A COGNITIVE THEORY
OF MUSICAL MEANING

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1. Introduction

This article presents the outlines of a theory of musical meaning that draws upon two ideas that have recently emerged in the cognitive sciences. First is the notion that thinking consists, at least in part, of matching patterns of thought to patterns of experience. Second is the notion that much of our thinking consists of mapping patterns of bodily experience onto patterns in other domains. Although the theory draws upon work carried out across the cognitive sciences, it focuses upon the work of two writers—social scientist Howard Margolis and philosopher Mark Johnson.

According to Margolis (1987), all thinking—from the recognition of a musical motive to the proof of a mathematical theorem—is based on pattern matching. That is, we make sense of the world around us by matching perceived patterns to patterns stored in memory. Margolis describes the cognitive process as beginning with the selection of a pattern to match an incoming stimulus. Selection is carried out through what he calls jumping, or a leap of intuition. Selection may be immediate, as when we see a familiar object. Or it may take a certain amount of time, as when we see someone whose appearance has changed significantly since we last saw them. If the match is exact, or nearly so, the search for
meaning may end there. If the match is only approximate, however, this may initiate a second step in the cognitive cycle, called checking, in which we compare patterns and note their similarities and differences. Checking may then give rise to higher levels of meaning, as we initiate a search for a higher-level pattern to account for similarities and differences found in patterns matched at a lower level.

Pattern matching also plays an important role in Mark Johnson’s theory of embodied meaning (Johnson 1987). Johnson claims that much of our thinking is metaphorical in that it involves a mapping of patterns from one domain of human experience to another. The patterns that Johnson describes as most basic to our thought processes derive from the immediate experience of our own bodies. Beginning with our first attempts to reach out and grasp a toy or a morsel of food, we learn about such phenomena as cause and effect, motion, force, energy, and balance through the ways in which they play a part in our own goal-directed actions. This learning is captured in the form of patterns that Johnson calls image schemas. According to Johnson, we use image schemas to make sense of our experiences in more abstract domains—domains as diverse as visual art, emotion, social interaction, and mathematics. For example, the balance schema, which we learn through the balancing acts of our own bodies, allows us to make sense of such diverse concepts as visual balance, emotional balance, balance of power, and balancing an equation. Bodily image schemas—especially those involving force and motion—appear to underlie our understanding of music as well. We find evidence of this in the language used to describe it: strong and weak beats, rising and falling lines, voice leading, leading tones, harmonic goals, and so on. Musical patterns particularly lend themselves to this sort of metaphorical mapping, being marked by changes of rate and intensity that translate easily into force and motion.

These two theories provide the basis for the theory of musical meaning to be offered here. Margolis’s theory of pattern matching suggests that music takes on meaning with respect to itself as a result of our mapping the musical patterns that we hear onto those stored in memory. Johnson’s theory of embodied meaning further suggests that these patterns take on metaphorical meaning as a result of our mapping them onto image schemas derived from bodily experience. According to the present theory, musical meaning arises more specifically through the mapping of the heard patterns of a musical work onto three different types of stored patterns: (1) intra-opus patterns—patterns specific to the work itself; (2) musical schemas—patterns abstracted from musical convention; and (3) image schemas—patterns abstracted from bodily experience. These three types of pattern matching are shown in Figure 1. The first two types give rise to intra-domain mapping, while the third gives rise to metaphorical, or cross-domain mapping.
A central premise of the theory is that many tonal conventions are themselves grounded in bodily experience. That is, the image schemas that lend coherence to our bodily experience are metaphorically reflected in conventional patterns of melody, harmony, phrase structure, and form. These conventional mappings are the everyday metaphors of music—cross-domain mappings that are carried out easily and unconsciously by experienced listeners. Understanding how tonal convention reflects bodily experience can give us insight into the novel metaphorical meanings of a musical work, just as examining everyday linguistic metaphors can provide insight into the more complex metaphors of poetry (Lakoff and Turner 1989).

Conventional cross-domain mappings—the everyday metaphors of tonal music—can be represented in the form of music-metaphorical schemas. These schemas show in a general way how the various aspects of tonal organization are shaped by the image schemas that underlie them. The conjoining of musical and image-schematic structure in these schemas is represented by double arrows in Figure 1. Each musical schema serves as a template upon which can be mapped the concrete patterns of a musical work. Correspondences between concrete pattern and musical schema yield generic-level metaphorical meanings, which then serve as the backdrop for the interpretation of their differences on the basis of more complex metaphorical projections.

Intra-opus pattern matching adds yet another layer of meaning. Patterns that recur within a musical work map not only onto schemas for tonal convention, but also onto versions of the same pattern heard earlier in the work. Each pattern, or paradigm, establishes its own paradigmatic axis, with each new statement of a pattern mapping onto those that precede it, as shown in Figure 2. Drawing upon the basic-level metaphors MUSICAL EVENTS ARE ACTIONS and A MUSICAL WORK IS A JOURNEY, we...
I A paradigmatic axis

Figure 2. Intra-opus pattern matching can interpret successive statements of a pattern as a sequence of related actions making up a musical narrative. It is intra-opus pattern matching that allows us to assign relatively precise meanings to surface-level musical events. The close correspondence between the patterns matched heightens our sensitivity to their differences, allowing even subtle alterations to take on meaning through their contribution to the narrative structure of the work.

The remainder of this article expands upon the theory outlined above, with the aim of developing tools for analysis that can help to uncover the metaphorical meanings of individual musical works. Part two examines the image schemas that are most pervasive in our everyday experience, schemas that play an especially important role in our embodied understanding of music. Part three shows how these image schemas map onto conventional features of tonal melody, harmony, key, and phrase structure, captured in the form of music-metaphorical schemas. Part four offers an overview of musical narrative and musical plot structure, showing how varied pattern repetition contributes to the narrative unfolding of a musical work. Part five presents a narrative analysis of Schubert’s “Du bist die Ruh” that serves to illustrate the analytic techniques introduced and to reveal the richly integrated network of cross-domain mappings through which the meaning of the song is conveyed. The article concludes by considering the theory’s relevance for music outside the common-practice period, as well as its potential for further development.

2. Embodied Image Schemas

The image schemas that appear to play the most important role in our embodied understanding of tonal music—CONTAINER, CYCLE, VERTICALITY, BALANCE, CENTER-PERIPHERY, and SOURCE-PATH-GOAL—are also among the most pervasive in everyday experience. These schemas reflect
basic features of our bodily experience of *space*, *time*, *force*, and *motion*, as follows:

1) We experience space as made up of bounded regions.
2) We experience time as marked off into cycles.
3) We experience the body as centered, balanced, and extending upward from a stable ground.
4) We experience motion as following pathways leading to goals.

Mapping these features of our bodily experience of the physical world (the *source* domain) onto music (the *target* domain) yields the music-metaphorical concepts of *musical space*, *musical time*, *musical force*, and *musical motion*.6

Certain general characteristics of the image schemas to be discussed here should be kept in mind. First, although they are represented in visual form, the understanding that they convey is primarily somatosensory. Our understanding of the interaction of such properties as motion, force, and balance derives from our own bodily motions, from ourselves exerting force and having forces act upon us, and from maintaining our own sense of balance. Second, two or more image schemas may combine in cross-domain mappings, allowing for the construction of more complex metaphorical meanings. Because image schemas are both simple and abstract, they are easily adapted to one another and a variety of structural features within the target domain. Finally, each image schema lends itself to elaboration on the basis of its entailments, consequences of its structure that give rise to more extended inferences and thus to more elaborate metaphorical interpretations.

The following discussion focuses on those entailments and combinations of schemas that play a significant role in the construction of music-metaphorical meaning. In some cases, this will involve combining schemas that govern aspects of bodily experience that are likely to co-occur. For example, our experience of an ordered relationship among stable and unstable tones appears to result from the simultaneous mapping of pitches onto three different image schemas—**CENTER/PERIPHERY**, **VERTICALITY**, and **BALANCE**—reflecting our association of bodily stability with centeredness, uprightness, and balance.

The **CONTAINER** schema, by which we conceptualize space, consists of a boundary and two regions, **inside** and **outside**, as shown in Figure 3. Entailments of the schema that can be inferred from the properties of physical containers include the following:

(1) An object must be either inside or outside of a container.
(2) Motion from inside to outside (and vice-versa) is constrained by the walls of the container.
(3) A container may itself be in motion.
(4) Smaller containers may be nested inside larger ones.
(5) The boundaries of a container may be fixed or flexible.
(6) A flexible container may expand or contract in response to changes in internal or external pressure.

In the physical world, we experience containment most directly through our bodies. We experience the body itself as a container with other containers nested within it—the lungs, the stomach, and other internal organs. We experience containment at a particularly visceral level through the expansion and contraction of the lungs, which give rise in turn to feelings of tension and relaxation. We also experience ourselves as nested within a series of ever-larger containers—a room, a building, a neighborhood, a city, a state. The schema for nested containers may also combine with a CENTER-PERIPHERY schema, as shown in Figure 4. Figure 4 shows one way in which we understand the concept of hierarchy—that is, as successive layers radiating outward from a core. We tend to conceive of its structure as originating in the center, with each added layer mirroring in some way the structure of the core.7

The CYCLE schema serves to organize our experience of time and the changes by which we measure time. Figure 5 represents the CYCLE schema.
schema in two forms, each highlighting different features of the schema. As a circle in Figure 5a, the schema implies continuous motion along a closed pathway, each iteration of the cycle ending where it began. As a wave in Figure 5b, the cycle takes the shape of a repeating pattern of peaks and troughs, suggesting climaxes alternating with points of repose. Figure 5b emphasizes the periodicity of the cycle, its capacity to mark off equal, or functionally equivalent, units of time.

The CYCLE schema combines easily with the CONTAINER schema, incorporating much of its structure. The circle, being closed, can be conceptualized as a container for motion around its perimeter. In its wave form, individual iterations of the cycle mark off units that can be conceptualized as temporal containers, their boundaries corresponding to beginnings and ends. These temporal containers may be of fixed duration, as in the case of conventional cycles such as minutes, hours, and weeks, or they may be subject to expansion and contraction, as in the case of most bodily cycles. Cycles may also be nested, with larger cycles subsuming smaller ones, producing a temporal hierarchy comparable to the spatial hierarchy shown in Figure 4.

An important feature of the CYCLE schema that is revealed by its wave

![Wave Diagram](image)

Figure 5. CYCLE schema

![Cyclic Diagram](image)

up vs. down

tension vs. relaxation

Figure 6
form is its inherent binary structure. As Figure 6 shows, each iteration of the cycle is made up of complementary halves. This reflects the alternation of processes or states related by binary opposition: up versus down, tension versus relaxation, in versus out, departure versus return. We observe this sort of opposition in many bodily cycles—the alternation of left and right in walking, in and out in breathing, back and forth in swinging. The alternation may be balanced, so that the halves of the cycle mirror one another exactly. Or the alternation may be asymmetrical, as in the case of most bodily processes of tension and relaxation, with the climax sometimes coming well after the midpoint of the cycle. A wave can assume an infinite variety of forms, and in fact it is this kind of flexibility that allows the schema to play such a pervasive part in our understanding of temporal experience.

The schema shown in Figure 7 combines aspects of schemas for CENTER-PERIPHERY, VERTICALITY, and BALANCE. It reflects the way that the force of gravity acts upon the body, causing us to maintain an upright, balanced position with respect to the earth’s surface. 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. The central, vertical axis can be interpreted similarly as a maximally stable position within the horizontal dimension. We experience the body as maximally stable when its weight is evenly distributed around its vertical axis. Any change in this distribution will cause the force acting on one side of the body to temporarily outweigh that on its opposite, resulting in an impulse to adjust the body’s position so as to restore equilibrium.

An important entailment of the CENTER-VERTICALITY-BALANCE schema is the establishment of a consistent relationship between stability and tension. 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. In a similar way, we tense our muscles when we shift the body away from its central axis.

![Figure 7. CENTER-VERTICALITY-BALANCE schema](image-url)
so as to keep ourselves from being pulled over sideways, and we relax them again once we realign ourselves vertically.

The SOURCE-PATH-GOAL schema shown in Figure 8 organizes our experience of motion, specifically goal-directed motion. The basic components of the schema are (1) the source, or point of origin, (2) the goal, (3) the path leading from source to goal, (4) the trajectory of motion, and (5) the force propelling the motion. Relevant entailments of the SOURCE-PATH-GOAL schema include the following:

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.
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 the 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.

Entailment 1 describes a feature of the SOURCE-PATH-GOAL schema that plays a central role in its mapping onto tonal music: an agent who conceives of the goal and who causes motion to take place. This entailment in turn gives rise to many others. 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. Entailment 3 likewise reflects our need for a larger sense of purpose. When we pursue a higher-level goal that can
only be reached through a series of small-scale actions, we imbue those actions with a meaning beyond their immediate fulfillment. From the taking of a single step, to the execution of a series of steps from one location to another, to the completion of an entire journey involving departure and return, each completed motion takes on meaning in relation to the whole.

Entailment 4 distinguishes between the goal of motion and its endpoint, while entailment 5 makes a similar distinction between the path for motion and its trajectory. Both goal and pathway must be conceptualized before goal-directed motion can take place. Yet, motion directed toward a goal may not reach its goal, or may diverge from the pathway leading to it. As entailment 6 suggests, other forces may prevent motion from following its expected course. This may result in the repetition of action, an increase in the force of propulsion, or the search for an alternative pathway, as suggested by entailment 7.

Entailment 8 reflects the way we experience speed and tension as they play a part in our own goal-directed actions. As we approach an unstable goal, we tend to move toward it with increased speed, tension, and anticipation. Upon reaching the goal, we tend immediately to seek its opposite—stability, relaxation, and the slowing and/or stopping of motion. Thus, each completed motion corresponds to a completed cycle of tension and relaxation.

The correspondence between completed motions and cycles of tension and relaxation allows for the superimposition of the SOURCE-PATH-GOAL schema onto the CYCLE schema. A single completed motion is represented in Figure 9a, a series of completed motions in Figure 9b. In this superimposition, stable and unstable goals map onto troughs and peaks, respectively, while beginnings and ends of motion map onto beginnings and ends of cycles.

![Figure 9. Superimposition of SOURCE-PATH-GOAL and CYCLE schemas](image-url)
3. Music-Metaphorical Schemas

3.1 Melody. Among the conventions for tonal melody that can be represented image-schematically are the following:

(1) Melody moves primarily by diatonic step, secondarily by chromatic step or arpeggiation.
(2) An unstable melodic pitch normally resolves downward and/or to its nearest stable neighbor.
(3) Melody normally comes to a point of final rest on the tonic.

Evidence of the embodied origins of these conventions is to be found in the language used to describe them. The description of melody as moving by step clearly reflects the bodily experience of walking. Interpreted according to the SOURCE-PATH-GOAL schema, it suggests a step-by-step progression along a pathway leading to a goal. Just such an image is brought to mind by Schenker’s description of the fundamental line: “Since it is a melodic succession of definite steps 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.” (Schenker, [1935] 1979, 4)

The schema in Figure 10 makes explicit the cross-domain mapping that underlies the metaphor of goal-directed motion, allowing us to observe specific points of correspondence between musical and image-schematic structure. It represents the diatonic scale as a pathway through melodic space ascending from 1 to 8, with the chromatic scale and the arpeggiated tonic triad appearing as alternative pathways. The pitches of the tonic triad appear as stable pillars, showing that they are likely resting points for melodic motion. Differences in the width of these pillars represent differences in stability, the widest pillar being occupied by 1, followed by 8, 5, and then 3. Solid and dotted horizontal lines convey differing degrees of stability as well, with diatonic pitches shown to be more stable than chromatic ones.

That the tones occupying stable pillars are ranked in the order in which they appear in the overtone series suggests that it is in relation to the overtone series that their stability is understood. Figure 11 provides an embodied explanation. Its mapping of the overtone series onto the VERTICALITY schema portrays the fundamental as metaphorical “ground,” the lowest, most stable location within the musical space of a single tone. By extension, harmonic root and tonic pitch can be interpreted as “ground” tones within triadic space and key space, respectively. Since the VERTICALITY schema correlates stability with vertical height, the relative stability of the other tones of the tonic triad can be correlated with their height above this metaphorical ground.
As a consequence of our interpreting melodic tones as having differing degrees of stability, we experience them as acted upon by forces. We feel these forces to act most strongly on the unstable tones of a melody, pulling them upward or downward to the closest stable tones. Rudolf Arnheim (1984) points out that the sensation of forces plays an analogous role in our experience of visual art. According to Arnheim, in viewing art, we experience visual objects as if they were governed by forces of attraction and repulsion. The most pervasive of these forces he likens to the force of gravity, which causes us to experience all visual objects as if they were pulled downward. More localized forces are felt to be exerted by the individual objects themselves, which we experience as pulled toward or repelled by other objects. Overall, the individual objects seem to strive toward locations that would allow these forces to come into balance.

In a similar way, Arnheim proposes, we experience musical tones as subject to both a constant downward pull of gravity, which acts with equal strength at all locations, and a more variable force of attraction exerted by the tonic. He suggests that these two pulling forces act to reinforce or oppose one another, the downward force of gravity lessening the upward pull to 8 in the motion from 7 to 8, while strengthening the downward pull to 1 in the motion from 2 to 1.

Steve Larson (1993) has elaborated upon Arnheim’s theory of melodic forces, invoking a third force of inertia, which he defines as the tendency for melodic motion to continue in the same direction. He attributes the force of tonal attraction not to the tonic pitch alone, but to each member of the tonic triad, each of which he describes as exerting a pull on the
unstable pitches on either side. He explains that just as the attractive force of a physical magnet increases with proximity, so does the pull exerted by stable tones on their unstable neighbors. As a result, we experience this force as strong or weak, depending upon whether the tones are separated by half step or whole step. Thus, we experience a strong pull from 7 to 1 and 4 to 3, but only a weak pull from 2 to 1 and 6 to 5.

The melodic forces of inertia and gravity that Larson describes appear to be the result of the metaphorical projection of our bodily experience of these forces in the physical world. That we experience the pull of the tonic with similar vividness suggests that this force also has embodied origins. In The Body in the Mind, Johnson accounts for the interplay of visual forces described by Arnheim—the experience of objects being attracted or repelled by one another—in terms of the workings of the Balance schema. I propose that the Balance schema similarly underlies our experience of the pull of the tonic.14

We have already observed that mapping the overtone series onto the Verticality schema yields the metaphorical concept of tonic as ground. Yet another image-schematic mapping, that of Nested Containers, appears to underlie our understanding of tonic as center. Based upon experimental data on the perceived relatedness of tones, Krumhansl (1979) has proposed a three-tiered hierarchical arrangement of triadic, diatonic, and chromatic pitches, which she represents in the form of a three-dimensional cone. Figure 12 shows how this arrangement of pitches can be represented image-schematically as a set of nested containers. The pitches of the tonic triad constitute the core, the remaining diatonic pitches the

![Figure 11. OVERTONE-VERTICALITY schema](image-url)
middle layer, and the chromatic pitches the outermost layer. This schema combines the nested container schema with center-periphery and balance schemas to represent the pitches of the central tonic triad as maximally stable, and the remaining diatonic and chromatic pitches as progressively more unstable as a result of their increasing displacement from the center.

Note that the schema in Figure 12 attributes centricity to the tonic triad as a whole. In this schema, the pitches of the tonic triad join together to form a central axis, the most stable location within the horizontal dimension. Yet the pitches of the tonic triad, being of different height, occupy different positions along the central, vertical axis. Thus, the balance schema applies both horizontally (i.e., to horizontal displacement from the central axis) and vertically (i.e., to vertical displacement from stable locations along the central axis). As a result, unstable tones seem to gravitate toward the stable tones that are closest in height, each one acted upon most strongly by the stable tones immediately above and below. These two stable tones exert opposing, but unequal forces that—when combined with the force of gravity—determine the overall strength and direction of the pull toward one tone or the other.

Figure 13 provides a physical analogy, showing the change in the balance of forces acting upon a block rotating from a lower to an upper position along an inclined plane. Like a tonal melody moving through the space of an octave, the block can occupy four different stable positions, one for each side of the block. As the block rotates from one stable position to the next, at first the unequal forces acting on either side sum to a force that strongly favors motion back to the lower position (point b). Once the block has rotated half way (point c), the force on the left still slightly outweighs that on the right, reflecting the overall downward pull of gravity, thus favoring motion once again to the lower position. Continued rotation of the block eventually results in a change in the overall direction of the pull (point d), so that the sum of the forces now favors

![Figure 12. NESTED CONTAINER/CENTER-PERIPHERY schema](image-url)
rotation to the higher position. In a similar way, an unstable pitch that is closer to its lower stable neighbor (i.e., 4), is felt to be pulled strongly downward, an unstable pitch that is equidistant from its two stable neighbors (i.e., 2) is felt to be pulled weakly downward, while one that is closer to its upper neighbor (i.e., 7), is felt to be pulled strongly upward. This distribution of strong and weak forces of attraction is shown in Figure 10.

Figure 14 reveals a slightly different distribution of melodic forces for the minor mode. Within the lower tetrachord, we might expect the lowering of 3 to b3 in minor to result in a weakening of the pull from 4 to 3 and a change in the direction of pull for 2. Yet 4 and 2 resolve in minor as they do in major, suggesting that the overtone-verticality schema, with its implied major triad, overrides the schema for the minor mode in determining the strength and direction of the pull of the tonic. In the upper tetrachord, on the other hand, the lowering of 6 to b6 results in a much stronger downward pull to 5. Of the unstable tones of the scale—2, 4, 6, and 7—only 6 changes its location in the shift from major to minor mode. This may explain why b6, much more than b3, has been exploited—especially by Romantic composers—as an expressive marker of the minor mode. In harmonic minor, the downward pull from b6 to 5 is intensified by the opening of a gap between b6 and #7, which impedes continued melodic ascent. It is here that we find the motivation for raising both 6 and 7 in the ascending melodic minor scale, and for reverting to the lowered scale degrees in the descending form. In melodic minor, forces of inertia and tonal attraction work together to allow both ascending and descending motion to follow the path of least resistance.

Differences in the experience of ascending and descending motion in major and minor modes appear to underlie differences in their affective associations as well. As far back as the Renaissance, major mode has been associated with happiness and minor mode with sadness (Zarlino 1558). Arnheim (1984) offers a bodily explanation for these feelings,
attributing the feeling of “vigor” associated with the major mode to the ease with which melodic motion seems to ascend within the major scale, and conversely the feeling of sadness associated with minor to the apparent effortfulness of the ascent in minor. Arnheim argues that rising motion is facilitated in the major mode by the placement of half steps and whole steps within the scale. Within each tetrachord, the “vigorous” motion of the first two whole steps is followed by an easier half-step ascent at the end, the repetition of this pattern of intervals within the space of an octave causing us to hear the motion from 3 to 4 as parallel to that of 7 to 8. In the minor mode, on the other hand, the lowering of scale degree 3 makes traversal of the lower tetrachord more difficult by robbing us both of the vigor of the motion from 2 to 3 and the feeling of resolution in moving from 3 to 4. The lowering of scale degree 6 makes ascent within the upper tetrachord even more difficult, with the ascent from 5 to 6 hindered by the strong pull from 6 back to 5 and the ascent from 6 to 7 by the widening of the gap between them.

Figures 10 and 14 provide a “snapshot” view of the distribution of melodic forces for major and minor scales, implying that the center of tonal gravity remains fixed. Yet just as we continually shift the body’s center of gravity so as to maintain stability while in motion, we realign our harmonic center of gravity over the course of a musical work in order to maintain our sense of stability with respect to harmony and key. Reflecting the nested structure of the tonal hierarchy, we interpret the root, third, and fifth of the sounding harmony as most stable at a lower level while interpreting the first, third, and fifth degrees of the key as more stable at a higher level. As a result, we experience the forces of tonal attraction as fluctuating over the course of a work according to local conditions of harmony and key.

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Our experience of pitches an octave apart as not merely closely related, but in some sense identical, gives rise to yet another mapping of melodic space, this time onto the cycle schema. In Figure 15, the major scale is represented as a circular path along which motion leads first away from the tonic and then back to its starting pitch. Thus, the path that is represented as continuously ascending in Figure 10 is represented as doubling back upon itself in Figure 15.

This experience of pitches an octave apart as both same and different allows for a perceptual paradox. On the one hand, we can interpret a scale as a vertical path extending infinitely upward and downward. On the other, we can interpret it as a closed circle traversing the space of a single octave. It is this property of musical pitch space—that we experience it as both “open” and “closed”—that Douglas Hofstadter (1979) brings to our attention as an example of the phenomenon he calls “Strange Loops.” He points out how this property was exploited by J. S. Bach to create a seemingly infinite ascending sequence in The Musical Offering, which he likens to the endlessly rising staircases of M. C. Escher. Shepard (1964) brings this paradox even more vividly to our attention through his computer-generated “Shepard’s tones,” which continuously ascend while remaining within the space of an octave, much as the bands on a barbershop pole spiral ever upward while the pole itself remains in place.

Differences in the way we interpret harmonic versus melodic distance give rise to a similar paradox. Comparison of Figures 10 and 12 reveals that the distance between pitches—our experience of “nearness” and “farness”—differs for each schema. In Figure 10, closeness is correlated with pitches that are close in frequency. Thus, C and Db are close together, and C and G are far apart. In Figure 15, on the other hand, closeness is correlated with the closeness of the harmonic relationship between pitches. In this space, C and G are close together, while C and Db are far apart. Highly chromatic music tends to exploit this property of “near-yet-far,” using chromatic voice leading to move easily, yet seemingly mysteriously, to distant regions of harmonic space.

Figure 15. Circular melodic path
3.2. Harmony. Tonal harmony appears to be structured by the same image schemas as tonal melody, with a similar set of mappings. That we describe harmony in terms of *progression* suggests that the ordering of harmony, like that of melodic tones, is governed by the SOURCE-PATH-GOAL schema. On the one hand, tonal harmony provides support for the tones of the melody, its “pillars” making motion along an underlying melodic pathway seem secure; on the other, it traces its own course through tonal space toward its own goals.

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. According to Schenker, in the progression I-V-I, “arpeggiation of the bass signifies movement toward a specific goal, the upper fifth, and the completion of the course with the return to the fundamental tone” (Schenker 1935, 2). Schenker’s derivation of the I-V-I progression from the overtone series—the “chord of nature”—brings into play the VERTICALITY schema, with its mapping of tonic as ground. As a result, the progression I-V-I evokes the experience not only of departure and return, but also of rise and fall, tension and relaxation. Figure 16 shows how Schenker’s interpretation of the fundamental structure can be represented image-schematically as a single goal-directed motion from $\hat{3}$ to $\hat{1}$ in the upper voice accompanied by two goal-directed motions—from $\hat{1}$ to $\hat{5}$ and back to $\hat{1}$—in the bass.

Completion of the I-V-I progression brings into play the CYCLE schema, and with it implications of closure and containment. By itself, the I-V-I progression represents a completed cycle of departure and return, tension and relaxation. Yet the opposition between tonic and dominant also lends itself to continued oscillation, producing the wave form of the CYCLE schema with its familiar peaks and troughs, as shown in Fig-

![Figure 16. Image-schematic representation of Schenker’s fundamental structure](image-url)
Oscillation between I and V can provide an impulse for continuous motion like that of a bouncing ball or an oscillating spring. Dance movements, in particular, often make use of the oscillation between I and V to feed continuous motion in the foreground while avoiding the implication of larger arcs of motion in the background.

The I-V-I cycle may be expanded to bring into its compass other diatonic harmonies, as shown in Figure 18. This figure offers an imageschematic view of harmonic conventions of the common-practice period, representing the most commonly traveled harmonic pathways for both major and minor. It shows the I-V-I cycle nested within a series of expanded cycles, each of which represents a longer path through harmonic space beginning and ending at I. The longest path for harmonic motion can be interpreted as the backwards extension of the path from V to I to form a completed diatonic circle of fifths, along which harmonic motion progresses indefinitely by falling fifth (as indicated by the rightward arrows), suggesting once again the influence of a metaphorical force of gravity. Just as continuous melodic descent along a diatonic path brings us back to our starting pitch after seven steps, harmonic descent along the diatonic circle of fifths brings us back to where we began after a sequence of seven fifths.

The asymmetrical arrangement of chords within the schema of Figure 18, with its proliferation of chords and arrows on the right-hand side, suggests that we experience harmonic motion as if it were carried out under the influence of the centripetal force of the tonic. The schema shows IV and vii appearing twice—at the beginning of a cycle of fifths and above ii and V, respectively—suggesting that we interpret these chords as the intersection of two harmonic pathways. Although IV and
vii can function as the first steps within a descending fifth progression, more often than not they substitute for ii and V, respectively, providing a shorter route back to I. Alternatively, they may function as intermediate steps within an interwoven circle of thirds, as indicated by the downward arrows from IV to ii and vii to V. Figure 18 also shows IV leading directly to I as part of a I-IV-I cycle that inverts, and thus counterbalances, the rise and fall of I-V-I. Other alternative paths—shown by arrows leading from iii to IV, vi to V, and V to vi—can be interpreted as resulting from one chord substituting for another of similar pitch content; that is, iii substitutes for I and vi for IV or I. In most cases, similarity of pitch content translates into similarity of meaning, an important exception being the deceptive cadence. For we interpret motion from V to vi not as an alternative pathway to I, but as the deflection of harmonic motion precisely at the point of expected arrival at the tonic.

The harmonic space of Figure 18 may be further expanded by substituting chromatically altered chords (secondary dominants, augmented sixths, modal mixture, and Neapolitan sixths) for their diatonic equivalents. The raising and/or lowering of individual tones within altered chords does not so much change the expected course of harmonic motion as heighten the effect of the melodic forces that contribute to musical expressiveness. In particular, secondary dominants and augmented sixth chords tend to heighten our experience of goal-directed motion by creating temporary leading tones that strengthen the feeling of pull toward the next chord. By contrast, the chromatic alterations that give rise to modal mixture and the Neapolitan sixth are experienced primarily as a change in affect. Modal mixture highlights the contrasting affective qualities of major and minor by juxtaposing them, the effect being much like that of chiaroscuro—the juxtaposition of dark and light areas in visual art. The Neapolitan sixth takes on its own special affective character through the lowering of 2 to form a major triad in place of one that would otherwise be diminished. It connotes the positive affect of major in a context in which the chord itself—built upon a root outside the key—is tonally unstable. Perhaps reflecting this, nineteenth-century composers often used the Neapolitan to portray transient or illusory states of happiness.18

Figure 19a begins by representing the diatonic collection as a circular pathway through “fifth space,” reflecting our intuition that tones a fifth

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Figure 19. Circular pathways in "fifth space"

apart are in some sense adjacent; that is, maximally close.\textsuperscript{19} In Figures 19a and b, we see how image-schematic logic plays a role in modifying the sounds given to us by nature. A series of pure fifths never doubles back upon itself to form a perfect circle but rather extends infinitely upward and downward. That is, motion by pure fifth never returns to its starting position within the chroma circle. However, a nearly perfect circle can be constructed out of a seven-note series by joining top and bottom pitches, B and F, to form a diminished fifth. This diatonic circle can then be expanded outward to the next point of near-perfection by extending the series from seven notes to twelve. Whereas a diatonic series of fifths can be represented image-schematically as a closed circle by accepting the presence of a single diminished fifth, in the case of the chromatic circle, closure is attained by tempering each fifth to bring F\# into alignment with G\#b, thus spreading the imperfection out over the entire cycle.\textsuperscript{20}

These two paths through fifth space are superimposed in Figure 20, highlighting an important correlation between CONTAINER and PATH schemas. When we project the diatonic collection onto the chromatic circle, the diatonic collection appears not only as a segment of a longer path, but as a container enclosing seven pitches of the circle. This divides chromatic space into two regions, diatonic pitches appearing "inside" and chromatic pitches "outside" the container. Through a mapping of the MOVING CONTAINER schema, we can then interpret modulation as motion of the diatonic container along the chromatic circle of fifths. Accordingly, the distance between two keys corresponds to the distance the container must move around the circle of fifths—either clockwise or counterclockwise, “upward” or “downward”—to get from one key space to the other.
It is here that we find an embodied explanation for the tendency to interpret modulation toward the sharp side of the circle of fifths as tensing and toward the flat side as relaxing, for these are the very sensations that we associate with the upward and downward motions of the human body. This interpretation of the sharp vs. flat dichotomy has a history nearly as long as that of major as happy and minor as sad. Theorists and composers of the eighteenth and nineteenth centuries described modulation to the sharp side as “tensing,” “strengthening,” or “hardening,” and modulation to the flat side as “relaxing,” “softening,” or “weakening.” Such terms were used to describe not only modulation, but the characteristics of sharp and flat keys themselves in relation to C major (Steblin 1981). In some cases, these attributions took the form of conventional associations of particular keys with particular settings; for example, F major became known as the “pastoral” key. Since F major is reached by moving down one step from the “natural” key of C major, suggesting relaxation, it may have seemed particularly well suited to portray the simplicity of nature and the relaxed character of rural life.

The paradox of “same-yet-different” comes into play once again in our experience of modulation, since continuous upward (“tensing”) motion or downward (“relaxing”) motion along the circle of fifths eventually doubles back on itself; movement by six sharps bringing us to the same place as movement by six flats. Yet Beethoven (and others) claimed to have had no difficulty distinguishing the “hardness” of the key of C# major from the “softness” of Db major (Steblin 1981). That enharmonically equivalent sharp and flat keys can be experienced as having different characters suggests that the distinction is made on the basis of whether one understands the key to have been reached through motion upward or downward from C major.

Figure 21 represents the outward expansion of fifth space to “triadic” space, constructed by adding to each fifth a major third, thus capturing our intuition that these three tones are maximally close, reflecting their

![Figure 20. Schema for modulation](image_url)
adjacency within the overtone series. The added major thirds join together to form a second circle of fifths, interlocked with the first as part of a chain of alternating major and minor thirds. Once again, we see how the impulse for containment and closure serves to shape the musical material provided by nature. Pure thirds, in exact imitation of nature, would produce a set of tones that are close to, but not identical with, those of the first circle of fifths, resulting in a potentially infinite outward expansion of pitch space. In order to achieve closure in triadic space, the thirds must be tempered—as were the fifths in chromatic fifth space—so as to bring the tones of the second circle into correspondence with the tones of the first.

Triadic space, like fifth space, brings into play *nested container* and *path* schemas, as shown in Figure 22. Figure 22 represents each triad not only as a set of three adjacent tones, but also as a container nested within the successively larger containers of the diatonic and chromatic pitch collections. Furthermore, just as any two adjacent tones of the inner circle of fifths may join with the intervening tone in the outer circle to form a major triad, any two adjacent tones of the outer circle may join with an intervening tone of the inner circle to form a minor triad. Thus, the minor triad, despite its absence from the overtone series, assumes a prominence equal to that of the major triad in triadic space.

Figure 22 also shows how the *nested container* schema combines with the *center-periphery* schema to represent the tonic triad as center. As Figure 22 shows, the tonic triad occupies the central, most stable position within diatonic key space, being balanced by overlapping IV and V chords arranged symmetrically on either side. This helps to explain why the I-V-I cycle so often expands to I-IV-V-I, the latter being the result of joining together the ends of the diatonic segment of triadic space to form a circle (thus reversing the process of expansion carried out in fifth space). The I-IV-V-I cycle can be represented in wave form by plac-
ing IV at the lowest point, V at the highest, and I at the midpoint of the wave, as shown in Figure 23. This schema represents tension and relaxation as a function of displacement—not from tonic as ground—but from tonic as center. Thus, the I-IV-V-I cycle emphasizes the opposition between dominant and subdominant, with the tonic triad appearing at the point where opposing forces come into balance.

Figure 22 represents in more concrete form the harmonic pathways shown in Figure 18. Harmonic progression can be interpreted image-schematically as motion of the triadic container along one of three alternative paths: the inner circle of fifths, the outer circle of fifths, or the interwoven circle of thirds. Harmonic distance thus corresponds to the distance traveled around the circle in moving from one chord to another. Modulation can be represented similarly as motion of the key container along one of these three pathways, in this way introducing an additional degree of freedom for change of key. Whereas in fifth space, C major and a minor occupy the same space, in triadic space, they occupy distinct, but overlapping spaces. That is, modulation from C major to a minor appears as motion of the diatonic container along the circle of thirds by a single step in the counterclockwise direction, as shown in Figure 24. This causes D, the “highest” note within the space of C major, to reappear as
the “lowest” note within the space of a minor. It also causes the main axis containing the structural fifths of the key (tonic, dominant, and subdominant) to shift from the inner to the outer circle, these now being filled in not by major thirds, but by minor ones. Thus, key space undergoes a kind of inversion, reflecting the flipping of all of the triads across the central axis, so that the triads that were major before are now minor, and vice-versa.

Figure 25 shows the further expansion of triadic space to major-minor space, formed through the addition of a third circle of fifths inside the first to form two interlocking chains of thirds. This schema allows us to represent parallel major and minor as overlapping containers, which in turn can combine to form the expanded space of modal mixture. Figure 25 shows that the move from major to parallel minor does not involve motion along any of the three pathways, but rather the “flipping” of diatonic space across the central axis, capturing our intuition that parallel keys lie side by side.22
The shift from major to parallel minor preserves the structural fifths of the key, thus heightening our perceptual awareness of the lowered thirds. This throws into relief the affective properties of the change of mode, which combines the characteristics of the move from major to minor—from happy to sad—with that of softening associated with the adding of flats. In this case, the effect of softening is due not to downward motion of the key container, but to the lowering of 3, 6, and 7 in melodic space. That a shift either to the minor mode or to the flat side of the circle of fifths is accompanied by downward motion—whether in harmonic or melodic space—may help to explain why eighteenth- and nineteenth-century theorists attributed many of the same qualities to minor and flat keys, and likewise to major and sharp keys, with minor keys having multiple flats thought to be particularly sad and languid, and major keys with multiple sharps thought to be particularly cheerful and lively (Steblin 1981).

The schemas that underlie our interpretation of harmony as stable or unstable appear to be the same as for melodic tones, namely, the OVERTONE-VERTICALITY and NESTED CONTAINER/CENTER-PERIPHERY schemas. It is the latter schema that appears to govern our perception of harmonic stability in relation to a tonic. This is conveyed most clearly by Figure 26, which lays out the circular space of Figure 22 in horizontal fashion, with the chain of interlocked triads continuing indefinitely in either direction. Like the melodic schema of Figure 12, it represents the tonic triad as a container nested at the center of diatonic space, itself nested within chromatic space. It represents both tonic triad and key as centrally located and thus maximally stable, and other harmonies and keys as increasingly unstable the greater their displacement from the tonal center.

The schema of Figure 26 relates to that of Figure 22 much as our embodied experience of the earth’s surface relates to reality; that is, we experience the earth’s surface as flat because its curvature is hidden from us. In a similar way, the curvature of triadic space remains unnoticed, allowing us to interpret the continuous chain of interlocked triads as the “horizontal” dimension of harmonic space, in contrast to the “vertical” dimension that dictates the arrangement of pitches within individual chords. Like the surface of the earth, triadic space lacks a fixed center, the symmetrical arrangement of tones in triadic space giving no inherent priority to any particular pitch, triad, or key over any other. Only with the establishment of the key of a musical work do the hierarchical relations of the NESTED CONTAINER/CENTER-PERIPHERY schema become a perceptual reality.

While our perception of harmonic stability in relation to a tonal center appears to be governed by the NESTED CONTAINER/CENTER-PERIPHERY schema, our perception of the stability of individual chords appears...
to be governed by the OVERTONE-VERTICALITY schema. That is, the overtone series serves as a prototype against which we measure the stability of each vertical sonority. Since the overtone series represents the most stable harmonic configuration of pitches, the more closely the arrangement of pitches corresponds to the overtone series, the more stable the sonority will seem to be. Thus, in tonal music, the preference for chords with the root in the bass at beginnings and endings of arcs of tonal motion, and especially the preference shown for a spacing that comes close to duplicating that of the overtone series—i.e., root, octave, fifth and third—appears to be not just a matter of preference for good sonority, but a reflection of the psychological desire for maximum stability at points of musical repose. Likewise, the preference for ending works in the minor mode in the parallel major or with a Picardy third can be taken to reflect the closer correspondence of the major mode to the OVERTONE-VERTICALITY schema, causing us to experience major as more stable than minor.

We have distinguished here between the “horizontal” and “vertical” dimensions of harmonic stability on the grounds that the former is governed by the NESTED CONTAINER/CENTER-PERIPHERY schema and the latter by the OVERTONE-VERTICALITY schema. Yet from an experiential standpoint, the two dimensions are not entirely separable. As we have already noted, mapping tonic as ground supports our interpretation of the bass of I-V-I as ascending from the ground and then returning to it, thus contributing to our sense of the stability of the tonic. If instead of returning to tonic, harmonic motion continues in the same direction along the circle of fifths, ascent will also appear to continue, with the root of each successive chord seeming to move to its upper fifth. The result is the paradoxical sensation of motion ascending continuously along a closed pathway, once again bringing to mind the endless staircases of M. C. Escher.

3.3. Phrase Structure. Figure 27 shows how the phrase structure of a musical work maps onto a combination of CYCLE and SOURCE-PATH-GOAL schemas, showing how the phrases of a musical work can be under-
stood as a series of goal-directed motions, with smaller arcs of motion nested within larger ones. It captures the way that harmony, melody, and rhythm work together to articulate a series of completed motions within an overall progression of departure and return. In its depiction of a specific number of phrases and relatively specific tonal plan, it constitutes more of a prototype than a schema, illustrating how the conventions of phrase structure might be realized in a typical work or section.

The rise and fall of each arc of motion reflects the normative shape of the melodic line—the way that melody tends to rise and fall over the span of a phrase. Underlying this interpretation is the VERTICALITY schema and the implication that motion is carried out under the influence of gravity. We naturally interpret rising lines as requiring an output of energy and tension in order to overcome the force of gravity, and falling lines as giving into it. It is in the domain of melody that the mapping is most clearly iconic, since the rise and fall of each arc of motion corresponds to the actual trajectory of the melodic line.

Horizontal arrows represent completed arcs of harmonic motion, each supporting a completed arc of motion in the melody. The overall trajectory of harmonic motion shows the expected cycling of harmony away from the tonic and expansion of the tonic-dominant cycle. Thus, the initial arc of harmonic motion—leading from I to V and back to I—undergoes expansion over the next three phrases, revealing a general tendency toward motion leading away from tonic to a point of greatest tonal distance followed by motion of return.

Each phrase is represented as having two distinct goals: the climax of the phrase—the turning point between tension and relaxation, and the cadence—the maximally stable event at the end of the phrase. The climax is nearer the end than the beginning of each phrase, reflecting a pattern of tension and relaxation familiar to us from everyday experience.²⁴
The rise and fall of each wave reflects a general correlation among five pairs of oppositions: speeding vs. slowing, tensing vs. relaxing, rising vs. falling, unstable vs. stable, and departure vs. return. We have already observed correlations among the last four of these in mappings of harmony and melody onto the overtone-verticality and nested container/center-periphery schemas. In laying out the music along a temporal axis, we can see how rhythm also contributes to our experience of music as goal-directed motion through our mapping of changes in duration onto motion starting and stopping, speeding and slowing.

Rhythm makes the metaphor of goal-directed motion particularly vivid, for musical rhythms map not just metaphorically, but literally, onto the sounds of bodily motion, in particular the sound of our own footsteps in walking or running. It is primarily rhythm that tells us where each arc of motion begins and ends. The rise and fall of each arc of motion in Figure 27 reflects this, showing the tendency for musical motion to accelerate leading up to a climax, followed by deceleration and the eventual stopping of motion with the arrival at a stable goal.

The slurs underneath the harmony show that phrase rhythm tends to be both regular and binary, at its most regular forming hierarchies of 2-, 4-, 8-, and 16-bar units. Such rhythmic regularity clearly reflects the workings of the cycle schema. At many levels of temporal experience, human activity tends to organize itself into cycles. From low-level patterns of walking and breathing to higher-level patterns of waking and sleeping, working and resting, we use these cycles to locate ourselves within the flow of time, anticipating the timing of upcoming events through the regularity and predictability of the cycles that they help to define. In a similar way, we attune to the periodicities of tonal music to anticipate upcoming events within a musical work. Tonal music reflects the regularity of the rhythms of everyday life while emphasizing the synchronization among simultaneously unfolding events, yielding a multi-leveled rhythmic hierarchy that is regular, yet flexible. At the phrase level, this regularity allows us to anticipate where arcs of motion will end, thus to hear phrase expansion as a delay in the expected arrival at a tonal goal.

Together, the music-metaphorical schemas of Figures 10 through 27 show that the bodily metaphors that underlie tonal convention are both complex and systematic. They show that the basic metaphor of goal-directed motion is supported by mappings of tonic as center and ground, triads and keys as nested containers, scales and arpeggios as pathways for melodic motion, circles of fifths and thirds as pathways for harmonic motion, and tonal motion as subject to forces of gravity, inertia, and tonal attraction. These basic-level metaphors may undergo extensive elaboration in the context of a musical work organized according to narrative principles. The music-as-narrative metaphor, which portrays the events of a musical work as a coherent series of actions, supports many higher-
level conventions of tonal music, including those of form. As the follow-
ning section will show, many of these conventions can be captured in the
form of schemas for musical plot structure.

4. Music as Narrative

According to Ivan Todorov, an ideal narrative begins in a stable state,
progresses toward disequilibrium, then reaches a new state of equilib-
rium by the end.25 The general outlines of such a narrative structure can
be seen in the rising and falling contours of Figure 27. If Figure 27 por-
trays the overall shape of a musical narrative, then the music-metaphori-
cal schemas of Figures 10 through 26 provide us with more detailed
information about its possible content. Figure 28 illustrates some of the
ways that the three most important features of these schemas—contain-
ers, pathways and goals—can play more specific roles in the elaboration
of musical plot.26

Figure 28a suggests that a musical container, at its simplest, functions
metaphorically as a container for motion. Among the musical elements
that can serve as metaphorical containers are an interval, a chord, a key,
and a registral span. One of the most vivid means of evoking containment
is through the use of a stable interval as a container for the motion of the
melodic line. In particular, the octave—the outside interval of the chroma
circle—combines the properties of stability and closure that we associ-
ate with physical containers. Many simple melodies remain entirely or
mostly within the span of an octave, either from 1 to 8 or 5 to 5, suggest-
ing a mapping of OCTAVE-AS-CONTAINER combined with either TONIC-
AS-GROUND or TONIC-AS-CENTER. These two mappings are portrayed
image-schematically in Figure 29.

Some musical containers, once established, may expand and contract,
as shown in Figure 28b, giving rise to feelings of tension and relaxation.
We have already seen that the schema for an expanding container under-
lies the gradual expansion of the I-V-I cycle over the course of a musical
work. It is also reflected in the expansion of key space to include chro-
matically altered chords. Figure 30 offers an image-schematic interpre-
tation of the expansion of diatonic key space to incorporate modal mix-
ture, augmented sixth chords, the Neapolitan, and the two most common
secondary dominants, V/IV and V/V. The expanding container schema
may also come into play in our experience of melodic containment. A
melody may remain within the bounds of an octave only to extend this
range upward by a single step at the climax. The feeling of tension that
results can be attributed both to the ascent and the force needed to over-
come the resistance of the upper boundary of the octave.

Perhaps the most visceral experience of expansion comes from the
registral expansion that results when the rise and fall of the melodic line

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Figure 28. Schemas for musical plot structure

is mirrored by contrary motion in the bass. From a bodily perspective, registral expansion and contraction map most naturally onto motion of the chest and lungs as we inhale and exhale. The lungs first expand, filling with air, as a result of the tensing of the muscles of the diaphragm, and then contract as a result of their relaxation. Roger Sessions (1950) once defined a musical phrase as “that portion of music that must be performed...figuratively in a single breath.” This suggests that we experi-
ence the expansion and contraction of registral boundaries in the typical phrase as mirroring the motion of the chest and lungs in respiration.

Figure 28c shows the schema for a container in motion, already familiar to us as a means of representing change of key. We have seen that modulation can be portrayed image-schematically as the motion of a key container along the circle of fifths. Figure 28d offers an alternative view of modulation—one that represents change of key as motion leaving one container and entering another, thus crossing a boundary between them. Whether we interpret change of key according to one schema or the other is likely to depend in part upon the relative smoothness or abruptness of the transition between keys, and whether the passage touches upon the intervening keys over the course of the movement from one key space to the other.27

The remaining schemas of Figure 28 reflect the engagement of higher levels of cognitive processing. To interpret music according to these schemas, one must not only be familiar with tonal convention, but also be able to bring both parts of the cognitive cycle—jumping and checking—
into play. In Figures 28e–g, features that appear in parentheses represent parts of a schema recalled from memory but not actually heard, corresponding to the listener's unfulfilled expectations. In order to experience melodic motion as departing from and returning to a pathway, as shown in Figure 28e, the completed pathway must first be constructed in imagination. To experience motion as blocked, as in Figure 28g, one must first imagine the goal toward which motion is directed.

Whereas Figures 28e and f show how meaning results from the divergence of a musical pattern from schemas for tonal convention, Figures 28g–j show how meaning results from the divergence of a pattern from earlier versions of itself. In Figures 28g–j, each schema features a series of repeated motions directed toward the same goal. These schemas reflect ways in which entailments 6 and 7 of the SOURCE-PATH-GOAL schema work in conjunction with one another to suggest the need for repeated action. Entailment 6 suggests that pursuit of a goal may be frustrated by forces that inhibit, deflect, or block motion, while entailment 7 suggests that these forces may be overcome by repeating the action, increasing the force of propulsion, or by seeking alternate pathways of motion. It is in Figures 28g–j that we see how intra-opus pattern repetition contributes to our experience of music as narrative.

Because in the case of intra-opus pattern matching, the pattern heard and the pattern recalled from memory are equally concrete, mappings can be relatively precise, allowing even subtle differences to take on significance. Mappings involving intra-opus patterns and tonal schemas often work together, the mapping of intra-opus patterns making overt those based on tonal convention. That is, they make it possible for us to hear literally what we would otherwise only imagine. In the final action represented in Figure 28g, continuation of motion confirms the existence of a pathway and goal that were previously only imagined. Likewise, in Figure 28i, the continuation of motion that previously ended at the boundary of the container allows us to understand the boundary of the container as having blocked earlier attempts at escape.

To see how intra-opus pattern matching and schemas for plot structure work together to give rise to musical narrative, it will be useful to examine a work in which these come fully into play. Schubert's “Du bist die Ruh” (Example 1) provides a useful illustration. In analyzing a work with text, we can consider how meaning emerges not only from the three forms of pattern matching already discussed, but also from the matching of the image-schematic structure of the music to that of the text. In music, as in poetry, different metaphorical mappings often work together to create a unified effect. Image schemas for containers, cycles, and pathways share structural features that allow them to be combined, each mapping onto different dimensions of a musical work at the same time. The various alignments among these mappings contribute to the music's meta-
phorical resonance, resulting in an intensification of meaning like that found in poetry. In a texted work, this effect is further heightened by the resonances established between music and text.

5. Analysis of Schubert’s “Du bist die Ruh”

Before examining the image-schematic structure of the music, it will be useful to consider that of the text. Figure 31 shows the text of “Du bist die Ruh” side by side with its translation. Words and concepts that have particular resonance with respect to the poem itself are underlined. The text, like the music, takes on meaning with respect to itself through the recurrence of certain sounds and images: “peace,” “longing,” “joy,” “pain,” “eyes,” “heart,” and “fullness.”

The poem is structured image-schematically by CONTAINER and SOURCE-PATH-GOAL schemas. The schema for goal-directed motion is evoked in connection with entering and filling two bodily containers, the eyes and the heart, two metaphorical dwelling places for the soul. The image of a filled container becomes increasingly vivid as the poem progresses, reaching a climax at the very end with the words, “O fill it full!”

The poem gains much of its emotional force from two pairs of expressive oppositions—peace versus longing and pain versus joy—providing an opportunity for the heightening of expression through their juxtaposition. At the beginning of the poem, the heart—metaphorically, the bodily container for emotion—is filled with joy and pain. The beloved is bid to enter the dwelling place of the heart through a door that opens and then closes, to drive out the pain and fill the heart with joy. The poem closes by juxtaposing two complementary positive images—the filling of the heart with joy and the filling of the eyes with radiance.

These are the metaphorical meanings of the poem for which we shall seek correspondences in the music. As the analysis will show, the images conveyed by the music do not form a one-to-one relation to those of the text, but rather complement them, elaborating upon and extending the metaphorical meanings of the text.

Figures 32 and 33 provide the main framework for the analysis of the song. They reveal generic-level metaphorical meanings that result from the song’s conformance to tonal convention, as well as the more specific meanings that result from deviations from convention and from intra-opus patterns established earlier.

Figure 32 shows how the music of “Du bist die Ruh” maps onto the schema for phrase structure. The upper part of the figure shows the precise trajectory of melodic motion and placement of stable and unstable goals within each phrase; phrase rhythm and arcs of harmonic motion are represented below. As the figure shows, the music divides clearly into
1) **Du bist die Ruh**,  
You are **rest**,  
Der **Friede mild**,  
Mild **peace**,  
Die **Sehnsucht du**,  
You are **longing**,  
Und was sie **stillt**,  
And that which **stills it**

2) **Ich weihe dir**  
I consecrate to you,  
**Voll Lust und Schmerz**,  
**Full of joy and pain**,  
**Zur Wohnung hier**  
As a **dwelling here**  
**Mein Aug' und Herz**  
My **eyes and heart**

3) **Kehr' ein bei mir**,  
Come enter in,  
Und schliesse du  
And close  
Still hinter dir  
The door quietly  
Die Pforten zu,  
Behind you.

4) **Treib' andern Schmerz**  
Drive other **pain**  
**Aus dieser Brust!**  
From this **breast!**  
**Voll sei dies Herz**  
May this **heart be filled**  
**Von deiner Lust.**  
With your **joy**

5) **Dies Augenzelt,**  
The tabernacle of these **eyes,**  
**Von deinem Glanz**  
By your **radiance**  
Allein erhellt,  
Alone is lit,  
**O füll' es ganz!**  
O fill it **full!**

Figure 31. Friedrich Rückert’s “Du bist die Ruh’”

three sections: a piano introduction, a first phrase group, to which are sung the first four stanzas, and a second phrase group, to which the fifth and final stanza is sung twice. For convenience, individual phrases are numbered one through seven. Notable departures from convention—those for which we shall seek metaphorical explanation—are marked by exclamation points.

As Figure 32 shows, the song exhibits many features of conventional phrase structure—the regular nested cycles of tension and relaxation, rise and fall, stability and instability, and departure and return. As we might expect, the song as a whole reaches both its climax and its melodic high point in its penultimate phrase. Most lower-level arcs of motion—sections, phrases, and subphrases—exhibit a similar pattern of tension-relaxation and melodic rise and fall. Yet two phrases depart in a notable way from the schema for melodic shape: in phrase one, the melodic peak occurs very close to the beginning; in phrase six, it occurs at the very end.

Arcs of harmonic motion and phrase rhythm largely conform to conventions governed by the cycle schema. Arcs of harmonic motion

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Du bist die Ruh, der Friede mild,
die Sehnsucht du, und was sie stillt. Ich weihe dir voll Lust und Schmerz zur Wohnung hier.
Example 1. (continued)
aus dieser Brust! voll sei dies Herz von deiner Lust, von deiner Lust.

Dies Augen-zelt, von deinem Glanz allein erhellt.
Example 1. (continued)
Figure 32. Phrase structure of Schubert’s “Du bist die Ruh’” (piano interludes and postlude omitted)

exhibit the progressive expansion of the I-V-I cycle, leading to and away from the tonic in ever-widening circles. Phrases one, two, and three return immediately to I, while phrase four cadences on V followed by a return to I at the end of phrase five. The point of greatest departure from tonic coincides—as we might expect—with the climactic sixth phrase, which cadences on IV after tonicizing bVI.

The phrase rhythm is for the most part regular and binary, showing a predominance of two- and four-bar units. Once again, the most notable departures from convention are to be found in the first and sixth phrases, which depart in strikingly similar ways. Each consists of a single uninterrupted arc of tonal motion seven measures long. These two phrases—which stand out by virtue of their length and melodic shape—relate to
one another as do the complementary images of eyes and heart; that is, through a combination of similarity and contrast. In the analysis that follows, we will discover other ways in which these two phrases complement one another, highlighting their special relationship to the song as a whole.

Figure 32 also shows how the melody takes on more specific metaphorical meaning through mappings of the CONTAINER FOR MOTION and EXPANDING CONTAINER schemas. In the piano introduction and first phrase group, the registral space occupied by the melody is framed by 1 and 8, the melody reaching up repeatedly to 8 yet never extending beyond it. The first part of the song thus establishes the octave as a container for melodic motion, with 8 as ceiling and 1 as floor, allowing us to hear the melodic ascent of phrase six as expanding this container.

Figure 33 shows how the varied repetition of intra-opus patterns—especially those of melody—contributes to our hearing of the song as narrative. As in most tonal works, patterns recur at many different levels, from individual motives to entire sections. Figure 33 focuses our attention on one level in particular; namely, that of the phrase. It is largely at the phrase level that the musical plot structure of “Du bist die Ruh” unfolds.

While the narrative structure of “Du bist die Ruh” is largely articulated through the varied repetition of phrase-level patterns, motivic recurrence also contributes to our sense of an unfolding narrative; in particular, the recurrence of the suspension/appoggiatura figure that first appears in measure 3. Figure 33 shows all statements of this motive, allowing us to see how the motive takes on meaning in relation to the whole.

In Figure 33, the music has been reduced to an outer-voice framework that focuses attention on tonal motion just beneath the surface. The reduction reveals three different levels of melodic motion. At the surface, appearing as small, unstemmed notes, are the suspension-appoggiatura figures. At the first level of reduction, appearing as stemmed notes, is what I will refer to as the underlying melodic line, a reduction of the melody to one note per harmony. It is largely the motion of the underlying melodic line that gives rise to our experience of an unfolding narrative. Within this line, the reduction distinguishes between motion following a pathway and motion departing from a pathway using beamed half notes and quarter notes, respectively. Harmonic motion is differentiated in a similar way using half notes and quarter notes in the bass.

In Figure 33, different statements of the same pattern are vertically aligned, making it easier to observe similarities and differences in successive statements of each pattern. Aside from the piano interludes and postlude, all of the music of “Du bist die Ruh” can be assigned to one or the other of the two paradigmatic axes shown. Axis 1 traces the evolution of a pattern of melodic ascent from 5 to 8, while axis 2 traces the evolu-
Figure 33. Paradigmatic analysis of “Du bist die Ruh’”
tion of a pattern of melodic descent from 6 to 1. The piano introduction combines the initial rise of axis 1 with the fall of axis 2, thus introducing the two “plot lines” to be developed over the course of the song.

We are now in a position to examine “Du bist die Ruh” from the standpoint of how each phrase contributes to the meaning of the song as a whole. Once again, exclamation points are used to indicate significant deviations from pre-existent patterns, whether patterns of tonal convention or intra-opus patterns heard earlier in the work.

The piano introduction does much to establish the mood of the song’s title, conveying restfulness through its treatment of melody, harmony, key, rhythm, and texture. The underlying melodic line moves entirely by step, rising gently from 5 to 6 before descending to the tonic. This is set harmonically by a series of sixth chords, its parallel voice leading suggesting smoothness and fluidity of motion. The tonality of Eb major and the pure diatonicism contribute to its relaxed character, as do the slow tempo, the unchanging harmonic rhythm, and the repetitive rocking motion in the right hand. All musical forces—propulsive, inertial, gravitational, and attractive—appear to be at a minimum, allowing the melody to remain momentarily suspended at its modest peak before drifting slowly to a point of repose.

The only apparent disturbance in the serenity of the stepwise descent is the suspension figure that appears unadorned in measures 3, 4, and 5, then echoed in ornamental form in the obbligato voice that comes to the fore in measure 6. The suspension, one of the most conventional modes of expression in tonal music, can be interpreted metaphorically as the musical agent’s momentary resistance to the downward forces of gravity and tonal attraction. That the agent eventually yields to these downward forces may explain why the suspension has so often been described as a “sigh.” The pervasiveness of the suspension figure in phrase one overlays the sense of restfulness with its opposite, longing, conveying an amalgam of feelings that musically captures the words of the second line of the poem, “You are longing, and that which stills it.”

Phrase two maintains the restful character of the piano introduction while continuing its initial melodic ascent to a new point of repose on 8. It is in this phrase that we hear the first melodic and harmonic departure from tonal convention. Melodic motion skips upward to Eb, departing from an ascending pathway from 5 to 8; harmonic motion is simultaneously diverted to I6 before closing on the expected V7-I cadence. Melodic and harmonic departure and return combine with registral expansion and contraction to mark the Eb as the climax of the phrase.

The expressive quality of the Eb of measure 10 is similar to that of the suspension figure heard in the piano introduction. Just as we can interpret a suspension as the musical agent’s resistance to the forces of gravity and tonal attraction, we can interpret melodic departure from a pathway as...
the musical agent’s willful shifting of motion away from its expected course. Furthermore, the strong correlation between measures 10–11 and measures 6–7 encourages us to map the former onto the latter, as shown by the dotted lines. The Eb–D of measure 10 echoes the Eb–D of measure 6, evoking similar feelings of longing.

Following a literal restatement of the music of phrase two for phrase three, the course of action shifts smoothly, almost imperceptibly, to axis two. As the dotted lines show, phrase four maps onto the descending portion of phrase one. The substitution of the sharply dissonant vii⁰⁷ of V of measure 16 for the vi⁶ of measure 2 introduces new tension, as does the move toward the sharp side of the circle of fifths, reflecting the introduction of the word Schmerz (pain). Melodic and harmonic motion at first continue as in phrase one, with the C–Bb suspension over V⁶ in measure 17 recalling measure 3. Yet the phrase remains in the key of the dominant, with A⁵ substituting for A⁷ in measure 18. The resulting upward force of tonal attraction counteracts the downward forces of inertia and gravity, blocking the continued descent heard in phrase one and deflecting motion back upward to 5. Yet the surface melody does not stop on 5, but continues all the way to 8, as if the chromatically charged #⁴ gives the line the momentum it needs to attain, if only briefly, its previous height. This is again accompanied by an outward expansion that reaches its greatest extension on the Eb. Significantly, the Eb resolves prematurely to D, recalling the earlier Eb–D figure of measures 6 and 10 while deflecting motion back to its expected place of rest on 5.

It is in the final phrase of this group that intra-opus pattern repetition makes its most significant contribution to the narrative structure of the song. The first two measures of phrase five are identical to those of phrase four, strongly inducing us to map the former onto the latter. As a result, we expect to hear A⁷ in measure 22. When A⁷ appears in its place, this note takes on an affective character that its surface normality belies. For as Figure 33 shows, the harmony and underlying voice leading are identical to that heard in measures 3–7. It is only when we trace the precise course of change in the pattern unfolding along axis 2 that the significance of the A⁷ becomes clear. Having heard the A⁷ of phrase four as creating blockage, we hear the A⁷ of phrase five as undoing that blockage, thus reopening a pathway that had been closed just a moment before. This is reflected in the close alignment between text and music in the fourth stanza, the two contrasting lines of text, “Drive other pain from this breast” and “May this heart be filled with your joy,” being underscored musically by tension and blockage giving way to a release of tension that allows melodic motion to continue—as it did in the piano introduction—to a state of repose.

This phrase also illustrates how pattern repetition itself may be experienced as a force that governs the trajectory of melodic motion. In the
physical world, our actions are propelled not just by force of will, but also by force of habit. Having performed an action once, we are predisposed to repeat that action. In a similar way, intra-opus patterns seem to give rise to their own repetition, like precut grooves that channel motion, even if somewhat arbitrarily, in a particular direction. It is to this metaphorical force that we might attribute the seeming inevitability of musical patterns that unfold along the lines of those heard earlier. Thus, the arc of rising motion initiated in measure 18 prepares the way for its varied repetition in measures 22–23 and 24–25. Furthermore, the changes introduced into the pattern with each repetition echo earlier patterns, with the Eb–D–Eb of measures 22–23 recalling the Eb–D–Ev of measures 6–7 and 10–11 and the Bb–A♯–B♭ recalling the Eb–D–Eb figure of measures 22–23. Thus, what might otherwise pass for motivic unity can be understood metaphorically as the tendency of musical behaviors, like other human behaviors, to repeat themselves.

The piano interludes of measures 26–29 and 49–52 reflect upon the preceding text and music while setting the stage for musical events to come. They reflect upon the opposition between joy and pain described in stanzas two and four through a highly conventional mode of expression; namely, the immediate juxtaposition of parallel major and minor. Varied pattern repetition at the measure level over a tonic pedal focuses our attention on the contrast, as do the stress accents that mark the alternation between b6 and b5. The reference to the immediate musical past is made more vivid by the resolution of b6 to 5 in alternate measures, bringing to mind the similar resolution of b6 to 5 in the suspension figure that appears in the piano in measures 18 and 41.

After repeating the music of the first phrase group for stanzas three and four, Schubert returns to axis one for the climax of the song. Phrase six begins in precise imitation of phrases two and three. But in measure 55, the chromatic alteration of C to C♭, foreshadowed by the piano interlude, opens up an alternative pathway that passes through the key space of C♭ major. When the melody ascends to Eb♭, we no longer hear it as 8 in the key of Eb major but as 3 in C♭ major. Whereas previously the 7–8 resolution put a halt to the ascent on the Eb♭, the change of key bypasses the expected cadence, allowing the ascent to continue all the way to Ab♭.

This melodic ascent, like the descent of the preceding phrase, takes on more definite meaning in relation to earlier events. As already noted, each phrase of the first phrase group rises up to and then falls away from Eb5, as if it were a ceiling beyond which motion cannot go. Each time, the familiar suspension figure expresses a yearning that we come to associate with falling away from this ceiling. When in the climactic phrase, the ascent continues, we experience the removal of blockage, as if once again a door has been opened that was closed before, making it possible to ascend to a previously unattainable height. Just as the Ab♭ of measure 22...
opens the door to continued descent to the cadence, the Cb of measure 55 opens the door to continued ascent to the climax.

The resulting melodic expansion is mirrored by similar expansions of register and duration. The registral expansion heard in phrases two and three here continues to the very end of the phrase, allowing us to interpret the earlier expansion of registral space—like that of melodic space—as having been blocked by the Eb5. Success in overcoming blockage is communicated through other changes in the treatment of melody, harmony, rhythm, and texture. In contrast to the melodic fluctuations of earlier phrases, melodic motion is entirely stepwise with no change in its rate and direction, implying an absence of opposing force. In place of first-inversion harmonies and stepwise motion in the bass, we hear root-position chords and bass motion by falling fifth, which—along with the parallel fifths and octaves and gradually thickening texture—suggest stability and strength. The suspensions that gave the opening phrase its sense of longing are here transformed into appoggiaturas in an inner voice that suggest the overcoming of gravity with their ascending leaps.

The modulation from Eb major to Cb major contributes further to the feelings evoked by the climactic phrase. As Figure 34a shows, Cb major lies a full four steps below Eb major along the circle of fifths, nearly the other side of the circle. Yet Schubert makes the transition from Eb major to Cb major seem particularly smooth by hinting at Eb minor in the preceding piano interlude, thus preparing us to hear motion along the shorter route through major-minor space shown in Figure 34b.

The sensation of motion through key space thus minimized, attention focuses on the change in emotional state. The Cb of measure 55 bridges two opposing emotional states, appearing first as b₆ in Eb minor and then as ¹ in Cb major, reflecting the transition from pain to joy described in
stanza four. After the tension created by the move to the sharp side of the circle of fifths in phrases 4 and 5, the addition of four flats in phrase 6 takes us far to the side of relaxation. Combining these two expressive oppositions-major/happy versus minor/sad and sharp/tense versus flat/relaxed—makes possible the expression of four “mixed” emotions: happy-tense (eager), happy-relaxed (peaceful), sad-tense (anxious), and sad-relaxed (depressed), as illustrated in Figure 35. The addition of four flats and the return to the pure major mode in the climactic phrase shifts us to the leftmost side of the affective plane. The change of key, the melodic ascent, and the registral expansion combine to evoke feelings of peacefulness and expanding joy.

In the climactic phrase, the image-schematic structure of the music does not so much reflect the meaning of the text as amplify and extend it. In the poem, the eyes and heart are represented as metaphorical containers, filled, respectively, with the radiance of the beloved and feelings of joy. What the words do not specifically describe, yet the music conveys, is the expansion of these two metaphorical containers. It is not until we hear the final words of the text, O full es ganz! (O fill it full!) that we fully grasp the meaning of the climactic phrase. Its remarkable expansion conveys the image of these two bodily containers being filled to their fullest extent, an image that becomes increasingly vivid as we approach the end of the phrase. For just as the melody reaches 3 in measure 59, suggesting the likely arrival at a cadence, V7 of IV takes the place of the expected I, causing the melody to ascend yet one more step to 4. To accommodate the unexpected lengthening of the phrase, the final syllable (-hellt) undergoes an expansion of its own. At the same time, the sudden stopping of surface motion in measure 59 and the diminuendo over the last two bars suggests that all available energy has been taken up by the ascent to the climax. The vocal line remains suspended in this elevated state for a full
measure of rest before picking up where it left off in phrase seven on \( \hat{\vphantom{\hat{\vphantom{\hat{\ddot{\vphantom{\ddot{\vphantom{\ddot{\vphantom{\ddot{}}}}}}}}}}} \), an octave lower, to retrace the path of descent heard in phrases one and five.

In recalling the descent of phrase one immediately after the ascent of phrase six, Schubert sets the emotional content of these two phrases in relief. Though widely separated in time, the two phrases and their associated web of affective states establish a relationship to one another that contributes greatly to the emotional character of the song. Their similarities—their lack of internal subdivision and their unusual length and melodic shape—serve to heighten our sensitivity to their differences—bass motion by step, inverted triads, and falling melodic motion in the introduction versus bass motion by fifth, root-position triads, and melodic ascent at the climax. In this way, Schubert highlights an affective opposition that is only hinted at by the text, yet is central to the music. Whereas phrases four and five focus on the contrast between pain and joy, phrases one and six highlight the opposition between peace and joy, the two positive emotional states associated with love.

6. Conclusion

Having completed a narrative analysis that shows how various aspects of the present theory apply to a tonal work, we may find it useful to return to our starting premise to reflect upon its broader implications. The grounding of the theory in principles of human cognition suggests that it should be applicable in some way to all musics. Given its emphasis on the mediating role of tonal convention in cross-domain mappings, what relevance does the theory have for music outside of the common-practice period? What evidence do we find that the bodily image schemas described here also underlie the music of other times and cultures?

From a historical perspective, we find evidence of the shaping force of embodied metaphor in the changes in compositional practice that led to the evolution and eventual dissolution of functional tonality. From rules governing the range and placement of structural tones for chant melody, to the preference for contrary motion between outer voices with the advent of polyphony, to the gradual expansion of harmonic space from fifth to triadic and from diatonic to chromatic, to the hierarchical nesting of arcs of tonal motion through the stratification of melody, harmony, and key, and finally to the opening up of new harmonic pathways and regions within the fully expanded chromatic space of the Tonnetz, it is possible to understand the evolution of tonal convention as reflecting the exploration over many centuries of tonality’s potential for metaphorical expression.

By the end of the nineteenth century, the expressive potential of conventional tonality seemingly exhausted, composers began to seek new
tonal languages with fresh expressive resources. Schoenberg made the most radical break, not only emancipating dissonance but eliminating the centrality of the tonic, yet many of his atonal and even twelve-tone works appear to be organized according to narrative principles, with plots unfolding along paradigmatic axes like those found in “Du bist die Ruh.” 34 Many of his more conservative contemporaries simply redefined tonality, incorporating into their music fresh material—new modes, scales, and harmonies—that offered new possibilities for metaphorical expression. The present theory may have particular relevance for this body of music, for much of it appears to be governed, at least at times, by metaphors of goal-directedness, verticality, groundedness, and containment. The music-metaphorical schemas presented here could be modified to make them more suitable for mapping onto the post-tonal and neotonal works of Debussy, Stravinsky, Bartók, and others. Pentatonic, whole-tone, and octatonic pitch collections suggest different musical geometries, each with different intimations of grounding, centering, stability, balance, containment, and strong and weak forces of tonal attraction. An investigation of these pitch collections from the standpoint of their image-schematic structure could provide the basis for more meaningful analyses of this repertoire. 35

Ethnomusicologists have just begun to investigate the role of bodily metaphors in non-Western music, yet early evidence suggests that metaphor plays an equally important role in organizing the music and musical theories of other cultures. Just as eighteenth- and nineteenth-century composers and theorists associated particular melodic figures, harmonies, and keys with particular emotional effects, the Kaluli of Papua New Guinea associate certain melodic figures with particular emotions and emotional behaviors; for example, they attribute to the descending minor third feelings of sadness, isolation, and loss (Feld 1981). Yet the Kaluli conceptualize melody metaphorically not as motion of the human body, but as the motion of water as it flows through streams, waterfalls, and pools. The predilection for expressing human agency and goal-directed motion on an epic scale may in fact be unique to Western art music, with other musics, including much contemporary Western art music, deriving much of its meaning from metaphors that come from nature. Debussy saw his music as evoking “the movement of the waters... the play of curves described by the changing breezes”; Messiaen, “the eternity of space and time”; Steve Reich, “the changing light as clouds move slowly across the sky.” These descriptions provide a strong contrast to the emotional evocations of their Romantic predecessors just a century earlier. In the words of Liszt, “one symphony expresses to a supreme degree the several phases of passionate, joyous feeling, another—elegaic mourning, another—heroic enthusiasm, still another—sorrow over an irreparable loss.”

Music speaks to us with an immediacy that leaves us largely uncon-
scious of the means by which it achieves its effects. Yet the fact that it is capable of evoking such powerful and varied emotions suggests that it reflects upon embodied experience at a very deep level. By extending our explanations of musical structure into the metaphorical domain, we can better understand music's capacity—long recognized but little understood—to convey the innermost realms of human experience.
NOTES

1. Margolis’s theory of pattern matching finds support in the theory of neural networks, which explains our capacity for pattern recognition and categorization as resulting from the selective strengthening and inhibiting of neural connections. For a discussion of the implications of the neural network model for many humanistic disciplines, including music, see Churchland 1995.


4. The present theory does not exhaust the possibilities for musical meaning; for example, it does not explain the meaning attributable to a waltz, a gigue, or a military march by virtue of its association with a particular social context. In semiotic terms, the theory can be said to deal with the first of Charles Peirce’s three categories of sign, the *icon*, to the exclusion of the other two, the *index* and the *symbol*. Symbolic and indexical meanings, sometimes described in terms of *topic*, have been the primary focus of many theories of musical semiotics. See, for example, Agawu 1991, Hatten 1994, Tarasti 1994, and Monelle 2000. It would be possible, drawing upon cognitive models already available, to expand the cognitive basis of the present theory to account for such culturally based meanings in terms of pattern matching. Deacon (1997) has theorized that the symbolic and indexical meanings of language grow out of iconic meaning through higher levels of cognitive processing. The same is likely to be true—if to a more limited extent—of music. For music lies at the other end of the spectrum from language with respect to the balance it maintains among the three types of sign function. Music rarely achieves—primarily because it rarely strives for—the pure symbolism that lies at the heart of language.

5. The concept of a *paradigmatic axis*, along which units are related by similarity, comes from structural linguistics. Structural linguists developed a system of paradigmatic analysis for language that was later applied to music by Ruwet (1972) and Nattiez (1975). The paradigmatic analyses of Ruwet and Nattiez divide a musical work into its recurrent patterns (motives, phrases, sections, etc.), aligning these vertically to reveal their similarities and differences. Paradigmatic analysis will be used later to show how narrative meaning results from the varied repetition of intra-opus patterns.

6. Such concepts, which combine features of two different domains, are examples what has been called *conceptual blending* (Turner and Fauconnier 1995, Turner 1996, Fauconnier and Turner 1998). Blending consists of the projection of structure from two or more input mental spaces (often a source domain and a target domain) to a single “blended” space, which takes on structure not found in the
individual input spaces. For more detailed discussion of conceptual blending as it applies to music, see Zbikowski 1999.

7. Another means of conceptualizing of hierarchical relations is offered by various mappings of the VERTICALITY schema. Zbikowski (1997) has shown that the verticality schema plays an important role in the modeling of tonal and rhythmic hierarchies, with the former tending to be “top-down” and the latter “bottom-up.”

8. In The Body in the Mind, Johnson refers to this as the PATH schema, but in his later writings he follows Lakoff in referring to it as the SOURCE-PATH-GOAL schema (Lakoff 1987, Johnson 1993, Lakoff and Johnson 1999).

9. While agency plays a central role in how we interpret music as goal-directed motion, in some mappings of the SOURCE-PATH-GOAL schema its role may be negligible, as when we use it to predict the behavior of a falling leaf or a rolling ball.

10. Figure 10 elaborates upon a similar schema used by Arheim (1984). In this and all following figures, metaphorical features of the schema appear in italics.

11. Lerdahl (1988) establishes a similar hierarchy of stability relations among triadic, diatonic, and chromatic pitches. However, because his model applies to pitch-classes, not pitches, his hierarchy exhibits five levels rather than six.

12. Although not consciously perceived, the overtone series finds its way into memory as a component of speech and musical sound, where it serves as a basis for pattern mapping at an unconscious level. Evidence of this is provided by the fact that we are able to recognize a complex tone as its fundamental, or its “virtual pitch” (Terhardt 1974, 1979), even when the fundamental is missing (as in the case of most pocket radios and telephone receivers).

13. The naturalness of the mapping of harmonic root onto fundamental has been noted by Terhardt (1984), who states that “the nature of the fundamental note (root) of musical chords is identical with that of the virtual pitch of individual complex tones.” (293) Language itself provides us with evidence that tonic, root, and fundamental have similar metaphorical meaning. In French, the term fondement means “bottom”; in English, the term “root” suggests attachment to the ground; and in German, the word for tonic—Grundton—literally translates as “ground-tone.”

14. The explanation offered here expands upon an earlier account (Brower 1997).

15. Lakoff and Johnson (1980) have noted the cross-cultural pervasiveness of the generic metaphors HAPPY IS UP and SAD IS DOWN, suggesting that these metaphors are both embodied and universal.

16. This cyclic aspect of musical pitch space is sometimes modeled as a three-dimensional helix, thus superimposing the spaces represented in Figures 10 and 15. (Révész 1913/1954, Shepard 1964). The helix, however, tends to obscure the paradox of “same-yet-different” by reconciling the conflict between harmonic and melodic dimensions. For further discussion of the perceptual implications of this model, see Butler 1992.

17. A similar diagram can be found in Kostka and Payne 1995.

18. For example, Schubert uses a tonicized bII in Erlkönig to set the Erliking’s final seductive call to the child, then resolves it to V in g minor as the child is snatched from the father’s arms. Similarly, Hatten (1994) interprets the appearance of bII in the F# minor slow movement of Beethoven’s Hammerklavier Sonata, Op. 106, as “a [brief] vision of grace in the midst of tragic grief” (p. 16).

19. Balzano (1980) similarly constructs different pitch spaces from different intervals: the semitone, the fifth, and the third. My melodic space corresponds to his semi-
tonal space, my fifth space to his fifths space, and my triadic space to his thirds space.

20. Carey and Clampitt (1989) have noted that the diatonic and chromatic scales share with the pentatonic scale the property of well-formedness, which they define in terms of a local condition of symmetry (the diatonic scale, e.g., is generated by a single interval, the fifth, always spanning five scale steps), and alternatively in terms of a more global condition of closure. The property of well-formedness can be explained image-schematically in terms of path and cycle schemas: the symmetry condition can be understood as favoring maximal smoothness, while the closure condition favors those pathways that take the shape of nearly perfect circles. (In the case of the pentatonic scale, the imperfect interval that “closes” the circle is a minor 6th.)

21. According to Rameau (1754), “the side of the dominant, that of the rising fifth, is rightly the side of strength, so that the more fifths there are in going up, the more this strength increases; the same reasoning holds conversely for softness, on the side of the subdominant.” This is echoed by Vogler (1779): “if we go up by fifths through G, D, A, and E, there is always an increase of strength, effect, cutting quality and penetration. If we go down by fifths through F, B♭, E♭, and A♭, all strength is reduced and the impression becomes duller and darker.” Similarly, in an eighteenth-century musical novel by Johann Jakob Heinse, the protagonist-conductor explains that sharp keys “climb ever higher until heaven is reached; flat keys sink to ever deeper levels of solemnity and earthly power” (Steblin 1981).

22. If one were to continue indefinitely the process of adding circles of fifths, one would eventually produce a grid that doubles back upon itself to take the shape of a three-dimensional torus. In that form, it would become identical to the Tonnetz, a two-dimensional grid used by many theorists to represent spatial relations among pitches, triads, and keys. While Riemann and his German predecessors conceived of the Tonnetz as made up of pure fifths and thirds, thus extending infinitely outward in all directions, more recent representations of the Tonnetz assume equal temperament, thus also the underlying geometry of the torus. Lewin (1984, 1987), Hyer (1995), Cohn (1996, 1997), and others have used the space of the Tonnetz to map out alternative pathways to those shown here, demonstrating that it is along such pathways that much of the highly chromatic harmonic motion of late nineteenth-century music takes place. Such applications of the model of the Tonnetz could be viewed as intersecting with and even extending the image-schematic model of tonal space presented here.

23. As Krumhansl (1990) describes it, “when combinations of tones are heard, tonal meaning (virtual pitches) are evoked to the extent that the sounded frequencies match some part of the template of interval patterns” (p. 53). From the perspective of the present theory, the overtone series serves not only as template, but also as prototype.

24. In some phrases, the climax may actually coincide with the arrival at the cadence, causing these two goals to collapse into a single musical event.

25. Todorov (1981) describes the ideal narrative as follows: “an ideal narrative begins with a stable situation that some force will perturb. From which results a state of disequilibrium; by the acton of a force directed in a converse direction, the equilibrium is reestablished; the second equilibrium is quite similar to the first, but the two are not identical” (p. 51).
26. Saslaw (1996, 1997) has shown that many of these schemas appear in the writings of Riemann, Schenker, and Schoenberg, including expansion of a container, motion from one container to another, departure from and return to a pathway, and the overcoming of blockage.

27. In her interpretation of Riemann’s theory of modulation, Saslaw (1996) represents modulation yet a third way; namely, as motion from one key container to another along a pathway connecting the two.

28. The idea that we may experience musical meaning as a kind of resonance, also proposed by Newcomb (1984), may in fact have a neurological basis. Neurologists have found that the meaning of individual objects and events does not register in any single place in the brain (Damasio 1989 & 1999, Edelman 1989). Instead, meaning appears to involve the simultaneous activation of sometimes widely separated neuronal groups. Repeated exposure to the same stimulus strengthens the connections among these groups, increasing the likelihood that activation of one group will result in activation of the others.

29. The phrase appears to occupy a privileged position within the grouping hierarchy as the unit corresponding most closely in length to the psychological present—that span of time over which events of the immediate past remain in consciousness and thus available for cognitive processing. Because we can hold an entire phrase in consciousness, we are able to map a phrase onto earlier versions recalled from memory and hear their similarities and differences in relation to the whole.

30. Figure 33 adopts certain conventions of Schenkerian notation; i.e., the use of different rhythmic values to distinguish among hierarchical levels, beams to show underlying stepwise melodic lines, and slurs to show unstable pitches resolving to stable ones. I have used somewhat different criteria in carrying out the reduction, however, in that I have attempted to preserve at each level those elements of a pattern shared by its variants.

31. The fact that the Eb, unlike the earlier suspensions, is sung rather than played also contributes to its expressiveness. Edward Cone (1974) suggests that we attribute the expressive qualities of the vocal line to the fictional character whose thoughts and emotions the text conveys, and that we understand the singer to be the living embodiment of this character.

32. Margolis makes no distinction in his theory between patterns of thought and patterns of behavior, noting that they are indistinguishable at the level at which they are represented in the brain; both are subject to pattern matching carried out largely at an unconscious level.

33. I thank David Lewin for bringing this detail of the image-schematic structure of the song to my attention.

34. We can infer that Schoenberg conceived of music in narrative terms from his description of a piece of music as “a photograph album, displaying under changing circumstances the life of its basic idea—its basic motive” (Schoenberg 1967, 58). Schoenberg’s first atonal work, Opus 11, Number 1, for example, exhibits many of the characteristics of a drama, lending itself to interpretation on the basis of a plot that unfolds along a paradigmatic axis established by its principal theme (Brower 1989).

35. For an illustration of how the image-schematic structure of the octatonic scale supports a narrative interpretation of Varèse’s Density 21.5, see Brower 1997.

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WORKS CITED


