserts that components of non-verbal, embodiment-based narrative can be coded into performance nuance for the willing and equipped listener, making nuance a powerful instrument of non-verbal, pre-conscious story-telling. Chapter 1 of the dissertation began by outlining a methodology for projecting grouping based on the properties (vibrato, timbre, dynamic, etc.) that become cognitively binded to pitches when a temporal coincidence is asserted by a performer between a pitch and those properties. Chapter 2 then proposed that a heard grouping interfaces with meaning via the agency of non-verbal, embodiment-based schema in interaction with norms during real-time structuring. This chapter extends this work toward what Russian acting teacher Constantine Stanislavski called truth on stage, by asking the performer to empathize with those mappings.

For the critical reader, the issues of demonstrability and testability which stumped the work of tier 2 analysis—the promiscuity of schema mappings—reassert themselves in this application of pitch network structure: if proving the function of schema mappings as an interface between sound and meaning presents so many methodological hurdles, what should motivate the performer to gamble their effort upon its existence? Stanislavski’s response to this question is admirable:

Let me tell you about an old woman I once saw trundling a baby carriage along a boulevard. In it was a cage with a canary. Probably the woman had placed all her bundles in the carriage to get them home more easily. But I wanted to see things
in a different light, so I decided that the poor old woman had lost all of her children and grand-children and the only living creature left in her life was—this canary. So she was taking him out for a ride on the boulevard, just as she had done, not long before, her grandson, now lost. All this is more interesting and suited to the theater than the actual truth. Why should I not tuck that impression into the storehouse of my memory? I am not a census taker, who is responsible for collecting exact facts. I am an artist who must have material that will stir my emotions.¹

That is, while a correlation between performance nuance and received musical meaning is probable but prescient, the pedagogical application of this dissertation is defended by Stanislavski’s words. Stanislavski defines *truth on stage* as “whatever we can believe in with sincerity, whether in ourselves or in our colleagues. Truth cannot be separated from belief, nor belief from truth.” Later he stresses that, “[E]ach and every moment must be saturated with a belief in the truthfulness of the emotion felt, and in the action carried out, by the actor.”² Schema mappings can provide a tangible intermediary of narrative for a performer. As such, they can be valuable facilitators for a performer who wishes to elicit *truth on stage* for him or her self.

A pitch-group object whose label elicits empathy within a performer—such as UP, or OUTSIDE, or BARRIER—can become an object of productive attention: an object of play, and an object of conversation. Stanislavski describes a phenomenon wherein the simple act of observing an object can catalyze further interest and more prolific creative activity surrounding the object. “Intensive observation of an object naturally arouses a desire to do something with it. To

¹ Stanislavski (1936), p. 101. This quote underscores an important tenet of this dissertation that was discussed in the Introduction: that the idea of an *absolute* narrative, while useful, doesn’t support the flexibility of imagination that is advocated for in this dissertation.

² Stanislavski (1936), p. 141.
do something with it in turn instensifies your observation of it. This mutual inter-reaction establishes a stronger contact with the object of your attention.\textsuperscript{3}

In collaboration, the game of structuring can act as a facilitator of deeper communication and richer interaction between partners. A mutual command of the grouping rule-set and an absorption into the labels/associations (UP, DOWN, BARRIER, etc.) can help chamber music partners to follow and nurture their respective narratives as they unfold, intertwine, and beg to be nurtured. In cases when differences of opinion reveal themselves to collaborators mid-performance—a situation which can make or break a chamber partnership—practice with re-structuring can empower a re-conceptualization of material on the spot. This can do more than simply \textit{alleviate} the effects of mishaps such as notes-too-loud, bowings that are clumsy and other random variabilities in human performance. It can transform these potential disasters into opportunities for deeper engagement and a fresh exploration of a soundscape-already travelled. Finally, for performers who tend to miss the trees for the forest, practice in the activities of structuring and re-structuring can help them to acknowledge a meaningful close reading of musical events.

Section 3.1 reviews Stanislavski’s method and section 3.2 explicates how pitch network structure can be used to attain Stanislavski’s goals of deeper engagement, continuity, and truth on stage. Section 3.3 provides exercises toward this end. The exercises aim to achieve a transfer of Stanislavski’s theory toward instrumental performance pedagogy: through practicing them, a student transforms a conscious study of embodiment image-schematic structuring into an implicit knowledge base that can be accessed during performance, in the service of \textit{truth on stage}, at the fast pace of real-time music-making.

\textsuperscript{3} Ibid, p. 83.
3.1. STANISLAVSKI’S METHOD

The crux of the performing arts, in the eyes of Stanislavski, is that the non-performing artist “may create whenever he is in the mood of inspiration. But the artist of the stage must be the master of his own inspiration and must know how to call it forth at the hour announced on the posters of the theater.”

Stanislavski’s method aims fundamentally to invite inspiration by inciting truthful psychological responses to the experiences that an actor’s character undergoes over the course of a scene and play. This requires first, an actor’s unwavering belief in the psychological reality of their characters’ experience, and second, a belief in the reality of their kinship with the character. Kinship needs to be recreated every time an actor plays the role in order to avoid a stale replication of a role in repeated performances.

In his 1936 *An Actor Prepares*, Stanislavski presents his method as a triad. The first tenet of the triad is a process of analysis, wherein the actor breaks a role down into *kosok*, or units, and *zadacha*, the objectives which drive those units. “Since it is impossible to take control of the whole at once, we must break it up and absorb each piece separately….When you cannot believe in the larger action you must reduce it to smaller and smaller proportions until you can believe in it.” Units are time spans marked by events, changes in motivation or developments. Objectives encapsulate the meaning or function of each unit toward narrative coherence. The breakdown of a role into its units is aimed toward understanding the psychological drives which motivate the actions and words of the character. It was the actor’s responsibility to break their role down into

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4 Stanislavski (1963 [posthumous]), p. 15.

5 These are Elizabeth Hapgood’s 1936 translations.

6 In the next sentence, Stanislavski stresses, “Don’t think that this is a mean accomplishment. It is tremendous.” Stanislavski (1936), p. 153.
its functional bits and later re-assemble the bits so that an unbroken line of objectives can be conceptualized while acting. Of the assembly of the unbroken line, Stanislavski teaches, “always remember that the division (of a role into its bits and parts) is temporary. It is only in the preparation of a role that we use small units. During its actual creation they fuse into large units.”

For Stanislavski, no words can be said and no actions taken without understanding of and belief in their necessity and relevance to a larger meta-objective, because truth on stage is inseparable from the actor’s belief in and understanding of the relevance of their smallest actions.

Stanislavski’s second tenet—the discovery or invention of given circumstances—supports the analysis of units and their re-assembly into an unbroken line of objectives. Given circumstances act as an interface between the derived drives and motivations of the character, and the genuine drives and motivations of the actor who is bringing that character to life: they inform the objectives at all levels of unit. Many of the given circumstances are supplied by the playwright, although some must be inferred. Those that cannot be found or inferred must be invented. If after careful thought a unit cannot be found to have an objective, it is the responsibility of the actor to provide that unit with an objective, so as to achieve belief in the actor’s need to accomplish the unit. Stanislavski explains:

To achieve…kinship between the actor and the person he is portraying add some concrete detail which will fill out the play, giving it point and absorbing action…The (given) circumstances…are taken from sources near to your own feelings, and they have a powerful influence on the inner life of an actor. Once you have established this contact between your life and your part, you will find that inner push or stimulus. Add a whole series of contingencies based on your own experi-

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7 Ibid, p. 125.
ence in life, and you will see how easy it will be for you to sincerely believe in the possibility of what you are called upon to do on the stage.\(^8\)

Stanislavski warns, “if you speak any lines, or do anything, mechanically, without fully realizing who you are, where you came from, why, what you want, where you are going, and what you will do when you get there, you will be acting without imagination. That time, whether it be short or long, will be unreal, and you will be nothing more than a wound-up automation.”\(^9\)

Completing the triad and supporting the other two tenets—analysis and the discovery/invention of given circumstances—is a rounded physical training. Stanislavski’s actors did exercises to promote an ever-increasing flexibility of voice and body. As Stanislavski was deeply-rooted against the use of highly-practiced physical motions and voice inflections, his exercises aimed for a virtuosic flexibility. A physical or technical limitation, according to Stanislavski, will both consciously and unconsciously limit the actor’s creative potential.

Stanislavski transmitted his triad to posterity by publishing several books on acting and directing. The first of his books, *An Actor Prepares*, was cast in the form of a fiction similar to Fux’s popular *Gradus ad parnassum*. In *An Actor Prepares*, the great acting teacher Tolstoy—a representation of Stanislavski—teaches a class of students over the course of a year. The course is recounted through the pen of a student named Kostya.

Throughout the lessons of *An Actor Prepares*, Tolstoy (the teacher) admonishes his students to avoid—at all costs—the external representation of feelings without appealing to the action from which an imitable psychological state derives. He criticizes, “all of you began your work at the end instead of at the beginning. You were determined to arouse tremendous emotion

\(^8\) Ibid, p. 52.

\(^9\) Ibid, p. 77.
in yourselves and your audience right at the start; to offer them some vivid images, and at the same time exhibit all your inner and outer gifts.” Tolstoy corrects his students with the following metaphor: “feelings cannot be fixed. They run through your fingers like water. That is why, whether you like it or not, it is necessary to find any more substantial means of affecting and establishing your emotions.” He then illustrates, “do as a hunter does in stalking game. If a bird does not rise of its own accord you could not find it among all the leaves of the forest. You have to coax it out, whistle to it, use various lures.” The key to reaching inspiration is to create an unbroken line of objectives and outfit them with given circumstances that support them. The objectives and circumstances will lure appropriate responses, which will in turn inspire a continuity of self-belief in the psychological validity of an action.

Pitch network structure can be a tangible agent of narrative for the interested performer: by latching onto a tapestry of dynamically-evolving embodiment schema mappings, a performer can achieve the unbroken line of continuity and self-belief that Stanislavski asks of his actors. Following this unbroken line brings a number of benefits to the instrumental performer: a continuity and resilience of focus, a flexibility and a spontaneity that doesn’t sacrifice coherence, and finally, the real-time integration of differences of opinion among collaborators.

3.2. PITCH GROUPINGS AND THE GIVEN CIRCUMSTANCES

Much of performance pedagogy is grounded in the imitation of a master. As a result, practice is sometimes aimed toward the repetition of specific set of nuances. As a practice, repe-

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10 Ibid, p.166.
11 Ibid, p. 207.
tition is not incongruent with Stanislavski’s method, as long as it is aimed toward the development of a skill set and/or a general flexibility, as opposed to an ability to replicate a serialized set of actions. Stanislavski was adamantly opposed to what he called the art of representation. Particularly telling is Tolstoy’s firm warning to his students: “you must be very careful in the use of a mirror. It teaches an actor to watch the outside rather than the inside of his soul, both in himself and in his part.”

Like a mirror, a recording device can be an important but limiting tool for a musician. It can motivate and empower the mastery of a serialized set of actions that yield a predictable result. For Stanislavski though, work is not complete once a performer is capable of performing a serialized set of actions to mastery.

In An Actor Prepares, Stanislavski uses a class activity as an opportunity to convey this. The students are repeating an activity which they had done several weeks before and then left behind for some time: they are playing a family who is sitting in their living room, listening to the radio. The radio program announces that a madman has broken loose in the neighborhood. Suddenly, there is an unexpected knock at the door. Stanislavski relates the story through the pen of the student Kostya.

I repeated exactly what I used to do. I found myself under the table, only I was clutching a large book instead of an ashtray. The others did about the same. Sonya, for instance, ran into Dasha the first time we ever did this scene and accidentally dropped a pillow. This time she did not collide with her but let the pillow drop anyway, in order to have to pick it up. Imagine our amazement when both Tolstoy and Rakhmanov (Tolstoy’s assistant teacher) told us that, whereas our playing of this exercise used to be direct, sincere, fresh and true, today it was false, insincere and affected. We were dismayed at such an unexpected criticism. We insisted that we really felt what we were doing.

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Tolstoy responds as follows:

There can be no question but that you preserved the whole staging, the movements, external actions, the sequence and every little detail of grouping, to an amazingly accurate degree. One could easily be led to think that you had photographed the set. Therefore you have proved that you have remarkably keen memories for the external, factual side of a play. Yet, was the way you stood around and grouped yourselves of such great importance? To me, as a spectator, what was going on inside of you was of much greater interest. Those feelings, drawn from our actual experience, and transferred to our part, are what give life to the play. You did not give those feelings.  

Tolstoy concludes his diagnosis, “[Y]ou repeated a successful rehearsal instead of recreating a new, living scene.” Stanislavski is conveying that in affording attention to replication, artists deny themselves the opportunity to sense the scene as a truthful event and subsequently, experience a truthful and creative psychological response. Especially compelling is his note regarding the actress Sonya and her pillow: he points out that the last time the students played the scene, Sonya had accidentally dropped her pillow, and the act of dropping the pillow had inspired a truthful response in her; her panic had been enhanced by the necessity of accommodating the accident. In the replication on the other hand, she dropped her pillow again, simply for the sake of dropping it. Stanislavski’s discussion of mistakes such as dropped pillows centers around the power that such events can afford an actor. He writes,

I could quote innumerable instances which have occurred in my own experience, where there has been something unexpected injected into the stale, routine acting of a play. A chair falls over, an actress drops her handkerchief and it must be picked up, or the business is suddenly altered. These things necessarily call for small but real actions because they are intrusions emanating from real life. Just as

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13 Ibid, p.177-179.

14 Ibid, p.177-179.
a breath of fresh air will clear the atmosphere in a stuffy room these real actions can put life into stereotyped acting.\textsuperscript{15}

Most musicians are aware that the circumstances they face in live performance differ in important ways from the safety of their practice room. Young performers are often taught to ignore a mistake or audience distraction that occurs during a performance. However, when a mild mistake or distraction is more than ignored—when it is incorporated into the evolving performance, it can be a catalyst for an invigorated and truthful exploration. A heavy bow drop can make a pitch that was yesterday outside the CONTAINER—just passing through—suddenly seem as if it is a defining member of the governing CONTAINER. In this case, a skilled restructor can discern how the narrative changes, and design new nuances which will nurture this new, emerging narrative.

In one lesson, Tolstoy tells the students, “the unexpected is often a most effective lever in creative work.”\textsuperscript{16} In order to accommodate the unexpected, and transform it into artistic material, a performer must have some means of 1) conceptualizing the impact of an upset (perhaps as part of the evolving fabric of a developing narrative), and 2) conveying and nurturing the performance’s newly-discovered direction. A performer who has practiced these skills, and who understands that an evolving narrative is just that—evolving—can (rightly) be more confident and their focus more resilient.

In trading the ceramic, but fragile performance we design in a practice room for a performance that emerges beneath our moving fingers, we also open ourselves up as collaborators to valuable influence from our partner. It is a common error among young performers to master a

\textsuperscript{15} Ibid, p. 154.

\textsuperscript{16} Ibid, p. 179.
set of nuances in the practice room, which they later find doesn’t quite fit the nuance-set of their collaborator. The nuances chosen—however cosmetically beautiful in isolation—function to remove collaborators from one another.

Stanislavski actively laments this problem of actors whose inflections and actions are not intertwined with one another meaningfully:

Unfortunately, (an) unbroken flow is all too rare. Most actors, if indeed they are aware of it at all, use it only when they are saying their own lines. But let the other actor begin to say his and the first one neither listens nor makes an attempt to absorb what the second is saying. He ceases to act until he hears his next cue. That habit breaks up constant exchange because that is dependent on the give and take of feelings both during the speaking of the lines, and also during the reply to those already spoken, and even during silences, when the eyes carry on. Such fragmentary connection is all wrong. When you speak to the person who is playing opposite you, learn to follow through until you are certain your thoughts have penetrated his consciousness. Only after you are convinced of this and have added with your eyes what could not be put into words, should you continue to say the rest of your lines. In turn, you must learn to take in, each time afresh, the words and thoughts of your partner. You must be aware today of his lines even though you have heard them repeated many times in rehearsals and performances. This connection must be made each time you act together…

Stanislavski later describes another version of this problem: an actor who is shaping his inflections and pacing with relevance to an imaginary actor, instead of his actual partner:

What torture to play opposite an actor who looks at you and yet sees someone else, who constantly adjusts himself to that other person and not to you. Such actors are separated from the very persons with whom they should be in closest relationship. That cannot take in your words, your intonations, or anything else.

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Their eyes are veiled as they look at you. Do avoid this dangerous and deadening method.18

Many performers will agree that an open and responsive collaborator is a true joy to work with: someone who hears and responds to their partner’s nuances, incorporating them into their own internal process, in turn commenting upon them, supporting them and challenging them. At its most living, chamber music is a game of deriving intent, predicting actions and choosing how to support or challenge those actions as they occur in real-time. One way some partnerships avoid failure at this game is to avoid it entirely, by planning and practicing a type of script together, thus constraining their possibilities and raising the probability of a flawless performance. All of the negotiating occurs behind closed doors, in the rehearsal room. Another way partnerships manage the contingencies of the game is to prepare several versions of each section, and toggle among the different sub-scripts in different performances. This can preserve a window for spontaneity, without risking quite as much.

When a major review or similar prize is at stake, the conservative or semi-conservative options can seem good choices. Partnerships need to do what they feel comfortable doing and what they feel will produce the best result for them. But if ever there was a context where restructuring can be fascinating and useful, it is in the context of collaboration, where separate minds, separate intents and separate narratives convene, and where partners’ work intertwines, shapes, and is shaped by one another. An attention to grouping, a mastery of the grouping parameters and an elegant set of labels that inspire empathy between performer and pitch-group object can facilitate a real-time intertwining among collaborators, and open the door to a great

freedom and confidence in both spontaneity and interaction. The ideals of pitch network structure—creating and anthropomorphizing vivid pitch-group objects in an unbroken line of emerging *given circumstances*—are certainly not the only means of contacting *now* and conceptualizing the musical becoming that is so vital to living chamber music, but they are an effective way to go about it.

Based on his writings, it is difficult to say definitively that Stanislavski would outright reject the conservative path of making a script and the semi-conservative path of toggling among scripts. After all, if scripts are motivated in the moment by a set of powerful given circumstances—not *just* a serialized set of actions—then an unbroken line can be achieved. On the other hand, Stanislavski makes it clear that new and living are clearly more highly prized: “you cannot repeat an accidental sensation you may have on stage, any more than you can revive a dead flower. It is better to try to create something new than to waste your effort on dead things. How to go about it? First of all, don’t worry about the flower, just water the roots or plant new seeds.”

Stanislavski actively bemoans the lure of replication:

Don’t spend your time chasing after an inspiration that once chanced your way. It is as unrecoverable as yesterday, as the joys of childhood, as first love. Bend your efforts to creating new and fresh inspiration for today. There is no reason to suppose that it will be less good than yesterday’s. It may not be brilliant, but you have the advantage of possessing it today. It has risen, naturally, from the depths of your soul to light the creative spark in you. Who can say which manifestation of inspiration is better? They are all splendid, each in its own way, if only because they are *inspired*.

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20 Ibid, p. 189.
Not all wrong turns will lead directly to a magnificent buried treasure, and many wrong turns will only become magnificent with restructuring of previously-performed sounds. By mastering the ruleset for grouping, a performer becomes capable of eclipsing the current primary parameter of grouping and influencing listeners’ preference rule outcomes retrospectively. Even if this newly-structured grouping is not received by a listener for the reasons outlined throughout the earlier chapters of the dissertation, the confident performer’s presence will not be denigrated. This in itself is valuable to a performer: it doesn’t take fine categories of just-noticeable difference to notice that a performer suddenly appears frightened, apologetic, frustrated, hesitant, or non-committed.

Regardless of whether we choose to explore on stage or behind closed doors, it is in the exploration of fresh connections where we find wonder. New, emerging truths are the magical transiences where art lives. As such, improvised narrative-restructuring in the moment can be considered the highest level of artistry in grouping. But even for a conservative (scripted) performance or a semi-conservative performance which toggles spontaneously among scripts, a tangible intermediary of narrative can provide an unbroken line of given circumstances from which to draw motivation during live performance. Section 3.3 guides a student toward using their empathic responses to nurture an emerging narrative; Chapter 4 concludes the work with a set of exercises for re-structuring, in real time.

3.3. EXERCISES IN EXPRESSION

This section provides exercises that transfer Stanislavski’s triad into instrumental performance pedagogy, using schema mappings as mediators of non-verbal narrative. Through the ex-
ercises, a teacher can guide the student toward a deeper, more comfortable and more accessible expressivity, and provide the student with tools for coping with human variability and the challenges of collaboration. A high aim of the exercises is that the student’s unique musical voice is exercised. The highest aim is the ability to do so in real-time, in the face of (and in response to) the realities of live performance; this is discussed in Chapter 4.

3.3.2. EXERCISE 6: PROVIDING GIVEN CIRCUMSTANCES FOR A MAPPING

Exercises 6 and 7 should be practiced as a loop: the teacher and student should complete Exercise 6 for some musical context, then move to exercise 7 for the same context. The pair of exercises should be completed for all of the different musical contexts that are provided in Figures 3.1 through 3.7.

Exercise 6 practices the invention of given circumstances based on schema mappings. The exercise lays the groundwork for developing empathy with a pitch-group object or set of pitch-group objects. This empathy will motivate Stanislavski’s truth on stage. Stanislavski taught his students to “never seek to be jealous, or to make love, or to suffer, for its own sake. All such feelings are the result of something that has gone before. Of the thing that goes before you should think as hard as you can. As for the result, it will produce itself.”21 He stressed, above all, that “whatever happens on the stage must be for a purpose. Even keeping your seat must be for a purpose, a specific purpose, not merely the general purpose of being in sight of the audience. One must earn one’s right to be sitting there.”22 Once a structuring schema such as

21 Ibid, p. 43.

UP or DOWN is acknowledged (exercise 5), the next step is to provide given circumstances as to why the music is going UP/DOWN, and equally important, how does the music feel about the act of going UP or DOWN?

In Stanislavski’s triad, the activity of providing given circumstances is a creative endeavor. In doing this exercise, the student should be encouraged to actively anthropomorphize the pitch group, by explicitly mapping the pitch group onto a mental image of a friend, an animal, an imaginary conceptualization of their self, or any object that has been decreed a soul, a sense of intent and the ability to experience and reflect upon an emotional response to the outcomes of intent and actions. Finally, the object must be something/someone with whom the student is capable of sharing an empathy.

The exercise consists mostly of exploration; the point is to seek out and develop the student’s empathic response to mappings. This should be done by asking the student to provide gradually more detail regarding the object of their empathy and its adventure. The following questions should be explored with regards to Figure 2.20 of the previous chapter (re-printed below):

- What does the object hope to achieve in climbing UP?
- Does the object have the strength to climb the prescribed distance?

![Figure 3.1. measures 25-30 of Sonata Appassionata for solo flute, by Karg-Elert](image-url)
• Why or why not?

• Does the object believe that it has the strength?

• If it can’t find strength, what other tools can it use to climb the slope?

Contextualizing the circumstances is part of this undertaking as well:

• What kind of slope is it? Is it a narrow, dark, slippery cave? Is the creature wafting up an easy, daisy-filled hillside? Is it a mosey, more of a jaunt, or more like a salmon battling a current?

• What awaits the creature at the top of the ascent? A friend? A betrayal?

Detail should be added as long as the student continues engaging in the activity. The activity can proceed purely by listening to or playing the ascent and responding intuitively, but the student should also be coached on properties of the ascent, such as the locations of its diatonic or set-class-based asymmetries, on pitches’ harmonic status, and on metrical placement to further cultivate their given circumstances.

• Which steps up are smaller and which are bigger?

• How does the meter relate to the climb?

It is paramount that the given circumstances reflect aspects of the score. It can happen that a disconnect can occur, and the exercise becomes a fantasy that is not attached to the score via any correlation with any properties of a pitch group. If this is found to occur, it is helpful to ask the student (while congratulating their creativity) to correlate their scenario back to some aspect or aspects of the score. Depending on their mastery of various vocabulary, they may or may not be capable of clearly expressing their correlation verbally, but a long-winded or clumsy attempt will usually suffice for assessing whether the student is correlating the two sides of a map-
ping, or simply fantasizing. A student who is skilled in correlating a mapping to an aspect of the score will be more effective at transferring the strategies of these exercises out of the exercises and into their repertoire.

Stanislavski asked his students for given circumstances using the following language, which centers around the observation of a chandelier:

Now I want you to tell me this: do you like it? If so, what is it that especially attracts you? What can it be used for? You can say to yourself: this chandelier may have been in the house of some Field Marshal when he received Napolean. It may even have hung in the French Emperor’s own room when he signed the historic act concerning the regulations of the Theatre Francais in Paris. In this case your object has remained unchanged. But now you know that imagined circumstances can transform the object itself and heighten the reaction of your emotions to it.23

The exploration should be aimed toward the student’s strongest modality. Some will achieve a high level of visual detail; others will visualize nothing but will sense a warmth in the air or fatigue in the muscles as their object ascends; still others will focus most prominently upon verbally conveying emotions, such as pride, helplessness, or drivenness. The teacher should trust the student’s way of understanding their universe, and guide the exploration in whichever direction the student leads or seems easily led. In some cases, it will be a stretch for a teacher to try to experience some moments through their student’s primary modality, but it is imperative that the teacher’s prominent modality does not overwhelm the exploration. The exploration must be something that the student does and owns.

Themes may be found to run through many of the student’s sets of circumstances, and characters/objects of empathy may reappear. It can be useful when students use the same charac-

23 Ibid, p. 97.
ters (for instance a mouse family, the Loch Ness Monster, etc.) in different schematic contexts, as their creativity is more immediately triggered. In the beginning, it might be helpful to vary these things often, until something truly productive emerges for the student. While it may be difficult for a student to respond to a dark, slippery cave, the student may very easily respond to a jaunt up a daisy-filled hillside. As the student builds a comfortable universe in which to situate their object and its various circumstances, their creativity will become more accessible. If that universe later loses its spark, it can be always be enriched with small changes, or entirely replaced.

Also importantly, allowing the student to follow their own strength will help them to feel more supported, which is very important as they are potentially risking quite a lot in this particular exercise. Some students will enjoy this activity and their imaginations will be fruitful, others will be much more slow to participate. For some students, to risk empathy or to risk expressing empathy with an imaginary entity is not a small request; they will face formidable emotional obstacles to the exercise.

In a case where a student doesn’t readily think of an object of empathy or a rich set of given circumstances, some limited guidance is permissible. However, it is imperative that the teacher’s judgements regarding an appropriate object of empathy are suppressed, and that the student’s early contributions—however vague, odd or unshared they are—are supported unconditionally. In cases where the student is extremely hesitant to engage, it can be helpful to make clear all of the following things: that the student is capable of self-expression; that they are worthy of being heard; that lessons will continue to help them by providing tools that—should they choose to use those tools—can move them from this place of difficulty to one where expressivity is more comfortable; that the teacher is qualified to help them; that the teacher is trustworthy;
that their work will proceed at a pace that is respectful of them and not too uncomfortable; and finally—and most gently—that expression is their duty as a musician of society and is expected of them by the larger institution of the music performance world.

Once this has been communicated, be sure to honor all of it. For some students, it can take months; it is very important to respect that one student’s sense of what constitutes risk will not be the same as another’s. A long timeline is certainly not a life sentence, and the most important action the teacher should take is to support the steps that a frightened student does take in those moments when they are brave enough to take them. The sense of risk the student experiences must be acknowledged and validated in order for the student to feel that their risk is being appropriately rewarded.

At times—especially at the beginning of this work—it might be useful to allow a hesitant student to imagine entirely privately. This gives them the space to develop a sense of safety in the activity before they are challenged to submit their thoughts to the pressures and judgements of the external world. Over time and with much support and space, less prolific sharers might share more. If they don’t, it is fair and reasonable to trust that as long as a good relationship between the teacher and student is evidenced to be developing, the student will be internally developing a deeper engagement with the exercise, regardless of whether they choose to share that engagement aloud. Allowing a student to explore internally makes it more difficult to assess their success in Exercise 6, but it is sometimes necessary and appropriate. For these reasons—and since Exercises 6 and 7 form a loop anyway—if the teacher can’t quite assess the effectiveness of Exercise 6, it is not unreasonable to wait to assess—perhaps going back to Exercise 6 several
times if it is found in Exercise 7 that the student has not come to terms with the new demands brought upon them by their study of expressivity.

Another important point as regards Exercise 6 is that, for some students, the idea of UP in itself might incite non-verbal associations such that the student immediately experiences a true empathy. However, for reasons that have nothing to do with emotional risk, the student is not capable of verbally documenting the associations that are guiding their feeling. Many people are capable of various forms of imagery but are not efficient at expressing their experience via language. Once again, the desired result of Exercise 6 is not necessarily a verbal conversation. Although language can certainly mediate for the majority of the population and facilitates the assessment of understanding, the desired result is some evidence of an empathy, which can be just as easily gauged through Exercise 7.

3.3.3. EXERCISE 7: RESPONDING TO GIVEN CIRCUMSTANCES WITH EMPATHY

Once the student produces a set of given circumstances surrounding the UP or the DOWN motion of Figure 3.1, the ground has been laid for the experience of empathy. Empathy arises when the student relates to the experiences of the object who is embroiled in the given circumstances they invented in Exercise 6. Exercise 7 uses guided discussion, teacher modeling, and student experimentation to begin translating that empathy into musical expression.

The teacher should guide the student in reflecting on the given circumstances that were invented or discovered for Figure 3.1:

- How does the creature/object of empathy feel?
- How does it feel to watch the creature?
• Do you take an antagonistic or a protagonistic approach to your creature’s circum-
stances?
• Do you want the creature to meet the goal of the motion UP, but fear for the creature’s
fate upon reaching that goal? etc.

As the student reflects upon their feelings, the teacher should begin guiding the student
toward specific actions they might take to demonstrate those feelings. This guidance will take
the form of guided questions, modeling, and experimentation. Guided questions should resemble
the following:

• Do you feel like you want the creature to climb up faster—accelerando—so as to avoid
the dangers lurking along the path (that you described in Exercise 6)?
• Do you feel like the creature wants to move slowly, so as to not disturb those dangers?
• Do you feel as if the creature should run screaming, or move as quietly as possible?

Modelling is very important in learning musical expression, and the modelling done by
the teacher will need to be outstanding to be effective. It might be a challenge, but the teacher
should perform the phrase according to the student’s given circumstances, and try to capture his/
er expressed empathic stance, using timbre, timing, and vibrato in a way which explicitly and as
honestly as possible reflects that stance. The student should then be asked to mimic and/or re-
fect upon aspects of the modelled rendition. The teacher should ask the student to locate and
describe some of the trajectories and gaps, dynamics and timbres that were used in the perfor-
mance. Each time the student identifies a trajectory, gap, timbre, etc, the student should mimic
that parametric usage.
After some work, the teacher should ask the student some guided questions which pertain to the translation of empathy into the tools of musical expression, such as the following:

- Why do you imagine this trajectory of timing symbolizes “struggle?”
- Why does the timbre we just practiced reinforce this symbolism?
- Why does this trajectory of dynamic reinforce it?

The student’s general impressions are sufficient answers to these questions, as the function of the questions is not to investigate the ontology of the various symbolism that is used in music performance per se, but to bring the tools of expression to the student’s attention.

Once the teacher’s model of the student’s expressed empathic stance has been discussed and mimicked to exhaustion, the student should formulate a different version of Figure 3.1. Beginning with Exercise 6, the student should produce a different set of given circumstances, and then consider how the parameters at their disposal can be used to symbolize the new empathic response they discover in themselves during Exercise 7. The goal here is to guide the student toward finding a means of responding to their empathy using a unique set of circumstances. In early practices, it is permissible to guide a student by offering suggestions, but the student must be challenged and given the space to choose—unimpededly—a way of expressing their own empathic leanings. Work should not progress to Exercise 8 until they can do so with some degree of confidence.

Once Exercises 6 and 7 have been completed for Figure 3.1, the student’s work should proceed with the activities below, labelled Exercises 8a—d. Exercises 8a—d use simple scales to develop the student’s tool box for musical expression. For these exercises, continue to utilize simple nuances (not binaries, such as hairpins or complex tapestries where parameters compete)
as it is important to keep things achievable and un-convoluted in the beginning stages. As the student returns to earlier exercises, more complex tapestries should be utilized and encouraged. Adjustments such as using pictures instead of words, tailoring the modality used, allowing the student to imagine privately, moving more directly to playing, and/or limiting the time spent on the activity should be made as appropriate for each student.

3.3.4a. EXERCISE 8a. The teacher should play a scale up using a trajectory of *diminuendo*. Ask the student, what happened? Why could it have happened? The student needs to provide a unique set of given circumstances, in one to three sentences. (Constraining the student to a few sentences helps the student to sense that the exercise is finite.) The student might try mimicking the diminuendo if it seems it would be fruitful. For this exercise, early practices can be coached as regards both the diminuendo and the motion UP; as the student progresses, they should be identifying both of these aspects without coaching. Later repeats of the exercise can halt the scale on different scale degrees, and can explore the part of narrative that is embroiled in scale degree qualia.24

3.3.4b. EXERCISE 8b. The teacher should play a scale up using a trajectory of *ritardando*. Ask the student why do you imagine we slowed? Provide a set of unique given circumstances in less than three sentences. Practices should proceed from more to less coaching, and repeats can engage scale degree qualia.

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24 Philosophers argue over a definition for scale degree qualia. For our purposes, appeals to closedness/unfinished-ness, tension/relief, and chord membership accomplishes what is needed.
3.3.4c. EXERCISE 8c. Have the student formulate a different nuance for a scale UP—something other than *diminuendo* or *ritardando*. If prompting is needed, it can be helpful to remind the student that, having done *diminuendo* and *ritardando*, two clear choices arise: *crescendo* and *accelerando*. Before the student performs the scale, have them formulate a set of given circumstances that motivate a *crescendo* in a motion UP (or that motivate an *accelerando* in a motion UP).

3.3.4d. EXERCISE 8d. Have the student perform a motion DOWN through a scale. Include scale degree qualia in the given circumstances if appropriate.

Exercises 8a-d lead elegantly back to Exercises 1 through 4 of Chapter 1. The student should return to their early work on grouping and explore how they might express an empathy with the various pitch-group objects that are revealed by different groupings of Figure 1.8. For some students, using actual literature will prompt more engagement than using scales. Some appropriate examples are provided in Figure 3.2. The excerpts are from the orchestral literature and are necessarily either/or—they were chosen for their lack of ambiguity for the purposes of introductory work. Some more complex networks form later exercises.

A sensitive student’s given circumstances very well might reflect aspects of CONTAINER naturally, but it is sufficient at this point to deal with simple UPs and/or DOWNs. Exercise 9 will deal explicitly with tonic containers, scale containers, etc., and after completing them, the student will be asked to return to Exercises 7 and 8, as well as 1-4 to enrich their ascents and descents with more details. Having said that, if the student seems eager to incorporate details of
CONTAINER into their ascents and descents and it doesn’t threaten to convolute their focus, then there’s no real reason to hold them back from that activity.

In repeating this exercise through returns to earlier exercises, aim for increasing independence of thought for the student. If a student is quick to mimic and/or agree to suggestion, and slow to explore their own imagination or empathy, modeling and guiding questions should be used gradually more cautiously. One form of musical talent that can be found in some students is a formidable ability to mimic. This is not a discounted skill by any means—it takes very fine just-noticeable difference categories and seemingly magical ability to transform desired sound into highly specific motor activity at the speed of music. To achieve a successful mimic is an amazing feat in musical development. But it is important to remember that the work is not finished when a student can reproduce with ease and fine accuracy. The goals for a Stanislavski-driven exploration are (1) that the student practices understanding what is inside of themselves and how they themselves feel about the material at any given moment, (2) that the student learns how to construct a kinship between their self and their pitch-group object using empathy, and (3) that they learn to express empathy that is born in that kinship through musical sounds.

A final note is that in assessing the student’s success at this stage, it is important to congratulate a successful expression regardless of any technical misgivings. For example, if a student’s intonation becomes wildly sharp during a crescendo, provide them with crescendo exercises with a tuner to solve this problem, but do it in isolation of the feedback you provide regarding their expression. Creativity will often invite a new level of technical expertise, by revealing deficits which were previously not evident. The danger here is that the student who risks being creative can unintentionally learn to associate that risk with failure or criticism. In some cases,
this association was learned long before they came to study music at the college level, and even long before they first picked up a musical instrument. A student who is more practiced in creativity is less vulnerable to this dangerous association, but for the student who is risking creativity and self-expression for the first time—or for the first time in a long time—it can be a serious impediment. One way to minimize this danger is to explicitly separate the feedback into two categories: provide congratulations on their successful communication first; second, allow some moments to pass; third, provide exercises to alleviate the intonation problem. It is also effective to actively congratulate the student on uncovering this new technical exploit, which will bring them into another realm of technical achievement.

Figure 3.2. Some famous UP/DOWN motions from the orchestral literature
UP: “Dance of the Blessed Spirits,” from Gluck’s *Orfeo et Euridice*, Wq. 41

DOWN: “Dance of the Seven Veils,” from Strauss’s *Salome*

DOWN: Movement 2 of Prokofiev’s *Classical Symphony*

*Figure 3.2. cont.*
3.3.5. EXERCISE 9: INCORPORATING BARRIER, CONTAINER AND PATH

Exercise 9 incorporates the BARRIER, CONTAINER, and SOURCE/PATH/GOAL schemas into the student’s repertoire of mappings. The student will practice expressing an empathic response to pitch groups which map onto these schemas.
To begin, the student should prepare the following excerpt from the final movement of Brahms’ fourth symphony. Since this exercise deals with harmonic CONTAINERS, part of the student’s preliminary preparation should include reading the clefs and transpositions, identifying the tonic key and learning the tonic arpeggio.

**Figure 3.3.** Measure 97 of Brahmos’ Symphony 4, IV. A set of given circumstances surrounding the accented passing tone: the note finally gathers courage to look at the sky as it prays, imploring a more tangible contact with her god. The motion from F♯ to G mirrors the upward motion of the character’s head.

The teacher should ask the student to describe what BARRIER means to them. The conversation should guide the student toward a rich understanding of all of the functions—both positive and negative—that a barrier provides. Ask them to provide an example of a barrier behind which they feel safe. Why do they feel safe: what is on the other side? Is the barrier protecting them from what is on the other side, or is the barrier protecting what is on the other side from them? Next, ask the student to provide an example of a barrier about which they feel frustrated. What is the source of the frustration? What about the barrier makes it so impermeable? Ask the student to provide an example of a barrier that they feel motivated to overcome. What is the barrier composed of? What is on this side that they want to escape? What is on the other side that they want to achieve?
The conversation will naturally yield several openings to the concepts of CONTAINER and PATH. What are some examples of containers that are bound by barriers? What does the path from this container to the other look like/feel like/sound like/etc.?

Through the discussion, the student should gradually begin building a qualitative universe around the accented passing tone (F♯) on beat 2 of example 3.3. That universe should come to encompass a SOURCE container, a GOAL container, and the barriers that characterize the path between them for the flute solo. The SOURCE, PATH and GOAL can be individuated by a different combination of qualia and circumstances. For example, an appropriate response would paint the following scenario: a woman in a tattered, draping, grayish-red plaid scarf is kneeling in a dusty room, looking down. She is sad about her far-away family and praying. She remains still for some time. (SOURCE) The F♯ (BARRIER) reflects some strength she garners to raise her head—so she can talk directly to her god. In the moments surrounding the G (RELEASE) she continues gazing upward, but her eyes search for a sign of response. For this set of given circumstances, the barrier functioned as a moment of transformation—a PATH from a place of supplication and acceptance of the gulf between a woman and the god to whom she is praying, to a place of beseeching the crossing of that gulf and pleading to be heard.

Assessment of the success of this exercise occurs during the student’s sound exploration of the Brahms excerpt. Does the student seem more engaged? More truthful? More impacted? Is there any difference in their use of timbre, dynamic, timing, etc.? In a successful exercise, there should be. Most importantly, does the student seem to be actively seeking something, as an exploring individual seeks, or are they merely seeking approval from the teacher and a green light to move ahead? If the answer is the latter, more work will need to be done in order to arrive
at a point where the student understands that while style and technique are important targets of their music study, self-expression is the goal of this aspect of their work, and they will need to learn to explore their self.

Some more materials from the flute repertoire are provided in Figure 3.4, and once the topic of CONTAINER is fully part of the student’s explorations, teacher and student should return to the UP/DOWN excerpts of Figure 3.2 (The Gluck, Hindemith, Mendelssohn and Prokofiev excerpts). These excerpts don’t go singularly up and down: they go up through scale degree \( x \); they begin and end on scale degree \( x \); scale degree \( x \) falls on beat \( y \), a metrical location which impacts grouping in such and such a way; and they end in the tonic triad container or they end out of the tonic triad container, etc. The given circumstances for these excerpts can now be substantially enriched. Once the student exercises their own voice regarding barriers and paths they find in Figure 3.2 and in their earlier work of Exercises 1-8, they are ready to move into Exercise 10.

This solo from the Andantino of Hindemith’s *Symphonic Metamorphosis* follows a prolongation of a Bb major triad. The Gb—Eb motion leaves not only the Bb major triad container, it leaves the diatonic container by implicating either a neighboring minor iv chord or a Neapolitan. The flute returns to Bb in the next measure with the strings’ re-entrance.

**Figure 3.4.** Some important barriers for the flute in the orchestral repertoire
EXERCISE 10: STRINGING TWO OBJECTIVES INTO A SUPER-OBJECTIVE

At this point, the student has achieved self expression which reflects their empathic re-
response to an anthropomorphized pitch group in several schema-contexts. The student is capable
of painting an UP, a DOWN, a BARRIER and a PATH among CONTAINERs with some type of expression that is motivated by a true and psychologically-grounded response. The next challenge is in stringing two schema together. The job here is simple: prepare an excerpt that uses two simple (non-ambiguous) narratological mappings in sequence.

The student should prepare the excerpt. Study will begin with the bit that is shown in Figure 3.5. Preparation should include listening to the scene and reading or reading about the libretto of the opera. If the student has studied chromatic harmony, they should do an analysis of Figure 3.5. If not, they should simply reduce the two chords and prepare to play the harmonic motion (Dm: +6, Ger.—V) on the piano.

Figure 3.5. An excerpt from Gluck’s *Orfeo et Euridice*

Together, the student and teacher should do the work of providing given circumstances and reflecting on their empathic responses for each half of Figure 3.5 in isolation. Upon completion of this work, the student should be asked to seek some type of justification for the circumstances of the second half in the predictions or outcome of the first half. Or, they should be asked to seek justification for the first half in the circumstances of the second half. This exercise creates a relationship between two schema in sequence. The relationship acts as the glue of an
unbroken line, in which, as Stanislavski expresses “all the minor lines are headed toward the same goal and fuse into one main current.”

For example, Figure 3.6 provides an appropriate design for the Gluck excerpt. In this design, the DOWN motion from D to G♯ takes place on a field; the main character is a barely-yellowed and disenfranchised sassafras leaf, drifting with a slowing wind. The BARRIER (the G♯, a suspension from the augmented-sixth chord of the prior measure) is a narrow, web-covered door. When the sassafras leaf brushes the webs away, the webs stretch into the sky (RELEASE) and unfurl into a garden of over-sized daffodils, their shadows creating bubbles of glistening sunshine on the ground beneath the leaf.

In order to connect the gently drifting sassafras scenario to the daffodil eruption coherently, the leaf will need extra energy. Perhaps the wind can speed up at the last second.

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Once some schema strings have been explored and unbroken lines constructed, the student should move forward to sets of three, then four schema, until an entire paragraph can be performed in an unbroken, narratologically-coherent flow. Some examples to be worked out are provided in Figure 3.7. Some interesting mappings are suggested for these excerpts as a starting point. However, work is certainly not limited to these mappings. The teacher and student should expand the work in whichever direction the score leads creativity.

Figure 3.7. Some schema strings to be worked out.
3.4. CHAPTER SUMMARY

This chapter appropriated the activities of schema-mapping that were discussed in Chapter 2 to the work of Constantine Stanislavski. The chapter put schema-mapping activities to use in drawing out empathic responses to anthropomorphized pitch-group objects. Exercises provided a means of developing a student’s ability to reflect upon anthropomorphized pitch groups that can be structured using the CONTAINER, BARRIER and PATH schemas, and to express empathic responses. Importantly, the last exercise in the chapter took a small step toward the topic of Chapter 4, in stringing together two mappings diachronically. The phenomenon of time complicates the discussion of meaning richly, and Chapter 4 is aimed at enhancing a performer’s conception of what we call now. The chapter asserts that a heightened awareness of now, in all its structural complexity, will benefit a performance by enhancing truthful expression, as well as empowering continuity of focus in the face of potential distractions.
CHAPTER 4
CREATING AN UNBROKEN LINE OF BECOMING

This dissertation advocates for explicit and purposeful study of expression which specifically develops a student performer’s ability to nurture, react to, and be surprised by a narrative in real time. In synopsis, many of the questions that are asked during the process of shaping an emerging narrative become closed. Therefore, the theoretical discourse and exercises of this chapter are aimed toward developing in a student performer a deeper, more detailed, and more continuous experience of time. These goals support Stanislavski’s goals of deeper engagement and more robust focus.

The minute differences between the performances of ordered pitch set \{E, D\#, G, F\#, E\} (Figure 2.14) might in a synoptic analysis be dismissed, for good reasons. For instance, the networks can very logically be boiled down to the more normalized analyses of Figure 4.1 below. However, minute differences in performance shape the process of structuring sound information into emerging meaning, and this is an important part of creating a living truth on stage. The moments that precede synopsis are the moments when a paradigm such as \textit{neighbor} threatens to betray us by remaining incomplete; these moments are of the most narratological interest. As a result, this dissertation advocates for a definition of \textit{structure} that relies on the structural play which organizes context over a listening. That is, the play of structure entails structure.

As a performance reveals itself, prior context predicts future context, and later context restructures prior context. For example, when \{E, D\#, G, F\#, E\} becomes \{E, D\#, G, F\#, E, x\}, that sixth pitch integrates into the growing network based upon the listener’s current reverberato-
ry activity. Depending on the qualities of timbre, vibrato, etc. that characterize the sixth pitch and the five pitches which precede it, the networks—which were presented in a more or less synoptic form in Chapter 2—can be re-structured ex post facto. Thus the evidence presented in the analyses of Figure 2.14 may become less relevant as the network becomes overwhelmed by the recency effect and changing definitions of disjunction. The sixth pitch has the power to reinforce some species of priming which was salient, or it has the power to abandon that species of priming.

![Figure 4.1](image.png)

Figure 4.1. In synopsis, the networks of Chapter 2 (see p. 87) all resolve to normalized middlegrounds such as these.

The impact of this phenomenon was only intimated in the Tier 1 and Tier 2 analyses of Chapter 2 (Figures 2.14 and 2.19). This final chapter will aim to free these analyses from the bonds of their post-hoc documentation. Sections 4.1 and 4.2 provide a background on becoming, beginning with a survey of becoming from the music-theoretical literature and ending with some discussion of the physiology of multistability. In Section 4.3, becoming is illustrated via an analysis of the six networks from Chapter 2, using a methodology that is developed in David Lewin’s 1986 article on phenomenology. Section 4.4 then completes the set of pedagogical exercises by helping a student of performance to access becoming and integrate multistability into their given circumstances, creating, as Stanislavski demanded, a truly unbroken line of truth on stage.
4.1. BECOMING

The definition of \textit{now} that is the most relevant to this dissertation is that that drives the work of Christopher Hasty. Hasty (1981) asserts that music offers us a unique opportunity to appreciate now, in all of its complexity. “It is one of the great powers of music that it can present us with another experience of time…” Hasty describes this experience as, “one in which the past can exist simultaneously with the present moment,” and clarifies, “as connections with what has occurred before are stored in the resounding present.”\textsuperscript{1} Hasty suggests that now is a continually-changing perspective on becoming.” He continues: “by calling now a perspective I mean that it is a ‘view’ taken on present becoming…”\textsuperscript{2} Lawrence Ferrara (1991) presents a definition of now that can be understood to enhance this, by calling now a convergence of temporal perspectives: “Within the context of an entire movement of a work or an entire piece, during any now instant in the work, past cognitions of the piece are retained in consciousness while anticipating development and conclusion. It is this coming together of past, present, and future that is of particular importance in the description of internal time-consciousness.”\textsuperscript{3} Hasty’s, Ferrara’s, and this dissertation’s now is (1) situated in a perceiver, and (2) defined as a series of perspectives upon becoming.

During the now of a becoming, the parts of a previous structure are re-organized into a different structure. These parts can be said to be characterized by a \textit{double-identity} during the moments when past converges with present. They function one way in this moment, and another

\textsuperscript{1} Hasty (1981), p. 63.

\textsuperscript{2} Hasty (1997), p. 76.

The act of reconciling a transformation asks us to understand both the change in identity and the overlapping double identity during the moments of a transformation.

Double identity and the search for continuity feature prominently in the music theoretical discourse. For instance, the idea of double identity for parts of a changing or emerging whole is at the heart of Moritz Hauptmann’s 1888 Hegelian-dualist approach to meter and harmony. For a performer, Hauptmann’s concept of double identity can lay the seeds for the appreciation of a tragic betrayal or joyful transformation. In effect, a vivid experience of double-identity and all of the conflicting desires and emotions that accompany such an experience can provoke a powerful empathy between performer and pitch object.

Two of Hauptmann’s heuristics are particularly powerful for bringing performers into deeper touch with becoming. The first is his elegant diagrams of meters becoming themselves. Hauptmann explains the process by which three-quarter-time becomes itself as follows: “as two beats enclose one space of time, determine a second and join it to the first, so three beats, actually bounding two spaces of time, cause a third to follow as echo of the second.” Hauptmann’s difficult syntax is clarified in his diagram, reproduced below as Figure 4.2. A notated measure of $\frac{3}{4}$ time is superimposed below Hauptmann’s diagram to facilitate discussion.

![Figure 4.2](image)

Figure 4.2. Top: Hauptmann’s analysis of $\frac{3}{4}$ time, and the double-identity that characterizes beat 2 of its becoming. Bottom: a measure of $\frac{3}{4}$ time superimposed upon Hauptmann’s diagram.
Hauptmann’s analysis asserts that as beats 1 and 2 occur in time, the two beats group into a hyperbeat: notated beat 2 is regarded as “echoing” notated beat 1. Hauptmann’s diagram reflects this by labelling these beats 1 — (Hauptmann’s top left). However, the introduction of beat 3 causes the listener to group notated beats 2 and 3 into a second hyperbeat, which overlaps his first: notated beat 3 is regarded as echoing notated beat 2. This second hyperbeat is labelled by Hauptmann as – 2 (top right).

The overall impression is that of three beats, but two hyperbeats: hyperbeat one encloses notated beats 1 and 2, and hyperbeat 2 encloses notated beats 2 and 3. The notated beat 2, then, bears a double identity in Hauptmann’s analysis. Hauptmann explains, “And thus the second member of the three-part unity gets the double-meaning of being second to a first and first to a second.” For a transient moment, whatever musical objects mark the notated beat 2 bear two metric functions: they echo hyperbeat 1 as they initiate hyperbeat 2. This transient moment marks a double meaning, which is key to Hauptmann’s concept of becoming. In Hegelian terms, the initial function of the second notated beat is overcome, and yet at the same time preserved.

In the transient moments of transformation, two functions emerge, as part of a Hegelian totality.

The second heuristic by Hauptmann that can provoke a vivid narrative for a performer applies the concept of double meaning in terms of common tones in harmony. Hauptmann identifies a meaning that is embedded in motion through diatonic triad space, and is embodied in the retention of common tones: “The succession of two triads is again only intelligible in so far as both can be referred to a common element which changes meaning during the passage.”

4 translated, W.E. Heathcote.
5 Hauptmann (1853), p. 191.
6 Hegel (1812/16), Pt. I, paragraph 88.
The common tones that are retained in a motion through diatonic triad space maintain their identity as a pitch class, but undergo a transformation of harmonic meaning: the tones’ chord-position function within their respective chords differs from one chord to the next. What was fifth of a tonic chord is transformed into third of a mediant chord. In the same motion (I-iii), what was third is transformed into a root. Hauptmann explains that in a motion from I to IV or I to V, one tone is retained: “the passage from the tonic to the subdominant or to the dominant makes two parts move melodically; the third part remains, receiving a new harmonic meaning.” The function, and thus part of the identity of the retained pitches is transformed.

![Figure 4.3. Hauptmann’s functional transformations of chord tones](image)

At the same time as its function changes, a retained pitch maintains part of its identity in the form of its pitch class. In this case, the retained pitch assumes a double identity during the moments of chord change. The irony of the juxtaposition between a retained identity and a transformed identity is part of the magic of such a transformation.

Chord changes occur so frequently and so rapidly that it is tempting to perhaps discount the profound experience that *can* be lived when truly connecting to the loss (and gain—and con-
fusion!) that an anthropomorphized chord tone might feel during the moments when their function has been overturned, even when moving between two chords in a diatonic space (as in the transformations of Figure 4.3). But it is this very close kinship between performer and role that Stanislavski demanded: empathizing with a pitch according to its changing relationships within pitch groups can spark a thrilling narrative and invite inspiration in the manner that Stanislavski’s own thought exercises do.

We can use Hauptmann’s account of becoming to postulate the set of conditions for becoming of Figure 4.4.

Under common tone transformation, a retained pitch:

(a) sustains its identity as pitch class;
(b) might sustain its identity as frequency (in fixed-pitch instruments by default; in moveable-pitch instruments by intent);
(c) changes its identity as root, third or fifth within an abstract triad.

In so doing,

(d) the dichotomy among the meanings embodied in change of identity (c) is revealed;
(e) there emerges a juxtaposition of retained identity (a)/(b), with changed identity (c).

Figure 4.4. Emergent meaning of a common tone transformation

While identifying aspects (a) through (e) of Figure 4.4 for a given transformation is necessary to modeling that transformation, it does not fully model that transformation. There is something else: an action we take while viewing a transformed object’s preserved function in contrast to its new function. Much of David Lewin’s work, especially his 1987 *Generalized Musical Intervals and Transformations*, illuminates this part of phenomenological experience, and
the ideas he presents can both deepen and vivify a performer’s kinship with pitches and pitch-group objects.

For Lewin, an event’s becoming is not defined merely by its measurement along some given metric or metrics, but rather, represents an action or set of actions we take. Lewin calls this viewpoint “a transformational attitude,” and explains it in terms of canonical transposition as follows:

Instead of thinking, “I is the intervallic distance from s to t”, we can think, “Ti is the unique transposition operation on this space that maps s into t.”

…we tend to imagine ourselves in the position of observers when we theorize about musical space; the space is “out there,” away from our dancing bodies or singing voices. The interval from s to t is thereby conceived as modelling a relation of extension, observed in that space external to ourselves; we “see” it out there just as we see distances between holes in a flute, or points along a stretched string…

In contrast, the transformational attitude is much less Cartesian. Given locations s and t in our space, this attitude does not ask for some observed measure of extension between reified “points”; rather it asks, “If I am at s and wish to get to t, what characteristic gesture should I perform in order to arrive there?”

Lewin’s transformational attitude affords us a means of understanding how we reconcile a double identity. As such, the transformational attitude has the power to take us inside the transformation, so that rather than remain observers of a double identity, we can become active participants in the transformation from one identity to the next. Lewin envisioned that we as listeners become active creators of whatever operation maps, say, G-as-fifth onto G-as-third. This is the type of qualitative engagement for which Stanislavski advocates.

Figure 4.5 develops a set of thought experiments for two phenomenological musical instances. In the first instance, a $B^b$ major triad transforms to a D minor triad. In this example, D-as-third of the $B^b$ triad becomes D-as-root of a D minor triad. Some listeners will describe that the root shifted up a third, and the F remains. For others, the stepwise motion $B^b$—$A$ might be the most salient part of their reconciliation. Some listeners will create an image of the transformation that shows how a major triad changes to its opposite minor, while retaining some elements. Neo-Riemannian theory, which grew directly from Lewin (1987), ascribes inversion around the interval \{D-F\} (the Leittonwechsel): the transforming listener inverts the M3 below D to the M3 above F, and inverts the D onto the F, essentially turning the structure upside down on an axis midway between its upper two notes (D and F). Some listeners might attribute the change in meaning to the change in intonation: the D sharpened by 9 Hz (from roughly 587 Hz to roughly 596 Hz), while F remained and $B^b$ was replaced.  

The second musical instance of Figure 4.5 transforms an F$\#$ from neighbor status to structural. In the example, an E minor triad moves to a B major triad in half cadence, and F$\#$ is anticipated. During the moments of F$\#$ over E minor, the F$\#$ appears as a neighbor, or perhaps a passing tone. Upon real-time root motion to B, the F$\#$'s function transforms dramatically. It is no longer a dissonant tone; it is the fifth of a chord.

Of course, under normalization, the F$\#$ above bass note E is merely an anticipation of its true function as fifth above B. This is another example where synoptic analysis, in flattening the dimension which connects levels, closes conversations that during transformation are vital.

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8 This holds in the case where the D is produced by a moveable pitch instrument and the other chord tones are produced by a fixed-pitch instrument in equal temperament.
However, the transforming listener might envision that it is the journey from surface to background that maps F♯—as—neighbor onto F♯—as—structural. The journey among levels, then, is the operation—that—maps.

<table>
<thead>
<tr>
<th>TRANSFORMATION</th>
<th>SURFACE DESCRIPTION</th>
<th>DEEP-STRUCTURAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-as-third ==&gt; D-as-root</td>
<td>“The D sharpened a bit.”</td>
<td>“The interval structure was inverted; D maintained its distance from F, because D took the place of F, and F took the place of D. The M3 below {D,F} hopped from [below D] to [on top of F]: {B♭, D, F}=&gt;{D, F, A}, transforming D from ‘middle’ to ‘root’.”</td>
</tr>
<tr>
<td>F♯ as neighbor ==&gt; F♯ as structural</td>
<td>“The F♯ held while the E moved down to D♯, ending the dissonance.”</td>
<td>“A dramatic transformation of the levels ensued when bass moved to B. The dissonant F♯, whose status as neighbor is situated exclusively at a surface level, magically becomes a consonant structural tone, revealing its true purpose at a more background level: as the second Stufe in an Unterbrechung.”</td>
</tr>
</tbody>
</table>

**Figure 4.5.** Operation-derivation for two transformations

Something that is not explicitly evoked by Lewin’s transformational attitude, but is proposed by this dissertation, is that the continuity that is accounted for by the transformational attitude manifests itself physically (in the listener) in a brief state of multistability, during which operation-derivation ensues. Multistability will be discussed in detail in section 4.3, but a brief illustration is warranted here in reference to Figure 4.5. Some listeners would, during the moments of the transformation from B♭ M to Dm, vacillate rapidly among two Ds: one in memory (587 Hz.) and the other in the air (596 Hz.). Some might vacillate between third and fifth within a pitch-less chord space. Some might vacillate along the axis of the L inversion. None of the
descriptions is comprehensive, singular, or absolute. They are however, sufficient for creating continuity among markedly disparate percepts. From the biopsychological viewpoint, the transformational attitude offers a compelling portal to the complex of information that is enveloped into Hegel’s *totality*. That is, for the transforming listener, a transformation is a mental action that takes place in a moment which is marked by real-time changes in synaptic potentiation. These changes entail part of the cost of a transformation, as we not only appreciate the various and multifarious distances our transformed object traversed on its way to becoming, but move those objects those distances.

The transformational attitude defines Figure 4.4’s item (d) more rigorously: the act of witnessing the dichotomy produced by a transformation inspires an activity of ad hoc operation derivation. The observer invents a set or series of operations by which an object’s old function can or could be mapped onto its new function. Figure 4.6 extends Figure 4.4:

<table>
<thead>
<tr>
<th>Under common tone transformation, a retained pitch:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <em>sustains its identity</em> as pc;</td>
</tr>
<tr>
<td>(b) <em>might sustain its identity</em> as frequency (in fixed-pitch instruments by default; in moveable-pitch instruments by design);</td>
</tr>
<tr>
<td>(c) <em>changes its identity</em> as root, third or fifth within an abstract triad.</td>
</tr>
</tbody>
</table>

In so doing,

(d) the dichotomy among the meanings embodied in change of identity (c) is revealed: the observer invents a set of operations that map the old function onto the new function;

(e) there emerges a juxtaposition of retained identity (a)/(b), with changed identity (c).

**Figure 4.6.** An expanded version of Figure 4.4. The emergent totality now accounts for continuity.
The expanded Figure 4.6 provides a performer with a deeper, more vivid insight into the psychological journey of an anthropomorphized pitch group object. This insight can provoke and/or nurture a more powerful and more resilient empathy for the performer during an experience of double identity such as what Hauptmann reveals through his meters-becoming and common tone transformations.

Two theorists whose work has also explicitly dealt with double identity are Naphtali Wagner and Peter Smith. Naphtali Wagner acknowledges double identity by crossing slurs in Schenker graphs. In so doing, Wagner (1995) asserts that the musical objects that fall under two slurs are at once both structural and embellishing.9 However, Wagner’s bent is less toward becoming per se than it is toward pluralism. He explains, “does not the very fact that a choice is necessary indicate that the spurned option, too, contains some musical validity?”

Peter Smith, on the other hand, asserts that plurality is in many cases an epiphenomenon of the passing of time and the accrual of context. Smith (1995) also uses Schenkerian notation, but the work separates identities from one another by drawing separate graphs, that are understood to co-exist, rising and fading in prominence as time passes. For Smith, prolongation is at its essence an act of becoming. Post hoc, synoptic analyses that generalize entire spans into a single prolongation also generalize out much of what is meant by harmonic meaning. “An analysis that locates fixed prolongational spans, without going further, fails to address the possibility that an articulation may change status when viewed from different temporal perspectives.”10 Smith is by no means being critical of Schenkerian analysis, or post hoc analy-

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sis in general. Rather, he wishes to assert that, “attention to the temporal perspective from which analytic statements are rendered will provide a window into the potential for multiple meaning in a tonic articulation.”\textsuperscript{11} He adds that “unequivocal points of initiation and termination also imply a clarity that is incompatible with passages characterized by gradual emergence of harmonic control.”\textsuperscript{12} Smith explains, “the emphasis on temporal perspective encourages us to engage the tonic attribution as a hypothesis rather than a \textit{fait accompli}.”\textsuperscript{13} Indeed, prolongation at its middleground level isn’t nearly as rich as a prolongation that is fraught with its flux of competing harmonic identities, each of which wrestles to redefine and govern the functional meanings of the diatonic set.

Smith’s work uses a methodology laid out by David Lewin in Lewin (1986), which systematically track aspects of a becoming.\textsuperscript{14} The methodology documents percepts—moments within a longer moment—as separate events, and uses vocabulary associated with the Leonard Meyer school of thought to model a dialogue among them: percepts may implicate one another, reinforce one another, elaborate, confirm or deny one another. Percepts fill boxes as they emerge diachronically within experience (not necessarily as they appear in a score). Because of this, higher level and emergent percepts can also be documented in boxes, and boxes at all levels of an emergent musical fabric can be in dialogue with one another.

\textsuperscript{11} Ibid, p. 249.
\textsuperscript{12} Ibid, p. 246.
\textsuperscript{13} Ibid, p. 251.
Figure 4.7 below reproduces Figures 7 and 8 from Lewin (1986).\textsuperscript{15} His Figure 7 (on the left) depicts the activities of looking and dialoguing for an excerpt from Schubert’s *Morgengrus*. For every identified percept, Lewin’s methodology asks an analyst (1) what event coincides with the percept?\textsuperscript{16} (2) what is the accrued context with which that event interacts? and (3) what is the nature of the relationship the event bears upon that context? Lewin’s final column provides a space where the analyst can express the emerging context in “some stipulated language l.” This language could be:

\begin{quote}
…a composite of several graphic and notational systems with a symbolic textual discourse, and also with a vernacular discourse like every day English. The language might involve instead or as well poetic sayings or writings; it might involve Freudian free associations. It might involve gestural ‘statements’ from other communicative systems not usually brought under the rubric of ‘language,’ gestures like writing down original compositional material, or performing musical passages.\textsuperscript{17}
\end{quote}

In the chart, \(p\) labels a perception. The row labelled \(p1\) is the first event that he perceives, \(p2\) is the second, etc. The label doesn’t necessarily coincide with chronology in the musical text; there are times when a row represents a reinterpretation of something that was already documented in an earlier row. \(EV\) documents which event is being documented, and is usually denoted by a measure number where the event can be found. \(CXT\) represents the context within which the event is viewed.

\textsuperscript{15} Lewin, (1986) p. 345.

\textsuperscript{16} Lewin struggles openly with the decision to assign an event status as an objective reality, outside the confines of perception; Kane (2011) finds this decision is grounded in Lewin’s reliance upon a West-Coast interpretation of Husserl, which separated sense from reference. Sense can safely be associated with Kant’s phenomena, and reference with his neumena.

\textsuperscript{17} Lewin (1986) p. 341.
For example, measure 12 is first viewed in the context of measure 12, then it is viewed in a larger context, measures 9-12. The next column, labelled P-R pairs presents a description of the meaning Lewin reads in that event, for that context. The meaning is conveyed in terms of the Meyer school: potential future events are predicted, and some of these potential events are realized. Sometimes, predictions are not realized; sometimes they are realized but that realization is later questioned. The vocabulary includes works such as denial, reinforcement, questioning, implication, modification, and confirmation. The final column on the right, ST, elaborates upon the terse description that is provided in the P-R column. It is a list of statements Lewin would like to make about the event, in “some language l.”

Here, Lewin’s language l includes musical notation, Roman numeral reference to harmonic function, protensive implication arrows, prolongational slurs, and text.

Lewin’s p$^1$ (perception 1) for this analysis coincides with an event that occurs in measure 12: dyad \{B, D\}. The dyad appears as part of a first inversion g minor triad. Its function as \(g^6\) is Lewin’s subjective assessment, given the context of measure 12. \(p^2\) references the same dyad, but posits a different harmonic function for the pitches: as (minor) v in the key of C major: \(V/6/b!\). This different harmonic implication is made possible by extending the dialoguing context deeper into the past: the ConteXT for \(p^1\) was measure 12, the ConteXT for \(p^2\) is measures 9-12. As a result of this expanded context, \(p^2\) interacts with \(p^1\) in two ways: (1) as terminal inclusion: the g minor triad is confirmed, and (2) as a questioning of the g

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18 Lewin (1986) suggests that any language can qualify as language l: musical notation, analytical notation, verbal description, etc.

19 The assessment is based upon his stated context: measure 12, plus his personal acculturation in western music. See p. 335.
minor’s role within the expanded harmonic context. The harmonic function that is questioned in p² is later fully denied, in p⁴, as a result of the context that is presented in m. 13. On the right is Lewin’s Figure 8, to which the STatements column of his Figure 7 points.

Although Lewin’s methodology appears to describe process, a Phenomenology analysis is still arguably a synoptic analysis in the sense that it represents a series of albeit incremental but nevertheless stable structures which are in dialogue with one another as time evolves. However, since the methodology facilitates cross-talk among temporal landmarks, it allows all of the events which are the ingredients in an interesting narrative—betrayal, reinforcement, questioning, denial and the like—to be temporarily separated out from the fabric of the becoming that continues to redefine them. Tiny, momentarily stable structures can be relished on their own terms, and moreover, the dismantling of all of the evidence that was used to support that structure can be witnessed. Because the complexity or ambiguity of moments when key elements of the past converge with key elements of the present can be experienced in vivid detail, it is a powerful means of conceptualizing becoming in very slow motion. Like Stanislavski’s given circumstances, the dismantling of structure and re-contextualization of its parts invites the performer to engage by provoking natural empathic responses.

Lewin’s methodology is used to illustrate structural play in section 4.2. The illustration serves to model the type of becoming that is advocated for by this dissertation for the student of its exercises. Section 4.3 suggests some aspects of the physiology of multistability in order to further help the student to access their own close reading of becoming. The exercises of section 4.4 will then ask the performer to conceptualize becoming in the ecological realm—at the speed of music.
4.2. PROCESSUAL ANALYSIS

Looking back to the exercises of Chapter 1, the transience of definitions for disjunction is a dynamic force behind grouping, and subsequently, the phenomenon of structural play. Reverberatory activity enables pitches and pitch relationships to outlive their provoking stimuli. As what was now becomes subsumed into a totality of what is becoming, relational properties evolve to produce a rich tapestry of transient pitch relationships that engage in structural play.

We saw a number of systems for modeling this phenomenon from the music-theoretical literature in section 4.1. Perhaps the most provocative of these discussions was that of Naphtali Wagner, whose crossed slurs invite either a lack of clarity or a large scale modification of Schenkerian theory. To answer to this difficult problem, Wagner restricts overlapping. He explains that in using his adaptation, an analyst is bound to a type of honor code: the use of overlapping slurs should be limited to discreet, well-behaved usage at the foreground only.

I am aware that unrestricted analytical application of the concept of ‘crossing branches’ could open a Pandora’s box for the discipline of musical analysis. Voice-leading analyses by novices tend to show overlapping prolongations that are inconsistent and a reflection of confused hearing. The analytical technique of overlapping should be applied only when it is justified by specific theoretical formulations such as those discussed in this study. (italics mine)\(^{20}\)

Wagner hits upon an important note that is highly relevant to the performer who is learning to allow themselves to be vulnerable to an emerging narrative: that of confused hearing. Part of the passion behind this dissertation is the momentary confusion that is invited by process. In

continually introducing new relationships to an accruing context, a pitch’s identity, which is situated within the throes of the relationships it forms with other pitches, changes. A structure that is climbing upward can suddenly reveal a deeper, downward surge, only to be soon restructured, retrospectively, into an extension of its former, climbing self. A common tone that has since disappeared from the air supplants its identity when a newly-emerging bass disavows its former function; a suspended pitch, which was once inside the container, magically becomes outside the container. The performer who allows themselves to be vulnerable to inspiration in the way that Stanislavski endorses allows themselves to experience this type of change and to be impacted.

Figures 4.8 (a through f) represent a slow-motion rendition of becoming. It tracks the becomings of the six networks from Chapter 2 (see permalinks below each analysis) through Lewin’s methodology as outlined above.

<table>
<thead>
<tr>
<th>SYMBOLS for Figures 4.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>stable dynamic</td>
</tr>
<tr>
<td>crescendo</td>
</tr>
<tr>
<td>stable dynamic, followed by crescendo</td>
</tr>
<tr>
<td>lift</td>
</tr>
<tr>
<td>slur</td>
</tr>
<tr>
<td>a pitch or pitches that is/are implicated, but not yet present</td>
</tr>
<tr>
<td>reaching-over</td>
</tr>
</tbody>
</table>

**Figure 4.8.** Symbols for figures 4.8a-e
<table>
<thead>
<tr>
<th></th>
<th>Event</th>
<th>Context</th>
<th>Perception-Relation List</th>
<th>Statement List</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E, stable dynamic</td>
<td></td>
<td>1. Breaks silence.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| p2 | Lift, D# | | 1. Lift suggests that E and D# might be in the same group.  
2. Relationship unclear: neighbor? | |
| | | | | |
| p3 | Cresc. D# | | 1. Use of crescendo suggests a foreign destination?  
2. Neighbor from p2.1 may be passing.  
3. Neighbor may simply resolve in crescendo to a more important E? | |
| | | | | |
2. Implicates reaching-over?  
| | | | | |
| p5 | F#, in dim. | | 1. Confirms p4.2 (G→F#)  
2. Asserts neighbor function for G.  
3. Asserts group \{D#,F#\} and asserts F# as prominent in the group.  
4. Decrescendo predicts group closure on F#. | |
| | | | | |
| p6 | E, articulated softly | | 1. E forms a frame and suggests group closure.  
2. E’s soft articulation reinforces group closure.  
3. Group closure confirms p2.1 neighbor. | |

**Figure 4.8a.** Network 1. Listen at https://archive.org/details/SupplementalFile3Network1.
<table>
<thead>
<tr>
<th></th>
<th>Event</th>
<th>Context</th>
<th>Perception-Relation List</th>
<th>Statement List</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E, stable dynamic</td>
<td></td>
<td>1. Breaks silence, opens group.</td>
<td></td>
</tr>
<tr>
<td>p2</td>
<td>E D#, equal dynamic</td>
<td></td>
<td>1. Implicates neighbor?</td>
<td></td>
</tr>
<tr>
<td>p3</td>
<td>cresc. D#</td>
<td></td>
<td>1. Use of crescendo suggests a foreign destination? 2. Neighbor from p2.1 may be passing. 3. Neighbor may simply resolve in crescendo to a more important E?</td>
<td></td>
</tr>
<tr>
<td>p4</td>
<td>G</td>
<td></td>
<td>1. Denial of E neighbor motion (p2). 2. Confirmation of foreign destination (p3) but denial of D# as chromatic passing tone. 3. Implicates reaching over motion? 4. Hierarchy highly unstable: prominence of G suggests it is a highly dissonant note, but the object of its dissonance is still unclear.</td>
<td></td>
</tr>
<tr>
<td>p5</td>
<td>F# in dim.</td>
<td></td>
<td>1. Great tension relief, confirms F# (p4.1). 2. F# suggests resolution of G as dissonance (p4.4). 3. D#’s continued prominence dwarfs F#, suggesting that F# is an arpeggiation.</td>
<td></td>
</tr>
<tr>
<td>p6</td>
<td>lift</td>
<td></td>
<td>1. Lift closes group {D#,F#}. perceptually privileging F# (denies p5.3). 2. However, diminuendo into F# reinforces p5.3. 3. Relationship/hierarchy among E and D# is still unclear.</td>
<td></td>
</tr>
<tr>
<td>p7</td>
<td>E, after closed group</td>
<td></td>
<td>1. E forms a frame with p1, suggesting group closure. 2. E confirms p2 neighbor motion. 3. Preference rule chooses the volume parameter, (privileging D#) over group closure and the recency effect for group {D#,F#}. 4. Preference rule negotiation selects prominence of first E above the recency effect and gap following final E, suggesting the first E as primary and last E as back-elaborating.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.8b.** Network 2. Listen at https://archive.org/details/SupplementalFile4Network2.
<table>
<thead>
<tr>
<th></th>
<th>Event</th>
<th>Context</th>
<th>Perception-Relation List</th>
<th>Statement List</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E</td>
<td></td>
<td>1. Breaks silence.</td>
<td></td>
</tr>
</tbody>
</table>
| p2 | Decresc. into D# |         | 1. Decrescendo implicates E as structural, embellished by less-structural D#?  
2. Decrescendo implicates E as dissonance, resolving into softer D#? | |
| p3 | Lift  |         | 1. Lift expresses group closure?  
2. Relationship p2 still unresolved. | |
| p4 | G     |         | 1. G’s non-relationship with D# suggests non-contiguous grouping with E, but this argues with the suggestion of group closure p3.1.  
2. Predicts a motion to F#. | |
| p5 | F#, in dim |         | 1. Predicts a third parallel reaching -over? But this prediction is lessened by the continuing, non-disjunct decrescendo throughout F#.  
2. Reinforces the ambiguity of p2; p2.2’s likelihood is diminished by the non-disjunct trajectory of diminuendo on F#.  
3. Motion to E is predicted by the non-disjunct trajectory of diminuendo on F#. | |
| p6 | E, soft |         | 1. E creates a frame, suggesting group closure.  
2. Smooth trajectory into E expresses group {G,E}, confirms p5.3.  
3. Denies parallelism p5.2.  
4. Denies p5.1  
5. E forms a frame, suggesting group closure.  
7. Preference rule selects volume over recency, suggestion firs E as primary and last E as back-elaborating. | |

**Figure 4.8c.** Network 3. Listen at https://archive.org/details/SupplementalFile5Network3.
<table>
<thead>
<tr>
<th></th>
<th>EVent</th>
<th>ContexT</th>
<th>Perception-Relation LIST</th>
<th>Statement LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><img src="g.png" alt="E" /></td>
<td>1. Breaks silence.</td>
<td><img src="g.png" alt="E" /></td>
</tr>
</tbody>
</table>
| p2 | dim. into D# | ![D#](g.png) | 1. Decrescendo implicates E as structural and embellished by D#?  
2. Decrescendo implicates D# as structural and embellished by E? | ![E](g.png)  
 ![D#](g.png) |
| p3 | lift | ![lift](g.png) | 1. Lift expresses group closure?  
2. Ambiguity of p2 still unresolved. | ![E](g.png)  
 ![D#](g.png) |
| p4 | G      | ![G](g.png) | 1. G’s non-relationship with D# suggests a non-contiguous group \{G,E\}, but this denies the implications of p3.1 (group closure).  
2. Implicates a motion to F#. | ![E](g.png)  
 ![D#](g.png)  
 ![G](g.png) |
| p5 | F#, cresc. into | ![F#](g.png) | 1. Crescendo into F# suggests that F# is structural?  
2. However, the non-disjunct trajectory of diminuendo through F# lessens this implication.  
3. Predicts a motion to E. | ![E](g.png)  
 ![D#](g.png)  
 ![F#](g.png) |
| p6 | E, cresc. into E | ![E](g.png) | 1. E creates a frame, suggesting group closure.  
3. Confirms p5.3.  
4. Crescendo into final E asserts it as primary, and the earlier pitches as ‘leading-up-to’. | ![E](g.png)  
 ![D#](g.png)  
 ![E](g.png) |

**Figure 4.8d.** Network 4. Listen at https://archive.org/details/SupplementalFile6Network4.
<table>
<thead>
<tr>
<th>5</th>
<th>Event</th>
<th>Context</th>
<th>Perception-Relation LIST</th>
<th>Statement LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E</td>
<td></td>
<td>1. Breaks silence.</td>
<td></td>
</tr>
<tr>
<td>p2</td>
<td>cresc.</td>
<td></td>
<td>1. Crescendo implies growth to some other event?</td>
<td></td>
</tr>
<tr>
<td>p3</td>
<td>D#, in dim</td>
<td></td>
<td>1. Decrescendo transforms the crescendo of p2 into a hairpin, suggesting that a stable E has transformed into an unstable neighbor, resolving to D#.</td>
<td></td>
</tr>
<tr>
<td>p4</td>
<td>G, articulated</td>
<td></td>
<td>1. Articulation expresses group opening. 2. Predicts a parallel neighbor motion?</td>
<td></td>
</tr>
<tr>
<td>p5</td>
<td>F#, in dim</td>
<td></td>
<td>1. Confirms parallelism (p4.2). 2. Predicts a third statement?</td>
<td></td>
</tr>
<tr>
<td>p6</td>
<td>lift</td>
<td></td>
<td>1. Lift expresses group closure, which lessens the probability on parallelism p5.2. 2. Lift could also be functioning to open up a space for robust reverberation of future events, for example a third parallelism.</td>
<td></td>
</tr>
<tr>
<td>p7</td>
<td>E, soft</td>
<td></td>
<td>1. E denies third parallelism. 2. E confirms group closure implicated in p6. 3. E forms a frame, creating a larger group closure in which the closure of p6 is nested. 4. Preference rule selects the primacy effect over the recency effect; the first E is primary and later notes are back-embellishing.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.8e.** Network 5. Listen at https://archive.org/details/SupplementalFile7Network5.
<table>
<thead>
<tr>
<th></th>
<th>Event</th>
<th>Context</th>
<th>Perception-Relation List</th>
<th>Statement List</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>E</td>
<td></td>
<td>1. Breaks silence.</td>
<td></td>
</tr>
<tr>
<td>p2</td>
<td>cresc.</td>
<td></td>
<td>1. Crescendo implies growth to some other event?</td>
<td></td>
</tr>
<tr>
<td>p3</td>
<td>D#, in dim.</td>
<td></td>
<td>1. Decrescendo transforms the crescendo of p2 into a hairpin, suggesting that a stable E has transformed into an unstable neighbor, resolving to D#.</td>
<td></td>
</tr>
<tr>
<td>p4</td>
<td>G, articulated</td>
<td></td>
<td>1. Articulation expresses group opening. 2. Predicts a parallel neighbor motion?</td>
<td></td>
</tr>
<tr>
<td>p5</td>
<td>F#, in dim.</td>
<td></td>
<td>1. Confirms parallelism (p4.2). 2. Implicates an additional reaching-over statement?</td>
<td></td>
</tr>
<tr>
<td>p6</td>
<td>cresc. F#</td>
<td></td>
<td>1. Denies additional parallelism (p5.2). 2. Large-scale crescendo encourages primacy for F#.</td>
<td></td>
</tr>
<tr>
<td>p7</td>
<td>lift</td>
<td></td>
<td>1. Lift expresses group closure, reinforcing p6.3. However, continued crescendo before lift negates closure.</td>
<td></td>
</tr>
<tr>
<td>p8</td>
<td>E, loud</td>
<td></td>
<td>1. E creates a frame, suggesting group closure, creating a nested closure (p7) within the larger group of p8. 2. Group closure confirms two statements of reaching-over. 3. Preference rules select prominence and recency over primacy, causing the last E to be primary and prior events to be forward-reaching.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.8f.** Network 6. Listen at https://archive.org/details/SupplementalFile8Network6.
4.3. THE PHYSIOLOGY OF BECOMING

The double identity that characterizes parts during a moment of marked transformation can be experienced in a state of *multistability* by a performer. In providing the conditions wherein we can assess what was and what is, as well as the dichotomy that breaches them, multistability facilitates continuity. Attention to moments of potent multistability can heighten a performer’s focus. Further, the operation-derivation activities that characterize these moments can enrich a performer’s given circumstances in remarkable ways. This section aims to deepen the performer’s awareness of the phenomenon. Section 4.4 then provides exercises to develop a performer’s ability to acknowledge and use moments of multistability in real-time.

Multistability is defined in a recent review as follows: “multistable perception occurs when sensory information is ambiguous and consistent with two or more mutually exclusive interpretations. When no additional cues are available that allow perceptual synthesis to converge on one unique interpretation, perception alternates spontaneously…”\(^{21}\)

A multistability illusion motivates a vacillation between inhibition and disinhibition.\(^{22}\) Well-formed percepts form and disappear alternatingly, using what appears from the outside to be the same input as evidence. Two (or more) higher-level schema-sets are activated, in turn, to support the differing percepts. Each of the two higher-level schema-sets, in their moments of dominance, functions to modulate the lower level structuring activities: they amplify the lower-level input that strengthens that higher level schema, and they suppress less-supportive input.

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\(^{22}\) It is unresolved whether the inhibition occurs at a level close to sensation or at the level of representation, but it is agreed that it is a process of inhibition/disinhibition. See Tong (2001) for a review. See also Lehky (1988), Noest et al (2007), Van Loon et al (2013).
An instance of multistability that strongly encourages the sensation of becoming that will be advocated for in the final exercises of this dissertation is the famous Charley Chaplin Mask video created by British psychologist Richard Gregory. The video, which can be viewed at Gregory’s website, depicts a mask of Charlie Chaplin rotating on a stick. Gregory used this video to demonstrate how top-down knowledge motivates a change in interpretation of incoming visual data. He theorized that the viewer uses their knowledge of the nose as a necessarily convex feature to determine whether they are looking at the inside or the outside of a mask. From this determination follows a series of top-down restructurings that support the determination. When the mask reaches a rotation of approximately 180 degrees (approximately 0:18 of the video), the mask appears to magically change its direction of rotation, and the inside of the mask becomes the outside of the mask. In the critical moments before the rotation appears to reverse, some moments of multistability ensue, in which the mask can be understood, alternatingly, as inside and outside. The multistability arises due to the processes of inhibition and disinhibition. Eventually one of the structurings becomes fully suppressed. The process of becoming repeats itself when the mask reaches approximately 230 degrees of rotation (approximately 0:24): the painted side of the mask appears to become the outside of the mask.

The physical processes which support multistability—inhibition and disinhibition—were gradually uncovered over several decades. In the late 1950’s and early 1960’s attenuation theory, spearheaded by Donald Broadbent, proposed that aspects of a signal deemed irrelevant are quickly discarded, and that this act of discarding supports selective attention. Broadbent (1958) presented the first of these bottleneck theories as follows: “the capacity of the brain will limit the

number of tasks that can be performed simultaneously and so (...) part of the information presented must be discarded.”

Broadbent calls this process *selective filtering*, and his research attempted to isolate variables that impact the filtering process, using a methodology called dichotic listening. In a dichotic listening test, a subject wears earphones, and two different streams of sound are sent through the earphones, one to each ear. The left ear hears one stream; the right ear hears the other. Often, researchers will constrain the subject to a single ear, by asking them to attend to that ear, with the use of priming techniques, or by simply making that ear more attractive to attend to. Researchers often ask the subject to document what they are attending to by *shadowing* it, or repeating the words that they hear. If a subject shadows the wrong ear, this usually provides the researcher with some interesting information. Broadbent’s work resulted in a theory of *physical characteristics*.

The physical characteristics theory states that characteristics of incoming sound—namely location of the sound source and frequency range of the sound—serve as a preliminary filter. Sounds that pass through the filter are processed; sounds that do not pass through the filter are discarded. Processing of Broadbent’s variables—location and frequency window—can all be accomplished in the brain stem. Therefore, his theory was called an *early-selection* theory. Information is selected at an early stage—before any cortical processing (or storage) has been completed. What is not selected at this early stage is discarded, in near-real-time.

However, the work of other researchers revealed the limits of Broadbent’s bottleneck theory. For instance, if a subject’s name was embedded into the unattended stream of a dichotic

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presentation, some listeners would tend to shadow the “wrong” ear for a period.\textsuperscript{26} This finding raised an important question: if a listener is capable of hearing their name through the unshadowed ear, then this information is not discarded in the way that Broadbent proposed. Neville Moray (1959) presented a more nuanced selective filter theory, which proposed variable threshold values for different objects in a listener’s soundscape. A listener’s name, for instance, would always carry a very low threshold: a listener is unlikely to discard information that is linked to the sound of their own name.

Anne Treisman (1960) supported this shift in thought, by presenting subjects with a logical stream of thought, but altering the physical characteristics of its delivery mid-phrase. Subjects were able to shift ears in order to understand the stream of thought. Moreover, Treisman’s later work revealed that a word’s threshold for being attended to could be lowered if it is associated with a priming word or object. For instance, if the word blue was primed for a listener, and words that are associated with blue—such as ocean, sky or sad—were presented to the unattended ear, the listener was more likely to respond appropriately to questions addressing the wrong ear. Moray and Treisman’s findings modified Broadbent’s physical characteristics filter, by offering some qualifications: under certain conditions, attenuation criteria can change. Semantic or syntactic logic can override the physical characteristics filter, as can a key word, such as the listener’s name or a previously-primed word.

\textsuperscript{26} A dichotic listening test is an experimental technique that was used to research selective attention. In a dichotic listening test, a subject wears earphones, and two different streams of sound are sent through the earphones, one to each ear. The left ear hears one stream; the right ear hears the other. Often, researchers will constrain the subject to a single ear, by asking them to attend to that ear, with the use of priming techniques, or by simply making that ear more attractive to attend to. Researchers often ask the subject to document what they are attending to by \textit{shadowing} it, or repeating the words that they hear. If a subject shadows the wrong ear, this usually provides the researcher with some interesting information.
Diana Deutsch and J. Anthony Deutsch reviewed the growing body of evidence, and proposed what was called a *late-selection theory*. Under Deutsch and Deutsch (1963), information that Broadbent would call *discarded*, and Moray and Treisman would call *processed*—*then discarded* can potentially be *stored*. Deutsch and Deutsch concluded that since “selection of wanted from unwanted speech can be performed on the basis of highly complex characteristics,” information that is attenuated does enter the processing areas of the brain. Deutsch and Deutsch proposed the location of attenuation to be the entrance to working memory, which they considered to be independent from sensory memory trace mechanisms. Deutsch and Deutsch postulated a network of neural comparison mechanisms, and it was proposed that “only the most important signals coming in will be acted on or remembered. On the other hand, more important signals than those present at an immediately preceding time will be able to break in, for these will raise the height of the level and so displace the previously most important signals as the highest.”

Later work used a technique called negative priming, and further refined the discussion by revealing a physical process called *neural inhibition*. This work revealed that when information enters our receptors, it *is* represented, even if it is not *selected*. Unselected information can follow two paths: it can be represented temporarily at a low level of processing beneath integration and awareness but be replaced quickly by new, interfering information. Or, it can be represented and actively inhibited, but linger in memory at these low levels beneath integration. Items that are reinforced but inhibited can even become indexed by the hippocampus (stored in long-

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27 Deutsch and Deutsch (1963), p. 81.
28 Deutsch and Deutsch (1963), p. 83.
29 Houghton and Tipper (1994).
term memory)—at many levels previous to the neural inhibition that prevents it from fully integrating into a perception.\textsuperscript{30}

The concept of levels in this instance is not a metaphor or an interface between concept and reality; it is a physiological phenomenon. There are many classes of neuron, which differ according to various structural attributes. As a result of their structural differences, the different classes yield different response properties, making neurons highly specializeable. Figure 4.9 gives a brief survey of neuron-classes’ general distribution, simply for the purpose of aiding the conceptualization of a geography within the brain. As can be seen, the classes tend to clump together—this is a result of timed hormone release in early development, which ensures that young, migrating cells that are in a particular place at a particular time receive a certain growth spurt. Cells that have not migrated as far receive a different set of hormones, later or earlier in their development. This results in a different type of morphology and ultimately different firing properties and means of connecting with neighboring neurons.

The different locations within the cortex come to handle information on different timescales: the more inward you go (away from the senses), the larger the scope of information that is handled. Several brain imaging studies have confirmed that for linguistic processing, somatosensation, and vision, tiny bits of information are handled near the sense organs; the more inward you look, cells respond to progressively to larger groups of information.\textsuperscript{31} This is termed receptive window size, and is the key element in this type of hierarchical grouping. Classes of neurons arrange in a way such that receptive windows become progressively wider.

\textsuperscript{30} Neill, Valdes, Terry & Gorfein (1992).

Figure 4.9a and 4.9b. Discreet layers and columns in the cortex. Layers and columns distinguish themselves by their various combinations and geographic arrangements of neuron-types. Because the combination of cells is unique to that region, patterned differences in temporal receptive window duration emerge.

As an illustration, a team of researchers based at Princeton recently demonstrated that low-level processing of sounds (such as the sequence of spectral content for a vowel or consonant) occurs at the peripheral edges of the cortex, and the highest level of processing (such as at the level of a situational model) occurs in deepest layers of cortex. The team scrambled stories for listeners, and recorded their brain activity, in search of invariance in activity across different scrambling combinations. An invariance in firing between two different word-scramblings of the same story would mean that at that cortical location, word-chunks are sufficient for generating like states of mind: chunks larger than words do not need to be the same in order for this location to fire the same. A variance, on the other hand, would suggest that the location requires words to appear in exactly the same order to generate a like brain state. This indicates that larger chunks are processed by that area. This chunk size has been nicknamed *temporal receptive windows,*
and discrete locations within the cortex have been correlated with levels of chunking. Lerner et al (2011) explains,

In early auditory cortices (A1+), brain responses were driven mainly by the momentary incoming input and were similarly reliable across all scrambling conditions. In areas with an intermediate TRW, coherent information at the sentence time scale or longer was necessary to evoke reliable responses. At the apex of the TRW hierarchy we found parietal and frontal areas which responded reliably only when intact paragraphs were heard in a meaningful sequence.\(^{32}\)

Discreet levels of temporal receptive window duration affords us the storage of unselected items at many levels. Potential phonemes that are blocked from the word level by inhibition can be stored—at the phoneme level, as can words, at the word level, and ideas at the idea level. As long as spreading activation continues to support that chunk—no matter its size—it will continue to be primed, even if it doesn’t integrate at higher levels. This accounts for the re-structuring process that re-interprets garden path sentences in linguistic processing and the phenomenon of narrative shift in the situational model literature. Some activations will wait for a period, in a state of inhibition, until context invites them to help re-organize the scene.

Grouping was asserted in Chapter 1 as an emergent property of the coincidences of reverberatory activity, which has been pruned by combinatoriality along many dimensions. Because of the geography of temporal receptive windows, we can store data in various and multiple states of chunking, retrieve it, and re-structure the relationships that comprise its meaning as necessary according to the combinatoriality of the emerging scene. This chapter uses this phenomenon to define *structural play* in physical terms: as a series of coincidences each of which

evoke a well-formed prototype at a higher level. The transformation of one prototype into another involves a re-structuring of parts. During the moments surrounding a transformation, a brief state of multistability ensues, during which the multiple forms of a double identity vacillate, and are reconciled via an activity of operation-derivation.

Because operation-derivation supports an inherent desire to derive causation, it can spur narrative at a level higher than the surface mappings that were practiced in the exercises of Chapter 3. Section 4.4 guides the student toward experiencing this type of higher-level narrative, expanding upon the concatenation of schema mappings that was explored for the Gluck excerpt in Exercise 10.

4.4. EXERCISES IN STRUCTURAL BECOMING

The exercises of Chapter 3 asked the student to anthropomorphize pitch group objects, nurture an empathy with those objects, and reflect upon those objects’ experience using the parameters of grouping that were practiced in Chapter 1. Exercise 10 brought the student closer to the goal of an unbroken line of truth on stage for the Gluck excerpt from Orfeo et Euridice by asking the student to concatenate two schema and justify the given circumstances of one in terms of given circumstances for the other. The exercises of this chapter develop that exercise. The student will be asked to attune their consciousness to states of multistability and allow their given circumstances to reflect their real-time experience of structural play. In excavating their own real-time empathic response to emerging given circumstances that confirm, dismiss, reinforce or modify themselves continually, truth on stage becomes even more viable.
4.4.2. EXERCISE 11: CREATING A DOUBLE-IDENTITY

At the point where several schema are able to be strung together in an unbroken line (as was accomplished in Exercise 10 of Chapter 3), the student might notice that more than two possibilities for grouping occur when two pitch-group objects are strung together—that concatenating them changes their potential because plurality profligates with the increase of context. It is at this point where the schematic fabric is born for the student. Pitch groups that are well-formed and even relatively unambiguous in isolation are threatened with reassignment in the process of contiguation. Groups that are formed at the seam, or that overlap with one another via re-assignment of already-structured pitches can implicate wholly different schema mappings, which stimulate wholly different narrative elements. It is at this point—when the student is aware of plural structurings in co-temporality—that the teacher should begin guiding the student toward the most highly-prized activity of the endeavour: real-time re-structuring. Exercises 11–13 work progressively toward that goal.

Exercise 11 challenges the student to conceptualize a type of prolongation. A pitch (C#) which occurs early in an excerpt (the main flute solo in Debussy’s Prelude a l’apres-midi d’un faun) and is not re-visited becomes re-enlivened later in the excerpt. The student will be challenged to conceptualize the C# as part of two groups: an ascent {C#, D#, E} that occurs early in the excerpt, and a descent {C#, B, A#} that occurs late in the excerpt.

The student should prepare the excerpt of Figure 4.10. Preparation should include listening to an orchestra performance or recording of the work, as the harmony and texture of this work provide quite a lush background for the given circumstances. If possible, care should be taken to address the substantial technical challenges that are posed by the excerpt.
Together, teacher and student should seek out possible pitch groupings for the excerpt. At some point, the student should be guided toward the two stepwise motions that are reflected in Figure 4.11. The student should perform the excerpt in two groups, deleting ungrouped pitches, as follows:

![Figure 4.10. Measures 3 and 4 of Debussy’s Prelude a l’Apres-midi d’un faun](image)

The student should complete Chapter 3 exercise activities for both the ascent and the descent. This work should begin by identifying the mapping (UP and DOWN, respectively), after which the student invents some set of circumstances that anthropomorphize the pitch object and support a salient empathy between the student and the pitch object. An example is provided in Figure 4.12.

![Figure 4.11. Two groups in the Debussy excerpt](image)
After playing the groups in isolation, the student should play Figure 4.13. The teacher should ask the student to actively sense the competition that occurs between the student’s well-formed pitch groups of Figure 4.12 in isolation, and the functional plurality that emerges for C♯ once the motion DOWN begins. What does it feel like to move from the world of the UP to the world of the DOWN? At this point, the thought activity goes beyond the activities of Chapter 3, in that it anthropomorphizes the overlapping functions and double-identity of C#. How does it feel to watch C# experience two desires and choose one? What does it feel like to later unearth and re-discover the downward yearnings of C#? Is there a sense of loss at leaving UP behind?

The student should play Figure 4.13 at a slow tempo, actively responding to both the UP and DOWN motion and their narratological interaction.

**Figure 4.12.** A sample set of given circumstances

| Setting: sitting at the edge of a bluff, sunrise |
| UP: The sun is just peeking over the edge of the bay, climbing, brightening, and warming |
| DOWN: the sun skirts the edge of a purple cirrus cloud. The holes in the cirrus cloud cause the sun to flicker during the B, the world chills and warms suddenly but gently in those moments. Upon reaching A#, the sun is clouded, and only a warm orange spot amidst its purple remains. |
The next step is to gradually re-insert the deleted notes, and explore how this further deepens and complicates the narrative. For instance, how does the G♯ octave descent impact the narrative? The performance now overlaps three groups; and the given circumstances should reflect this complexity. This is a vital moment in the student’s study, as the objective is to conceptualize the groups as co-existing elements of a complex tapestry of becoming. The student should aim to sense that the upward motion \{C♯, D♯, E\} is still occurring while the \{G♯-G♯\} descent begins. The motion \{C♯-B-A♯\}, likewise should not erase or replace either of these motions, but should be felt to co-exist: the seed of the downward motion is not born with the B, but was there inside of C♯ all along as it were, and is actualized later.

**Figure 4.13.** Double-identity of C#: SOURCE for a path UP, SOURCE for a path DOWN

Figure 4.14. Given circumstances for a complex tapestry
Finally, how does the narrative change when the C♯ is re-inserted?

![Figure 4.15](image)

**Figure 4.15.** The C♯ is re-inserted.

The exercise practices pitch-network structural becoming amidst a rich schematic fabric. In early practices of this exercise, the given circumstances can reveal themselves in parts, and be sewn into coherence, as shown above. As the student becomes more adept at the exercise, it will need to be done without verbalizing, as a true *becoming* occurs at the speed of music. When groupings re-define each other’s members, as the structure of Figure 4.15 does with C♯, those notes’ future lives begin existing during moments when their other identity is more prominent and come to fruition when the context is receptive to that identity.

After studying the Debussy, the excerpt from William Tell should be re-visited. Figure 4.16 reprints Figure 3.7 from chapter 3, and poses a second reading which marks the A *neighbor* from 3.7 as a *passing tone*. The given circumstances should explore both the neighbor reading and the passing tone, and incorporate the magic transformation that uses the A as a portal.
Exercise 12 challenges the student to share a becoming. That is, the student will not be in exclusive control of encouraging structure; other musicians will be collaborating with him/her to put pitches into relationship with one another. This is a great way of introducing a sense of vul-

Figure 4.16. The neighbor A (above) is interpreted as a passing tone (below). The student should incorporate the double-identity into their given circumstances.

4.4.3. EXERCISE 12: SHARING THE NETWORK
nerability to an emerging narrative and a receptiveness to an undetermined outcome. As such, it is an important step toward a true fluency in becoming.

Figure 4.17 is the first four bars of “Aus Liebe will mein Heiland sterben,” from J.S. Bach’s *St. Matthew Passion*. The student’s preparation should include singing the flute line while playing the oboe da caccia lines on the piano. The student should also do a part-writing analysis for this passage, as the three-part voice-leading mingles among three instrumental voices (the flute and the two oboes da caccia). Prior to work, the student should identify or be guided toward four important elements: (1) the harmonic motion i-V\(^6\)-i, (2) the suspended A in measure 2 (oboe 2) moving to G\(#\) in measure 3, (3) the flute’s suspended B in measure 4 moving to A, and (4) the voice exchange on the third beat of the second full measure, which transfers the first oboe’s B to the flute and the flute’s D to the first oboe.

![Figure 4.17. Measures 1-4 of “Aus Liebe will mein Heiland sterben,” Bach’s St. Matthew Passion](image)

Study should be geared toward understanding two species of CONTAINER motion which occur across the excerpt. The first uses the familiar chord tone/non-chord tone dichotomy. Suspended A, which was IN the container in measure 1, becomes OUT of the container with the harmony change at measure 2. This suspension is then echoed in measure 4, when the B—which worked very hard to clarify its status as IN during the moments of measure 2—becomes OUT of
the container in measure 4, as the flute’s octave descent of measure 3 culminates in a suspended B over tonic. This is illustrated in Figure 4.18.

![Figure 4.18](image_url)

**Figure 4.18.** The pitch A begins its life IN the governing chordal container, but in measure 2, the descent of flute and oboe 1 moves A OUT of the governing chordal container.

Woven in between the two suspensions that are illustrated in Figure 4.18 is a CONTAINER motion of another species: a voice exchange between the first oboe and the flute. The first oboe’s “IN but dissonant” B of measure 2 is transferred to the flute, just one beat before the second oboe’s A resolves to G#. This is illustrated by Figure 4.19.

![Figure 4.19](image_url)

**Figure 4.19.** The voice exchange moves the flute and oboe 1 OUT of their original voices, and INTO each other’s voice-space.

The activity of providing given circumstances for the first species of CONTAINER motion (the non-harmonic tone) has already been exemplified in the exercises of Chapter 3, using
the Brahms and Gluck excerpts. Therefore, the work of identifying schema mappings, anthropomorphizing them and learning to sustain an empathic response toward groped pitch objects might be done first. Because the student is more practiced in this work, it might be interesting at this stage to begin including in the narrative that aspect that makes suspensions unique among non-harmonic tones—their sudden crisis of identity with the onslaught of the new harmony, their becoming of self as OUT; their leaving-behind of self as IN despite not having changed; their RELEASE in abandoning self entirely when they move to a chord tone. If this exploration inspires a richer or more sophisticated empathy, the student might enjoy re-visiting all of the other non-harmonic tones throughout the exercises, exploring for example the dual-loyalty and/or the propulsions that a passing tone might face, or the unique urges an escape tone might endure in the uncertain moments before its true container arrives to envelope it.

However, the the next official stage of work and the primary goal of Exercise 12 is the second species of CONTAINER motion of Figure 4.19—the voice exchange. In the Bach excerpt, the voice exchange is realized by three different human beings in collaboration. For this exercise, (unless a third player is invited into the lesson), either the teacher or student will need to play the two oboe parts on the piano while the other plays the flute. These roles should alternate, so the student has the opportunity to experience how the oboists contribute to the network, and understand what each of the players needs in order to accomplish the dramatic voice exchange as a team.

After some alternations of playing oboes and then flute, given circumstances should be either documented or invented for the exchange, from the perspective of each of the roles of oboe 1, oboe 2, and flute. Key to the thought experiment should be the question of why the lines
should feel compelled to transfer themselves? As an example, the student might respond that the flute was so attracted to the dissonance that was sparked with oboe that it wanted to celebrate it—by not only territorializing the oboe’s property, but expanding it into a higher octave. The exercise should provide emotionally-saturated given circumstances for not just the flute, but all of the instruments of the trio.

If in performance, one member of the trio projects a narrative that isn’t compatible with the narrative that has been discussed thus far, the narrative will need to be re-invented, based on the new information presented by the performance. The second part of Exercise 12 practices this skill. The teacher, in either the flute or the oboe role, should now challenge the narrative in various ways, by projecting a different mood, changing the grouping, changing the location of an unmarked crescendo, etc. This work might result in several failed attempts and/or strange groupings, and the players should be patient. The players also should not worry tremendously if their original, pre-planned circumstances remain now only as vestiges or even not at all. Stanislavski was clear that yesterday’s inspiration is “as unrecoverable as yesterday” and that the undeniable asset to today’s inspiration is that “you have the advantage of possessing it today.” The objective of the exercises is to practice the actions of providing and reflecting upon given circumstances in real time—not simply to provide them and then plan a suitable response.

A fertile imagination that has been encouraged to allow flexibility and correlate their work with aspects of the score will find little difficulty in doing this in real-time, as the music emerges. Thus, all of the previous exercises throughout all of the chapters should aim to develop these three things: the student’s creativity, their ability to correlate their creativity to a mapping

33 Stanislavski (1936), p. 189.
that is potentiated by the score, and the flexibility (both mental and technical) to continually de-
velop the scenario.

After early renditions, the student should reflect upon the narrative, either verbally or by
adjusting their own nuance, or by a combination of both. Once again, the verbal label for the
mapping is a mediator for the narrative, and is not the end goal of the exercise. Unless the stu-
dent prompts verbalization, later practices should rely progressively less on verbalization, and
more on adjustment. This adjustment is called re-structuring, and is the skill that the student
needs to accomplish in real-time in order to support an emerging narrative.

At this point, the Debussy excerpt of Exercise 11 should be re-visited, allowing the con-
cept of voice-leading voices to guide the re-working. This will help the student to conceptualize
the excerpt not as a modular series of disparate paths that disappear and reappear, but as a true
network, whose dormant paths continue to reach into the future despite their apparent silence.
Work should be guided on the principle that momentarily-silent voices continue to be impacted
by and still hold the potential to impact the emerging narrative.

4.4.4. EXERCISE 13: ECLIPSING PARAMETERS, RE-STRUCTURING IN REAL-TIME

Exercises 11 and 12 and those from Chapter 3 dealt with a living narrative and facilitated
truth on stage without asking the student to exercise the grouping rule-set explicitly. Exercise 13
re-envelopes the work of Chapter 1, employing the parameters of grouping toward the encour-
agement of a structure.

The exercises practice the strategy of eclipsing parameters. When a performer eclipses a
parameter, they change their primary parameter of structuring. There are multiple parameters at
the skilled performer’s disposal, and at any given moment, any of them has the potential for forming a coherent group with future music. Importantly, any of them could in theory hold some potential for forming a coherent group with past music which was (at the time) governed by a different parameter.

For example, Figure 4.20 shows a set of nuances for a musical excerpt, in which the parameters of vibrato and dynamic-plus-slur compete as structuring agents. Vibrato functions to group pitches 1, 3 and 5 into an arpegiation of a tonic triad, whereas dynamic-plus-slur functions to group pitches 4, 6, 7 and 8 into an arpegiation of iv.

Vibrato is initially prominent, due to its early arrival on the scene. Its use functions to encourage a grouping of \{A, C, E\}, and suppress the other pitches. To experience this, the student should perform the pitch group in the manner of Figure 4.21. The performance groups the tonic arpeggio using the law of similarity, and suppresses the D which (in a later figure) will introduce a competing structure.
The student should then perform Figure 4.22, which places a dynamic-plus-slur on the group \{D, E, F\}, thereby transforming the function of the \{E\} of \{A, C, E\}. If with the help of the recency effect the dynamic-plus-slur successfully overrides the vibrato grouping, then the coherence of the vibrato-formed group can be temporarily weakened, and \{E\} undergoes a transformation of identity as time unfolds. The dynamic-plus-slur trajectory is said to *eclipse* the grouping potential of vibrato during those moments. The new grouping can be reinforced by the further arpeggiation of iv in pitches 7 and 8.

![Figure 4.22. Dynamic-plus-slur eclipses vibrato as a parameter for grouping](image)

**Figure 4.22.** Dynamic-plus-slur eclipses vibrato as a parameter for grouping

### 4.4.5. EXERCISE 14: RE-RE-STRUCTURING

The activity of re-discovering a lost function can be a powerful narratological motivator. This exercise challenges the student to re-structure the already re-structured pitch 5, *back into* its initial function of scale degree 5 within a tonic arpeggio.

Pitches 9 and 10 of the network of Figure 4.20 reinforce the tonic arpeggio, and it is highly likely that these pitches will group according to this species of combinatoriality. Their membership within the tonic arpeggio provides a powerful force in grouping. However, pending many variables, including the magnitude of all of the various nuances of the figure and aspects of the various neural states of listeners (as discussed throughout this dissertation), pitch 5 \{E\} *can* potentially be re-re-structured into its original function as part of a tonic arpeggio. The activity
of re-re-structuring brings us closer to the highest goal of the exercises of this dissertation: that of
nurturing a truly living narrative.

The student should perform Figure 4.23, which uses the same pitch set as Exercise 13. The set of nuances closes the iv group and reinstates the vibrato from earlier in the excerpt. A sizable gap after pitch 8 provides pitch 9 with a less competitive space for developing its identity in separation from the iv group, and after having established a similarity of vibrato between pitch 10 and the other pitches (including pitch 5), there is potential for that pitch 5 to be retrospectively re-structured into its original function. A decrease in intensity and larger gap after 10 will provide pitch 10 with the very un-competitive space that comes with a sense of closure, encouraging its vibrato to function efficiently in grouping pitch 10 with the \{A, C, E\} arpeggio.

The student should perform Figure 4.23 with the aim of grouping pitch 10 with pitch 5. Care should be taken not to intentionally suppress the competing grouping, however. The adventures of re-re-structuring depend on a potent competition among structures.

4.4.6. EXERCISE 15: NURTURING A LIVING NARRATIVE

Exercise 15, which can reach great heights of virtuosity, takes the form of a pedagogically-oriented arrangement of the Partita from J.S. Bach’s BWV 1013. The Partita is parsed into a
duet so that student and teacher alternate, each providing exactly one note before the other takes a turn. Through the activity of dually-creating similarities, trajectories, and disjunctions, the student and teacher are challenged to respond empathically in real time to the groupings that emerge in true collaboration—one note at a time.

The student should prepare the top line of Figure 4.24. Line 1 includes all of the notes from the first half of a binary form from J.S. Bach’s Partita, BWV 1013. Lines 2 and 3 parse the section into a duet, student and teacher alternating turns. During the lesson, the student and teacher should play lines 2 and 3 together, in the style of a duet. Holding a coherent meter under these circumstances is in itself a virtuoso activity, and should be given the time and practice it needs to improve. It will be helpful to do the first several practices at a very slow tempo. Achieving small bits at a time and building up to a phrase is also a great strategy. However, as groups emerge, the challenge of holding a meter will be less and less detrimental, so the duo shouldn’t feel compelled to remain in this preliminary stage for very long.

The duo should create—as a team—some sort of a coherent trajectory to form the first group. Slurs are impossible, so grouping will rely on similarity and trajectory of timing, articulation stroke, dynamic and vibrato, as well as gap. Verbally planning or devising a plan on paper is fine in the initial stage, but it is paramount that listening and responding become the primary mode of communication between players, as this is the fundamental skill that is practiced.

As the team develops the ability to group collaboratively, the players should introduce the idea of eclipsing parameters, and invite from each other the freedom to re-invent the grouping at will. In later practices, the teacher and student should focus their attention more on narrative than on the technical actions they’re taking, and discussion along the lines of the exercises of
Chapter 3 can play a role in the work, again moving swiftly from discussion toward exclusively non-verbal communication.

Later work should parse the Partita into increments other than every-other-note, using ad hoc analysis as a guide for locating potential harmonic boundaries, voice exchanges, and the like. At the culmination of Exercise 15, the student should practice the Partita as it is generally conceived: a solo polyphonic flute work.

Figure 4.24. J.S. Bach’s Partita in A minor, adapted for pedagogical study (continued on the next page)
4.5. CHAPTER SUMMARY

This chapter presented the concept of structural becoming in live performance, using discussion from the music theoretical literature and knowledge of the physiology of becoming to enhance the performer’s awareness of the gradualness of meaning formation. The work aims to draw the performer’s attention to moments when plurality can be not only rich but potent and well-formed, and to moments when synopsis resolves questions of multiple-identity, creating a natural flow of ambiguity and its vivid resolution across the life of a performance. In the interest of inviting inspiration in the manner proposed by Constantine Stanislavski, the exercises emphasized an egalitarian relationship between performer(s) and music, such that at times the performer surrenders to a narrative that is evolving in the music around them, and at others takes action to eclipse species’ of priming and drive a narrative in real-time.
CHAPTER 5: CLOSING REMARKS

Upon completion of the exercises of this dissertation, the student should continue to practice applying the concepts of grouping, anthropomorphization, empathy and becoming to all of their repertoire. Speed will come gradually, as will depth; the highly successful student is capable of improvising whole narratives in an unbroken flow of becoming, by themselves and with collaborators, in a variety of musical contexts.

An important element in a student’s follow-up is to study the larger wholes of each of the excerpts they practiced in the Exercises. The snippets of Chapters 1-4 were chosen for their didactic value in this context—not because they are necessarily the most or only important moment in their respective piece. Most importantly, in the Gluck and Debussy excerpts we saw explicit instances where schema mappings were unambiguous in isolation, but proliferated when seen in their larger context. For example, the student should examine how the first two measures of the Debussy excerpt, with its octatonic undertones, impact all of the work that was done for Exercise 11. Each excerpt should be understood as a part that is both capable of impacting its larger context and capable of being impacted by it. If the student initially finds it difficult to transfer the work of these exercises into their repertoire, it can be helpful to start this work by doing the popular chamber music exercise of changing the felt meter. The musician can endeavor to feel and express the meter in two long beats as opposed to four short beats, and then in one long beat as opposed to four short beats. This exercise automatically generates new groupings by virtue of metrical accents.

The primary work of this dissertation is the set of exercises that guide a student into a deeper focus and more comfortable spontaneity. Their application as a bridge between a stu-
dent’s study of music theory and the topic that most likely interests them most—performance—
will also likely yield tremendous advantages for theory faculty. It can also be predicted that the
two tiers of analysis that are proposed and illustrated throughout the theoretical sections of this
dissertation will yield insight into an individual’s affective response during small moments of
dedicated music listening, and an empirical investigation of this assertion is a third direction that
the work might take in future years. Sections 5.1 and 5.2 provide an illustration of each of these
practical applications, respectively.

5.1. ANALYSIS AS GENERATOR FOR MAPPINGS

One of the most valuable applications of this work will be its utility in the music theory
class for performers, as a bridge between the work that performers do, and the work that they do
in their core music theory curriculum. Any type of analysis can be useful for generating group-
ings. Some of the most vivid groupings emerge from voice-leading analysis (including
Schenkerian analysis), set-class analysis, and motivic analysis. Figures 5.1, 5.2 and 5.3 provide
examples of groupings and narrative mappings that emerge from various methodologies.

Figure 5.1 is a voice-leading analysis of the opening of Telemann’s Fantasy in A minor
for solo flute (TWV 40). The analysis finds patterned instances of magical CONTAINER mo-
tions, wherein a pitch which was IN the container becomes OUT. It also locates instances
wherein a root of a chord becomes the fifth of a chord. In the analysis, double arrows represent
becoming, in the manner of Janet Schmalfeldt.1 Lines depict UP, DOWN and wedge motions

1 Schmalfeldt is credited with this icon by William Caplin in the Prologue to Caplin (2000).
formed among non-adjacent pitches. All of these mappings can be used to encapsulate narrative elements when they are viewed anthropomorphically.

Figure 5.2 is a non-conventional Schenkerian analysis of the opening to Sigfried Karg-Elert’s *Sonata Appassionata* for solo flute. The top staff represents the notes in the solo flute part; the bottom three staves are analytical. Staff 2 represents an analysis which crosses slurs, in the manner of Naphtali Wagner, and the bottom two staves represent the two readings that are revealed by the crossed slurs of staff 2. Staff 3 is a double-neighbor motion; this is perhaps the more conventional reading of the opening. Staff 4 is a chromatic descent from D through C# and C to B. In this example, the given circumstances can encompass the two readings, as well as their interface: the tension that grows as a result of B#’s prolonged state of double-identity offers a powerful impetus for the furious multiple-voice chromatic descent of measure 3.

Figure 5.3 is a set-class analysis of the solo flute opening of the third movement of Robert Muczinski’s *Sonata* for flute and piano. The analysis reveals a captivating dialogue of UP/DOWN contours among sets of (012). Midway through the solo, the analysis reveals a process of expansion, whereby the pre-dominating ic 2 is overtaken temporarily by ic 3. As the (012) contour dialogue resumes, ic 4 continues the expansion, culminating in a gradual increase of density of identity for the various pitches: at the culmination, pitches come to function as part of multiple sets. The dialogue among same-sets that is revealed early on in the analysis can be used to generate a set of given circumstances, as can the intrinsic properties of the sets, all of which revolve around an ic1. On a larger scale, both the gradual expansion from (012) to (014) and the increase in conflict of identity can be used to fuse these smaller elements into a larger, more sophisticated narrative. The solo ends on a long low D, at which point the processes of dia-
logue, expansion, plural identity, and inherent gravities within a set class can be considered to be at rest.

**Figure 5.1.** An analysis of Telemann’s Fantasy in A minor for solo flute, TWV 40. A voice-leading analysis reveals UP/DOWN and CONTAINER motions at a more background level.
Figure 5.2. An analysis of Karg-Elert’s Sonata Appassionata, bars 1-4. A non-conventional Schenkerian analysis reveals plural identity for several pitches in terms of CONTAINER allegiances and PATHS. The tension between these readings can be used to motivate the furious descent of the third bar.
Figure 5.3. A set-class analysis of Muczinsky’s Sonata for Flute and Piano. The analysis reveals several sources for given circumstances:

- a dialogue of UP/DOWN contours among sets of (012)
- the expansion of the primary ic from ic 2 to ic 3, and finally, ic 4.
- a gradual increase in density of plural identities
5.2. EMPIRICAL INVESTIGATION OF THE THEORETICAL WORK

As explained in Chapter 2, issues of promiscuity in the mappings and the difficulty of controlling for just-noticeable differences present some of the sure methodological difficulties of an empirical validation of performance nuance as a constraint upon meaning. At one point, this appeared to stump this avenue of application. However, my strong suspicion is that if a data set correlating performance nuance and received meaning were to be collected for a set of listeners, there would be found to be some structure in that data set using a non-linear dynamical analysis. I predict that the structure would show that (1) there is predictive power in an analysis which used two tiers: grouping and schema-mapping, and that (2) meaning—though it proliferates—is constrained by performance nuance, perhaps even to a degree that can be called deterministic within a highly complex system that involves individual differences.

For the reader who is not initiated into the methodology of non-linear dynamical analysis, it is a system of analysis wherein large groups of seemingly chaotic data (such as that which might be likely to emerge from a study of subjective meaning) can be shown to be structured such that multiple variables converge in various places in a space of any number of dimensions. These convergences are called attractors, and represent places where parameters meet to yield the same outcome. Convergences can be thought of as recipes for high predictability. Oft times, a data set which appears chaotic in a linear analysis can be found to be structured in a non-linear dynamical analysis.

Strange attractors in the analysis of a data set collected regarding musical meaning and performance nuance might include convergences of tier 1 and tier 2 correlations with certain as-

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pects of the individual listener. For example, the listener would be in a certain state of priming: perhaps they were persuaded to attend to vibrato; perhaps they were primed toward particular just-noticeable difference categories for particular aspects of vibrato; and perhaps they were primed to associate UP with a certain affect. The function of non-linear dynamical analysis is just this: to seek order in systems that are highly sensitive and have many variables. I project that (in addition to its future as a powerful and much-needed pedagogical tool) this dissertation provides an encyclopedia of the variables that are likely to produce the primary eigenvectors in such a non-linear dynamical space.

A program might begin with the two studies such as the two that follow. Neither experiment would be comprehensive, but rather represent first steps for each respective tier: grouping (in the manner of chapter 1), and meaning (in the manner of chapter 2).

The Tier 1 investigation (grouping) would ask whether/to what extent grouping is constrained by performance nuance. Specifically, it would ask two questions: whether a primed listener can hear an intended UP grouping (Group 1) and whether an unprimed listener can hear an intended UP grouping (Group 2). Group 1 is the control group; its results provide a baseline. The target question—whether grouping can be constrained by performance nuance—is presented in Group 2. A methodology follows:

1. Categorize subjects according to level of musical expertise, and divide into two groups with more or less equivalent demographics (in order to ensure a relatively even distribution).

2. For group A, prime the listeners to “please notice vibrato”. Define and demonstrate vibrato.

   For group B, do not prime or demonstrate vibrato.
3. Present the stimulus, a recording of Figure 1.7 (the interpolation from BWV 1034). The stimulus should come in two versions. Stimulus 1a should be prepared such that the performer guides the listener in a clearly UP direction, using vibrato as the primary grouping parameter. Stimulus 1b should be prepared such that the performer guides the listener in a clearly DOWN direction, using vibrato as the primary grouping parameter.

4. The subject base will respond to the multiple choice question, “does it sound or feel to be moving UP or DOWN?” In order to prevent either/or guessing, both stimuli might be presented at least once each in a group of randomized hearings prior to presentation of the question. If a subject’s response is “both” for any of the presentations, this response or subject can either be excluded or the subject can be asked again to choose a single response. Alternatively, excluded answers of “both” might be included in a collection of responses such as “not sure”.

5. Other questions may be asked to mask the target question if appropriate, and the order of the questions might be randomized.

The results for the two groups would be compared. If the results of the control Group 1 and the target question Group 2 are comparable, it would indicate that vibrato that is primed entirely within the stimulus can function as effectively as a deliberate external pre-trial primer, and therefore can be used to constrain grouping for a listener. A follow-up program of study would use the same methodology for different musical stimuli and different parameters/combinations of parameters.

The Tier 2 investigation (meaning) would ask whether various species’ of priming can be used to constrain a listener toward either effort or ease. The subjects would be divided into three
groups, and each would receive a different type of priming. Two species’ of priming would be administered pre-stimulus, and the third species would be embedded within the stimulus itself, (as part of the performance). The target species of priming is that used in this third group: mimetic representation internal to the stimulus itself. A comparison between the three species of priming would ask whether priming that is embedded in the stimulus itself can be as powerful a constrainer of meaning as priming that is deliberate, external and administered prior to the stimulus. A sample methodology follows:

1. Categorize subjects according to level of musical expertise, and divide into three groups of more or less equivalent demographics (in order to ensure a relatively even distribution).

2. Group 1 will be primed toward either effort or ease for each presentation of either an UP or DOWN stimulus, using images that depict one or the other affect. Group 2 will not be primed externally—rather, the subjects will be guided toward a state of priming through a series of questions which develop an internal concept of either effort or ease. Group 3 will receive no guidance in priming outside of the stimulus.

**Group 1**

1. Inform subjects that they will hear a brief musical excerpt and be asked to report upon its meaning. Present a multiple choice list such as the following:

   (a) climbing up
   
   (b) floating up
   
   (c) floating down
   
   (d) falling down
   
   (e) pushing down
2. Present two stimuli at least two times each, in combination with two different primers. Include those presentations among other randomized, excluded presentations.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Primer</th>
<th>Stimulus</th>
<th>Reported affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>effort</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ease</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>effort</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ease</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.4.** Reporting structure for Group 1

**Group 2**

1. Inform subjects that they will hear a brief musical excerpt and be asked to report upon its meaning.

2. Ask subjects, “when you think of UP, what do you imagine?” Ask subjects to respond with a single word that they associate. Interpret the response: is it more associated with effort or more associated with ease? Encourage whichever association presents itself more strongly, by asking a brief series of prepared questions that help the subject to develop a robust internal concept for that association. Subjects might be asked to draw a picture using two or three strokes that reinforces the association.

3. To half of Group 2, present the stimulus that is appropriate to that subject’s internally-primed association. Ask subjects to respond immediately: “do you feel the mood was appropriate to the music?”
4. Present the stimulus that is in contrast to that subject’s internally-primed association. Ask the subjects, “do you feel that the music sounded and felt the same, or different in the two versions? Was it the same music? Was it the same performance? Did it feel different the second time? Do you think it was a different performer? Which performance felt more appropriate?”

5. To the other half of Group 2, present the stimuli in the reverse order, asking the same questions. The division helps to control for serial position effects.

**Group 3**

1. Inform subjects that they will hear a brief musical excerpt and be asked to report upon its meaning.

2. Present a stimulus which clearly moves either UP or DOWN and uses mimetic representation to reflect either effort or ease. Listeners should receive no priming that is external to the stimulus.

3. Ask the subjects to reflect upon the mood. Free response might be used so as to avoid priming from the questions themselves. However, if in a pilot trial this generates unusable data, a set of multiple choice questions might be devised, or free response might be constrained by a series of carefully worded yes/no questions.

In this tier 2 study, if the degree of correlation between subjects’ reported affect and the priming (groups 1 and 2) or intended affect (group 3) is equally comparable (the degree of correlation for group 1 is comparable to the degree of correlation for group 2 and the degree of correlation for group 3), it would indicate that all three forms of priming are sufficient to constrain
meaning for listeners. The target species of priming is of course present in the Group 3 experiment: that of mimetic representation.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>stimulus</th>
<th>priming</th>
<th>response</th>
<th>outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>two stimuli: UP DOWN</td>
<td>Images are used to prime either effort or ease for an UP or a DOWN</td>
<td>Subjects report on experienced affect, multiple choice.</td>
<td>The reports will coincide to some measurable degree with the priming.</td>
</tr>
<tr>
<td>2</td>
<td>four stimuli: UP/effort UP/ease DOWN/effort DOWN/ease</td>
<td>Subjects prime themselves by imagining either effort or non-effort.</td>
<td>Subjects report on the appropriateness of the affect of two performances.</td>
<td>Subjects will either perceive the performance that correlates with their priming as more appropriate or not necessarily more appropriate.</td>
</tr>
<tr>
<td>3</td>
<td>four stimuli: UP/effort UP/ease DOWN/effort DOWN/ease</td>
<td>Priming is embedded in the stimulus: grouping signals for UP/DOWN, mimetic representation for effort/ease.</td>
<td>Subjects report on affect and direction using either free response, yes/no or multiple choice.</td>
<td>The reports will coincide either weakly or strongly with the intended affect.</td>
</tr>
</tbody>
</table>

**Figure 5.5.** Tier 2 summarized.

An empirical investigation of CONTAINER, SPG and BARRIER might follow along the same lines of comparing species of priming, in order to determine whether meaning can be reliably constrained by performance nuance, and which aspects of performance nuance tend to be the most effective shapers of a communication.

The studies are the very surface of a program of study that is inspired by the main theoretical ground of this dissertation—that disjunction and priming function in tandem to structure incoming sound into meaning, and that listeners who “prefer” one performance over another are responding, among other things, to a narrative that embeds itself in the grouping that is projected.

It may seem that prominent strands within the performance pedagogy tradition already bear witness to these assertions, and that such an empirical validation is superfluous. However, I
predict that as the research program develops, more nuanced studies will emerge in response to problems met, and that these more directed, specific studies will yield fascinating insights that simply cannot be inferred from the traditional methods of reading critical reviews, asking feedback from audience members, peers and/or teachers, and listening to recordings post-performance. For performers, these insights would run along the lines of how priming might be used to reach more audience members, more deeply. For the psychologically oriented, insights can potentially quantify the weighting and manipulability of the various variables that are at work for listeners while they are transforming sound into meaning.

5.3. CHAPTER SUMMARY

This dissertation travelled paths through many topics which might not readily be perceived as related: music performance, musical narrative/meaning, process as structure, Stanislavski’s acting method, and the psychology and neuroscience of grouping/selection/integration as it changes over time. The through line for these meanders is the concept of the unraveling of a musical communication: all of the theoretical discourse and the exercises presented are aimed toward connecting performers more deeply with the meanings they often take for granted, thus opening a space for their own unique investigation into performance nuance and meaning, and empowering a deeper, more critical engagement with the meanings/actions they are/have been asked to consider by their teachers. In this way, the dissertation expresses unwavering commitments to developing the artist’s voice and to disempowering the hegemony that is deeply embedded in classical music performance pedagogy and quietly—often uncontestedly!—stifles new insights. The dissertation asks performers (and perhaps listeners)—if nothing more—to ex-
perience the unraveling of music more closely, in a way that takes less for granted; to appreciate the density and complexity of moments and the tragedy of those moments’ resolution and the joy of their upheaval.
WORKS CITED


