Des Herzraums Abschied: Mark Johnson's Theory of Embodied Knowledge and Music Theory

Lawrence M. Zbikowski

"Du Fremde: Musik. Du uns entwachsener
Herzraum. Innigstes unser,
das, uns übersteigend, hinausdrängt, —
heiliger Abschied. . ."
Rainer Maria Rilke, *An die Musik*

Music theory can seem, at times, a relentlessly abstract discipline. Although we theorists often play music, and illustrate our points with music, and even *enjoy* music, what theory is about, first and foremost, is concepts. And concepts, as we all know, originate in the mind. Or do they?

Consider a staple of musical description, the paired notions of tension and release. Various musical situations can be described in terms of tension and release; for instance:

Example 1: Dominant seventh to tonic.

Example 2: Sibelius, *Sixth Symphony*, first movement, mm. 255-266.

Example 3: Sonority with chromatic cluster to sonority without chromatic cluster.

Each of these characterizations poses few problems—we understand more or less immediately how each situation embodies tension and release. However, it is actually very difficult to explain why the notions of tension and release have any relevance here. Standard dictionary definitions of "tension" and "release" scarcely encompass such musical situations. From the evidence, there also seems little prospect for adequate music-theoretical definitions: the "four-measure *mezzo forte* passage in the strings and winds" of Example 2 could itself be a generator of tension within another context; the "tense" dominant-seventh chord of Example 1 is actually embedded in the "release" sonority of Example 3. One way to solve these difficulties would be simply to banish such imprecise language from our descriptions of music. However, the 'technical' language that would remain (most likely reminiscent of the descriptions given above for each of the three situations) is flat and two-dimensional, and provides no sense of why one event should follow another other .

Of course, our reason for characterizing these situations in terms of tension and release is not to exercise technical jargon but to capture, in a single, highly salient image, important aspects of our experience of music. This image is more kinesthetic than visual, and comprises a host of bodily sensations that we associate with tension and release. These sensations include that of tightening and relaxing our muscles; of narrowness and constraint yielding to that of expansion (as when a physical restraint is removed); of an attention sharply focused giving way to a more diffuse awareness (as when we look up from the page to pause and reflect). Applying the image associated with these sensations to music allows us to describe the relatively abstract and ephemeral domain of sound in terms of concrete physical experiences. It also leads to inferences about musical syntax. We know tension cannot be maintained indefinitely, and so infer that musical events that provide tension must progress to musical events that provide release. We know tension and release are usually in equal proportion to each other, and thus anticipate that profound musical tension will be followed by profound musical release.

Most musicians are familiar with the contribution of the body to our understanding of music, but in somewhat different terms. Accounts of the production and reception of musical rhythm (as distinct from musical meter) almost always take as their point of reference embodied knowledge: we learn about rhythm from the motions and regularities of our bodies. Similarly, conceptions of musical gesture are framed in terms of the motion of bodies—our own or others'—through space. However, in our folk psychology, mind and body occupy two completely different domains, linked only by the functions of controller (the mind) and controlled (the body). In consequence, we have no ready conceptual framework through which to describe the contribution of the body to our thought.

That such a framework is necessary has become increasingly obvious from recent work in cognitive psychology, cognitive linguistics, and neuroscience. This work suggests that mind divorced from body is not only indefensible, but that the division between mind and body has become so obscured as to become meaningless. This is not to say that the question of how body and mind interrelate has in anyway been solved, only that such an interrelationship is necessary to any adequate theory of mind. In his 1987 book *The Body in the Mind*, the philosopher Mark Johnson offered a way of addressing this problem through an account of how conceptual structure originated in embodied experience. Johnson's work suggests that the gulf between the concepts at the core of music theory and our embodied understanding of music is not only not as wide as it seems, but may in fact be little more than an illusion born of an outdated theory of mind.

In the following, I would like to outline Johnson's theory of how the body is in the mind, starting with its origins in the study of metaphor and extending through current work in cross-domain mapping. I would then like to give an overview of the role of this theory in Johnson's larger philosophical project, and the role it has played in the work of other researchers. Finally, I shall turn to the essays that follow and the arguments they make for the way embodied knowledge informs our theories of music, and consider how they allow us to come to terms with what Rilke called "du Fremde: Musik."[1]

METAPHOR AS A FUNDAMENTAL STRUCTURE OF HUMAN THOUGHT

Metaphor and cross-domain mapping. Perhaps the most common conception of metaphor is of a literary device, a manifestation of the figural use of language to create colorful if imprecise images. However, in 1980 Johnson, together with the linguist George Lakoff, presented an alternative view: metaphor, they argued, was not simply a manifestation of literary creativity, but was in fact pervasive in everyday discourse.[2] As an example, consider the way the spatial orientation of up-down is used to characterize emotions:

> I'm feeling *up*. My spirits *rose*. I'm feeling *down*. I *fell* into a *depression*. My spirits *sank*.

consciousness:

> Get *up*. I'm *up* already. He *rises* early in the morning. He *fell* asleep.

and health:

> He's at the *peak* of health. Lazarus *rose* from the dead. She's in *top* shape. He came *down* with the flu.

Each characterization suggests not a literal representation of the spatial domain implied by the orientation *up-down*, but instead uses our knowledge of physical space to structure our understanding of emotions, consciousness, or health.

Based on evidence provided by a large number of similar examples of the appearance of metaphorical constructions in everyday discourse, Lakoff and Johnson proposed that metaphor was a basic structure of understanding through which we conceptualize one domain (typically unfamiliar or abstract — the target domain) in terms of another (most often familiar and concrete — the source domain). Further study has provided a wealth of empirical evidence for this proposal and contributed to the development of the field of cognitive linguistics.[3]

Fundamental to the theory of metaphor that sprang from Lakoff and Johnson's work is a distinction between conceptual metaphors and linguistic metaphors. A conceptual metaphor is a cognitive mapping between two different domains; a linguistic metaphor is an expression of such a mapping through language. For instance, the conceptual metaphor STATE OF BEING IS ORIENTATION IN VERTICAL SPACE maps relationships in physical space onto mental and physical states.[4] The cross-domain mapping wrought by this conceptual metaphor then gives rise to innumerable linguistic expressions. Some of these expressions are commonplace, such as "John seems a bit *down* today." Others summon a rich imagistic world, such as that of John Keats's "Ode to a Nightingale":

> My heart aches, and a drowsy numbness pains
>   My sense, as though of hemlock I had drunk,
> Or emptied some dull opiate to the drains
>   One minute past, and Lethe-wards had sunk.

Here the descent to the mythical river gives a physical correlate to the narcotic state of the narrator — the act of sinking is mapped onto a melancholy emotional state — and serves as yet another expression of this conceptual metaphor.

The process of cross-domain mapping offers a systematic way to explain our commonplace notions of musical space. There is ample evidence that our characterization of musical pitches in terms of "high" and "low" is basically metaphorical. Consider "high" and "low" on the piano: how can D4 be "above" C4 on the piano when they are both on the same horizontal plane? Think of playing the two notes on the 'cello — to play the "higher" D4, we have to move our left hand *down*, so that it is closer to the ground. Behind these linguistic expressions is the conceptual metaphor PITCH RELATIONSHIPS ARE RELATIONSHIPS IN VERTICAL SPACE, which maps spatial orientations such as *up-down* onto the pitch continuum.

Additional evidence for the metaphorical basis of musical terminology is provided by the way other cultures characterize pitch relations. Greek music theorists of antiquity spoke not of "high" and "low" but of "sharpness" and "heaviness;" in Bali and Java pitches are not "high" and "low" but "small" and "large;" and among the Suyá of the Amazon basin, pitches are not "high" and "low" but "young" and "old."[5] The differences among these ways of characterizing musical pitch suggests that the understanding of music is profoundly metaphorical: not only is the *high* and *low* of musical pitch metaphorical, but it is only one of a number of ways to characterize pitch relations.[6]

If it is the case that our usual characterization of musical pitches in terms of "high" or "low" is not necessary, why is it that mapping the spatial orientation *up-down* onto pitch works so well? The answer to this question is provided by two interlocking theories fundamental to current work in cross-domain mapping: Mark Johnson's theory of image schemata, and the theory of image-schematic constraint embodied in the Invariance Principle.

Johnson's theory of image schemata. A problem facing Lakoff, Johnson, and others early on in their investigation of metaphor was the ultimate grounding of the process of cross-domain mapping. Even if we grant that we understand a target domain in terms of a source domain, how is it that we understand the source domain in the first place? In *The Body in the Mind*, Johnson endeavored to address this issue with the proposal that meaning was grounded in repeated patterns of bodily experience. These patterns give rise to what he called *image schemata*, which provide the basis for the concepts and relationships essential to metaphor. An image schema is a dynamic cognitive construct that functions somewhat like the abstract structure of an image, and thereby connects up a vast range of differ-

ent experiences that manifest this same recurring structure.[7] Image schemata are by no means visual — the idea of an image is simply a way of capturing the organization inferred from patterns in behavior and concept formation.

As one example of an image schema, consider the VERTICALITY schema, which might be summarized by a diagram of the sort given in Example 4. We grasp this structure repeatedly in thousands of perceptions and activities that we experience every day. Typical of these are the experiences of perceiving a tree, our felt sense of standing upright, the activity of climbing stairs, forming a mental image of a flagpole, and watching the level of water rise in the bathtub. The VERTICALITY schema is the abstract structure of the VERTICALITY experiences, images, and perceptions. Our concept of verticality is based on this schema, and this concept is in turn invoked by the various conceptual metaphors that use vertical space as a source domain through which to structure target domains such as emotions, consciousness, health, and musical pitch.

Example 4: Verticality image schema.
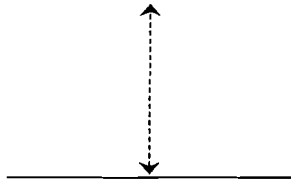
By definition, image schemata are preconceptual: they are not concepts, but they provide the fundamental structure upon which concepts are based. In consequence, it is important to emphasize that any diagram used to illustrate an image schema is intended to represent the key structural features and internal relations of the schema; it is not meant to summon a rich image or mental picture that we somehow have "in mind," and use to actively structure our thought. More directly, whatever actually occupies our thoughts is not, by definition, an image schema. We can conceive *of* image schemata, just as we can conceive of any of a number of non-conceptual or preconceptual cognitive processes. We can also note general patterns in the way concepts are structured, which can be attributed to image schemata. However, there are, by definition, no 'image-schema concepts.'

The relationship between the VERTICALITY schema and our characterization of musical pitch with reference to the spatial orientation *up-down* is fairly immediate: when we make *low* sounds, our chest resonates; when we make *high* sounds, our chest no longer resonates in the same way, and the source of the sound seems located nearer our head. The "up" and "down" of musical pitch thus correlate with the spatial "up" and "down" — the vertical orientation — of our bodies. The VERTICALITY schema offers a straightforward way to explain why we characterize musical pitch in terms of *high* and *low* even when the actual spatial orientation of the means through which we produce pitches either does not reinforce the characterization or runs directly counter to it.

Of course, our embodied experience of musical pitch is not limited to the bodily sensations we associate with the production of "high" and "low" pitches. To account more fully for why mapping the spatial orientation UP-DOWN onto pitch is as effective as it is, we need to consider how image-schematic structure constrains mappings between domains.

An image-schematic constraint on cross-domain mapping: The theory of image schemata provides a way to explain how conceptual metaphors are grounded. However, it does not, by itself, explain why some conceptual metaphors seem intuitively better than others. For instance, the conceptual metaphor PITCHES ARE FRUIT could provide the grounding for such expressions as "You must play the first note more like an apple, the second more like a banana." Although such mappings are possible, they are certainly not common. Pitches and fruits just do not seem to be a good match.

To account for why some metaphorical mappings are more effective than others, George Lakoff and Mark Turner proposed that such mappings are not about the *imposition* of the structure of the source domain on the target domain, but are instead about the establishment of correspondences between the two domains. These correspondences are not haphazard, but instead preserve the image-schematic structure latent in each domain. Lakoff and Turner formalized this perspective with the Invariance Principle, which Turner states as follows:

> In metaphoric mapping, for those components of the source and target domains determined to be involved in the mapping, preserve the image-schematic structure of the target, and import as much image-schematic structure from the source as is consistent with that preservation.[8]

According to the Invariance Principle, mapping the spatial orientation *up-down* onto pitch works because of correspondences between the image-schematic structure of components of the spatial and acoustical domains. Both space and the frequency spectrum are continua that can be divided into discontinuous elements. In the spatial domain, division of the continuum results in points; in the acoustic domain, it results in pitches. Mapping *up-down* onto pitch allows us to import the concrete relationships through which we understand physical space into the domain of music, and thereby provide a coherent account of relationships between musical pitches. Mapping various fruits onto musical pitches works less well because fruit do not (in any ordinary way) constitute a continuum. To employ this mapping is to highlight instead the discontinuity among musical pitches, as well as how they are *unlike* one another (an emphasis on difference suggested by the idiomatic phrase "like apples and oranges").

SUMMARY AND OVERVIEW

The fact that music can move us both emotionally and physically invites speculation into how our embodied experience of music connects with the way we think about music. Mark Johnson's theory of image schemata offers one way to explain this connection. Our understanding of notions such as tension and release is grounded in repeated patterns of bodily experience. These in turn provide the basis for such conceptual metaphors as COMPLICATED PHENOMENA CREATE TENSION, SIMPLE PHENOMENA CREATE RELEASE. Through cross-domain mapping, we apply this understanding to domains such as music, giving rise to a rich variety of linguistic expressions through which we can describe musical relationships. Our mappings of conceptual metaphors onto music are constrained by the image-schematic structure of the correlated domains: we must be able to draw correspondences between the musical domain and that of our embodied experience. Thus it is no accident that our characterizations of music in terms of tension and release demand either pairs of events (which contrast in terms of 'tension' and 'release') or a systematic account of why a series of events, is, in and of itself, 'tense' or 'relaxed;' these constraints reflect how we experience tension and release through our interactions with our environments.

Image schemata theory and Johnson's philosophical project. In Johnson's own work, the theory of image schemata proved crucial to the perspective on human understanding he developed in *The Body in the Mind.* Using his work with Lakoff in metaphor theory as a point of departure, Johnson proposed that the cognitive bases of conceptual metaphors could be situated in patterns of repeated bodily experience. Adopting and modifying terminology that he traced to the work of Immanuel Kant, Johnson called such patterns image schemata. Johnson bolstered his argument with numerous analyses of linguistic, conceptual, and visual phenomena, and showed how the theory of image schemata permitted a single, relatively simple explanation for the underlying structure of these phenomena. This theory then offered a somewhat unique way to approach the problem of human understanding. As Johnson argued,

> understanding does not consist merely of after-the-fact reflections on prior experiences; it is, more fundamentally, the way (or means by which) we have those experiences in the first place. And this is a result of the massive complex of our culture, language, history, and bodily mechanisms that blend to make our world what it is. *Image schemata and their metaphorical projections are primary patterns of this "blending."*[9]

Understanding, in short, is grounded in the recurrent patterns of bodily experience represented in abstract form by image schemata.

In that image schemata constrain but do not determine absolutely our understanding, imagination comes to play a crucial role in our experience of the world, for it is through the flexible play of imagination that we apply image-schematic knowledge to various situations.[10] Johnson summarizes this perspective as follows:

> Creativity occurs at all levels of our experiential organization and not just in those rare moments when we discover novel ideas. We are imaginatively creative every time we recognize a schema in a new situation we have never experienced before and every time we make metaphorical connections among various preconceptual and conceptual structures.[11]

Imagination is thus not ancillary to our understanding, but is instead basic to it.[12]

In sum, then, the theory of image schemata enabled Johnson to develop a fundamentally different view of knowledge and understanding, leading to a fundamentally different way of doing philosophy. In that the issues engaged by his philosophical investigations connected with inquiry into the structure and organization of the human mind, Johnson regarded them as part of cognitive science. This perspective then informed his subsequent work in ethics. In his *Moral Imagination* of 1993, Johnson made a persuasive argument that questions of ethics and moral reasoning were best explored from the perspective provided by recent work in cognitive science, which included his own work with image schemata and metaphor.[13] Further work on connections between cognitive science and philosophy appears in Lakoff and Johnson's recent and highly detailed *Philosophy in the Flesh.*[14]

Image schemata theory and research in cognitive science. It is within the field of cognitive science that the theory of image schemata has had its broadest impact. Lakoff adopted the theory early on, most notably in his *Women, Fire, and Dangerous Things,* an influential book on processes of categorization that marked Lakoff's full-scale entry into the field of cognitive science. Lakoff has continued

to build on the theory, and it has informed his perspective on how cognitive linguistics should be shaped.[15] Other researchers in cognitive linguistics, such as Zoltan Kövecses and Eve Sweetser, have provided additional evidence for the importance of the theory.[16] Mark Turner's work on cognitive rhetoric shows a similar influence, and, together with Francis-Noël Thomas, he has shown how image schemata can shape writing style.[17]

While there is a strong empirical component to the work of these scholars, its methodology is not one of hypothesis and experiment. And if there is a weakness to Johnson's theory, it is that it has remained in large part a *theory*, useful for explaining a wide variety of phenomena but without substantial experimental verification. However, the work of the psycholinguist Raymond Gibbs has started to rectify this situation, and together with Herbert Colston he has begun to provide the proof that has been heretofore lacking.[18] Perhaps more important is recent work by the cognitive psychologist Lawrence Barsalou and his associates on perceptual symbols, which are analogous to image schemata.[19] Barsalou's research not only makes a strong argument for the cognitive importance of structures such as image schemata, but has also provided the first experimental evidence of the existence of such structures within human cognition. Similar arguments for the importance of image schemata or analogous structures have been made by researchers both in neuroscience and in human gesture as a communicative means.[20]

MUSIC THEORY AND EMBODIED KNOWLEDGE

Music theory and The Body in the Mind. Research in cognitive science suggests that the appeal of making a place for the body in our theories of music may well extend beyond what is intuitively satisfying: it may also be necessary if we are to reconcile our theoretical accounts of music with the range and power of musical expression. That music theorists of the recent past attempted to do just this — capture the range and power of musical expression in their theoretical accounts of music — is ably demonstrated by Janna Saslaw's essay. Saslaw traces the use of a specific category of image schemata — the force schemata — in contemporaneous writings by Heinrich Schenker and Arnold Schoenberg. Undertaking a close reading of numerous passages from both theorists, Saslaw shows the presence and variety of force schemata in their writings about music. By this means she demonstrates that a notion of force, especially as an embodied experience, is central to both Schenker's and Schoenberg's conceptualizations of music. Saslaw then examines how these same schemata are demonstrated in musical analyses by the two authors, even affecting their choice of graphic representation. It becomes clear that Schenker and Schoenberg are not simply engaged in absolute or abstract theorizing, but theorizing vibrantly informed by the experience of the body.

Saslaw's work also demonstrates an aspect of image schemata not emphasized above: although schemata represent wholes that are analogous to gestalts, they oftentimes can be broken down into their components, or what Saslaw calls "features." Feature-analysis is particularly useful for exploring the aspects of a given image schema that are preserved by — or are invariant under — a particular cross-domain mapping. Feature-analysis also gives a glimpse into how image schemata guide reasoning: although a particular cross-domain mapping may emphasize only portions of schematic structure, we often develop our understanding by considering how the remaining aspects could be realized in the target domain.

Candace Brower extends the basic argument presented by Saslaw's essay with a detailed analysis of the first seventeen measures Edgard Varèse's *Density 21.5*, in which she explores the various image-schematic possibilities presented by the work. Brower is especially interested in the ways Varèse's

work supports goal-oriented image schemata. As a way of framing her approach, she draws on goal-directed interpretations of common-practice tonality, and then redeploys these interpretations (with modifications) in her analysis of the Varèse. Brower's analysis shows that our understanding and appreciation of music such as *Density 21.5* does not rely, in a simple way, on its 'absolute' character-istics but on the opportunities it presents for sonically realizing the various schemata through which we structure our understanding of the world.

Brower's essay points up two further roles that image schemata play in the way we think about music. First, the reasoning processes associated with image schemata can be quite elaborate, as demonstrated by the list of entailments of the image schema for goal-directed motion given in Brower's Figure 3. Image schemata will often provide the structure for an entire conceptual model, which we can then use to guide our reasoning about a particular domain. In the case of Varèse's *Density 21.5*, the image schema for goal-directed motion provides the basis for a conceptual model for pitch rela-tions within the work.[21] Second, Brower shows how our experience of music may inform, and per-haps even shape, our image schemata: that is, under certain circumstances, music may represent the *primary* source of experience, rather than a target domain which we structure in terms of a more-familiar source domain.[22]

Steve Larson's essay provides an example of how an approach to musical organization based on embodied knowledge can be generalized through systematization, and how such a theory integrates with a theory of musical meaning. As a point of departure, Larson proposes that experienced listeners hear tonal music as purposeful action within a dynamic field of three forces: gravity; magnetism; and inertia. These forces provide a way of elaborating two more basic metaphors: MUSIC IS MOTION and MUSIC IS PURPOSEFUL. These basic metaphors and their elaborations through the three force metaphors combine into a coherent system, grounded in embodied experience, which Larson uses as the basis for generating a set of melodic patterns. As Larson shows, this well-defined set of patterns bears a strong resemblance to those found in published descriptions of hidden repetition in tonal music, those underlying fugue expositions, and those found in background and first-level middleground structures proposed by Schenker.

Where Larson's contribution starts with the predicate of embodied knowledge and proceeds from there to generalized musical structures, Andrew Mead proceeds in (approximately) the opposite direc-tion. Mead begins with a consideration of the intervallic properties of scale-based music as a way of exposing the system of metaphors through which we elaborate our understanding of scale-based mu-sic. Mead then goes on to argue that this system is ill-suited to the understanding of aggregate-based music because of the different function of intervals within such music, and suggests a new set of metaphors better suited to the musical properties of this music. Although much of Mead's essay is concerned with the abstract properties of scale-based and aggregate-based music, he explores these only as a way of characterizing how these musics sound and feel: at every turn he is concerned with finding an adequate account of his embodied experience of the range and power of musical expres-sion.

Music theory and embodied knowledge. The essays that follow clearly demonstrate the importance of embodied knowledge to our conceptualizations of music as well as the centrality of metaphor to our elaboration of those conceptualizations. They offer new ways to think about the history of music theory, musical analysis, theory building, and the relationships (or lack thereof) between music theo-ries pertaining to different musical domains. They show that music theory, ever and marvelously an abstract discipline, is also grounded in our basic experience of the world.

Perhaps more importantly, these essays give us a glimpse into how our theories of music connect with (rather than simply control) our passion for music., For despite our familiarity with music, despite our daily involvement with its textures and moods, music remains a mysterious stranger, as it is in Rilke's poem. However, it is not simply a fascination with the Other that draws us to music, but a knowledge that this Other grows from something deep within us. Understanding how the body is in the mind offers a way to sketch the outlines of this knowledge — it offers us a way to trace the shapes left by the departure of that which is deepest within us.

NOTES

1. Earlier versions of the papers collected here were first presented as part of a special session on Mark Johnson's theory of embodied meaning at the Society for Music Theory National Conference in Baton Rouge, Louisiana in November of 1996. Marianne Kielian-Gilbert was one of the participants in that session, but it was not possible to include a summary of her presentation with this collection. My own contribution was originally that of a respondent.

2. George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980).

3. For a review of the empirical evidence supporting metaphor as a basic cognitive process see Raymond W. Gibbs, Jr., *The Poetics of Mind: Figurative Thought, Language, and Understanding* (Cambridge: Cambridge University Press, 1994). For discussion of the link between the study of metaphor as a cognitive process and the central concerns of cognitive linguistics see George Lakoff, "The Invariance Hypothesis: Is Abstract Reason Based on Image-Schemas?" *Cognitive Linguistics* 1, no. 1 (1990): 39-51.

4. The conceptual metaphor STATE OF BEING IS ORIENTATION IN VERTICAL SPACE is a variant of the STATES ARE LOCATIONS conceptual metaphor discussed by George Lakoff and Mark Turner in *More Than Cool Reason: A Field Guide to Poetic Metaphor* (Chicago: University of Chicago Press, 1989). On cross-domain mapping as a general phenomenon see Lakoff and Turner, *More Than Cool Reason*, 4; George Lakoff, "The Contemporary Theory of Metaphor," in *Metaphor and Thought*, 2d ed., edited by Andrew Ortony (Cambridge: Cambridge University Press, 1993), 202-51; Gibbs, *The Poetics of Mind*; and Gilles Fauconnier, *Mappings in Thought and Language* (Cambridge: Cambridge University Press, 1997).

    By convention, conceptual metaphors are represented in capital letters. Thus LOVE IS A JOURNEY designates a conceptual metaphor of general application, and "Love is a journey" a specific linguistic expression based on that metaphor.

5. On the matter of the characterization of pitch by Greek music theorists of antiquity see Andrew Barker, ed., *Greek Musical Writings, Volume II: Harmonic and Acoustic Theory* (Cambridge: Cambridge University Press, 1989), n. 43, p. 134. For information about the characterization of pitch in Bali and Java I am indebted to Benjamin Brinner and to Sumarsam, personal communication. Regarding the characterization of musical pitch by the Suyá, see Anthony Seeger, *Why Suyá Sing: A Musical Anthropology of an Amazonian People* (Cambridge: Cambridge University Press, 1987), 100-02.

6. I have discussed connections between recent work in metaphor theory and music theory in Lawrence Zbikowski, "Metaphor and Music Theory: Reflections from Cognitive Science," *Music Theory Online* 4, no. 1 (January 1998). For a slightly different interpretation of the basis of high and low in musical terminology, see Arnie Walter Cox, "The Metaphoric Logic of Musical Emotion and Space" (Ph. D. diss.: University of Oregon, 1999).

7. Mark Johnson, *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason.* (Chicago: University of Chicago Press, 1987), 2.

8. Mark Turner, "Aspects of the Invariance Hypothesis," *Cognitive Linguistics* 1, no. 2 (1990): 254; emphasized in original. For additional writings on the Invariance Principle (which at first was called the Invariance Hypothesis) see Lakoff, "The Invariance Hypothesis"; Mark Turner, "An Image-Schematic Constraint on Metaphor," in *Conceptualizations and Mental Processing in Language*, edited by Richard A. Geiger and Brygida Rudzka-Ostyn, Cognitive Linguistics Research, vol. 3 (Berlin: Mouton de Gruyter, 1993), 291-306; and Mark Turner, *The Literary Mind* (New York: Oxford University Press, 1996), chapter 3.

A preliminary discussion of a similar sort of topographical invariance, with applications to music, can be found in Peter Gärdenfors, "Semantics, Conceptual Spaces and the Dimensions of Music," in *Essays on the Philosophy of Music*, edited by Veikko Rantala, Lewis Rowell, and Eero Tarasti, Acta philosophica Fennica, vol. 43 (Helsinki: Philosophical Society of Finland, 1988), 9-27.

9. Johnson, *The Body in the Mind*, 104, emphasis as in original.

10. In ascribing a central role to the imagination, Johnson built upon Kant's view of the imagination as it was developed in *The critique of judgment*. See Johnson, *The Body in the Mind*, 157-66.

11. Johnson, *The Body in the Mind*, 170.

12. For those who would inquire further into Johnson's work, it should be noted that an important strain running through *The Body in the Mind* is a confrontation with Objectivism. Objectivism, first character-ized by Edmund Husserl (see *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*, translated by David Carr (Evanston, IL: Northwestern University Press, 1970)), has been described by Richard Bernstein as inhering in the basic conviction that there is or must be a permanent, ahistorical matrix or framework to which we can ultimately appeal in determining the nature of rationality, knowledge, truth, reality, goodness, or rightness (*Beyond Objectivism and Relativism: Science, Hermeneutics and Praxis*, reprint, 1983 (Philadelphia: University of Pennsylva-nia Press, 1988), 8). In seeking to refute Objectivism, it was important for Johnson to show how human knowledge could be grounded in embodied experience; that understanding could develop and flourish without having to touch base with an objective reality; and that such a reality was not a prerequisite for knowledge. The theory of image schemata proved crucial in making his argument, for it supported each of these claims.

13. Mark Johnson, *Moral Imagination: Implications of Cognitive Science for Ethics* (Chicago: University of Chicago Press, 1993).

14. George Lakoff and Mark Johnson, *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought* (New York: Basic Books, 1999).

15. See in particular Lakoff, "The Invariance Hypothesis"; Lakoff and Turner, *More Than Cool Reason;* and Lakoff, "The Contemporary Theory of Metaphor."

16. See Zoltán Kövecses, *Emotion Concepts* (New York: Springer-Verlag, 1990); and Eve Sweetser, *From Etymology to Pragmatics: The Mind-as-Body Metaphor in Semantic Structure and Semantic Change* (Cambridge: Cambridge University Press, 1990).

17. For Turner's work on cognitive rhetoric, see his *Death is the Mother of Beauty: Mind, Metaphor, Criticism* (Chicago: University of Chicago Press, 1987); *Reading Minds: The Study of English in the Age of Cognitive Science* (Princeton: Princeton University Press, 1991); *The Literary Mind*; and the essay "Figure" in Albert N. Katz, Cristina Cacciari, Raymond W. Gibbs, Jr., and Mark Turner, eds., *Figurative Language and Thought* (New York: Oxford University Press, 1998), 44-87. An analysis of image-schematic aspects of literary style can be found in Francis-Noël Thomas and Mark Turner, *Clear and Simple as the Truth: Writing Classic Prose* (Princeton, New Jersey: Princeton University Press, 1994), 67-71.

18. A comprehensive view of Gibbs' work can be found in his *The Poetics of Mind*; empirical research on image schemata is reported in Raymond W. Gibbs, Jr. and Herbert L. Colston, "The Cognitive Psychologi-cal Reality of Image Schemas and Their Transformations," *Cognitive Linguistics* 6, no. 4 (1995): 347-78.

19. Lawrence W. Barsalou, "Perceptual Symbol Systems," unpublished paper (1997); Lawrence W. Barsalou, et al., "Concepts and Meaning," in *Chicago Linguistics Society 29: Papers from the Parasession on Conceptual Representations*, edited by K. Beals, et al. (Chicago: University of Chicago, Chicago Linguistics Society, 1993); Lawrence W. Barsalou, Karen Olseth Solomon, and Ling-Ling Wu, "Perceptual Simulation in Conceptual Tasks," in *Cultural, Typological,˙and Pyschological Perspectives in Cognitive Linguistics: The Proceedings of the 4th Conference of the International Cognitive Linguistics Association* (Amsterdam: John Benjamins).

20. On neuroscience, see Gerald M. Edelman, *The Remembered Present: A Biological Theory of Consciousness* (New York: Basic Books, 1989), chapter 8; Gerald M. Edelman, *Bright Air, Brilliant Fire: On the Matter of Mind* (New York: Basic Books, 1992), 238-41; Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: Avon, 1994); and Antoino R. Damasio, The Feeling of what Happens: Body and Emotion in the making of Consciousness (New York: Harcourt Brace & Company, 1999). On gesture, see David McNeill, *Hand and Mind: What Gestures Reveal About Thought* (Chicago: University of Chicago Press, 1992).

21. For discussions of the way image schemata structure conceptual models see George Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (Chicago: University of Chicago Press, 1987), chapters 4 and 17; Lawrence Zbikowski, "Conceptual Models and Cross-Domain Mapping: New Perspectives on Theories of Music and Hierarchy," *Journal of Music Theory* 41, no. 2 (Fall 1997): 11-43 and Lawrence Zbikowski, *Conceptualizing Music: Cognitive Structure, Theory, and Analysis* (Forthcoming: Oxford University Press), chapters 3 and 4.

22. I discuss a related notion — what I call a "properly musical concept" — in my essay "Seeger's Unitary Field Theory Reconsidered," in *Understanding Charles Seeger, Pioneer in American Musicolgy,* edited by Bell Yung and Helen Rees (University of Illinois Press, 1999): 130-149.

BIBLIOGRAPHY

Barker, Andrew, ed. *Greek Musical Writings, Volume II: Harmonic and Acoustic Theory*. Cambridge: Cambridge University Press, 1989.

Barsalou, Lawrence W. "Perceptual Symbol Systems." Unpublished paper, 1997.

Barsalou, Lawrence W., Karen Olseth Solomon, and Ling-Ling Wu. "Perceptual Simulation in Conceptual Tasks." In *Cultural, Typological, and Pyschological Perspectives in Cognitive Linguistics: The Proceedings of the 4th Conference of the International Cognitive Linguistics Association*. In press. Amsterdam: John Benjamins.

Barsalou, Lawrence W., et al. "Concepts and Meaning." In *Chicago Linguistics Society 29: Papers from the Parasession on Conceptual Representations*, edited by K. Beals, et al. Chicago: University of Chicago, Chicago Linguistics Society, 1993.

Bernstein, Richard. *Beyond Objectivism and Relativism: Science, Hermeneutics and Praxis*. 1983. Philadelphia: University of Pennsylvania Press, 1988.

Damasio, Antonio R. *Descartes' Error: Emotion, Reason, and the Human Brain*. New York: Avon, 1994.

Edelman, Gerald M. *Bright Air, Brilliant Fire: On the Matter of Mind*. New York: Basic Books, 1992.

————. *The Remembered Present: A Biological Theory of Consciousness*. New York: Basic Books, 1989.

Fauconnier, Gilles. *Mappings in Thought and Language*. Cambridge: Cambridge University Press, 1997.

Gärdenfors, Peter. "Semantics, Conceptual Spaces and the Dimensions of Music." In *Essays on the Philosophy of Music*, edited by Veikko Rantala, Lewis Rowell, and Eero Tarasti. Acta Philosophica Fennica, vol. 43, 9-27. Helsinki: Philosophical Society of Finland, 1988.

Gibbs, Raymond W., Jr. *The Poetics of Mind: Figurative Thought, Language, and Understanding*. Cambridge: Cambridge University Press, 1994.

Gibbs, Raymond W., Jr., and Herbert L. Colston. "The Cognitive Psychological Reality of Image Schemas and Their Transformations." *Cognitive Linguistics* 6, no. 4 (1995): 347-78.

Husserl, Edmund. *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*. Translated by David Carr. Evanston, IL: Northwestern University Press, 1970.

Johnson, Mark. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press, 1987.

————. *Moral Imagination: Implications of Cognitive Science for Ethics*. Chicago: University of Chicago Press, 1993.

Katz, Albert N., Cristina Cacciari, Raymond W. Gibbs, Jr., and Mark Turner, eds. *Figurative Language and Thought*. New York: Oxford University Press, 1998.

Kövecses, Zoltán. *Emotion Concepts*. New York: Springer-Verlag, 1990.

Lakoff, George. "The Contemporary Theory of Metaphor." In *Metaphor and Thought*, 2d ed., edited by Andrew Ortony, 202-51. Cambridge: Cambridge University Press, 1993.

————. "The Invariance Hypothesis: Is Abstract Reason Based on Image-Schemas?" *Cognitive Linguistics* 1, no. 1 (1990): 39-74.

————. *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago: University of Chicago Press, 1987.

Lakoff, George, and Mark Johnson. *Metaphors We Live By*. Chicago: University of Chicago Press, 1980.

————. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books, 1999.

Lakoff, George, and Mark Turner. *More Than Cool Reason: A Field Guide to Poetic Metaphor*. Chicago: University of Chicago Press, 1989.

McNeill, David. *Hand and Mind: What Gestures Reveal About Thought*. Chicago: University of Chicago Press, 1992.

Seeger, Anthony. *Why Suyá Sing: A Musical Anthropology of an Amazonian People*. Cambridge: Cambridge University Press, 1987.

Sweetser, Eve. *From Etymology to Pragmatics: The Mind-as-Body Metaphor in Semantic Structure and Semantic Change*. Cambridge: Cambridge University Press, 1990.

Thomas, Francis-Noël, and Mark Turner. *Clear and Simple as the Truth: Writing Classic Prose*. Princeton, New Jersey: Princeton University Press, 1994.

Turner, Mark. "Aspects of the Invariance Hypothesis." *Cognitive Linguistics* 1, no. 2 (1990): 247-55.

————. *Death is the Mother of Beauty: Mind, Metaphor, Criticism*. Chicago: University of Chicago Press, 1987.

————. "An Image-Schematic Constraint on Metaphor." In *Conceptualizations and Mental Processing in Language*, edited by Richard A. Geiger and Brygida Rudzka-Ostyn. Cognitive Linguistics Research, vol. 3, 291-306. Berlin: Mouton de Gruyter, 1993.

————. *The Literary Mind*. New York: Oxford University Press, 1996.

————. *Reading Minds: The Study of English in the Age of Cognitive Science*. Princeton: Princeton University Press, 1991.

Zbikowski, Lawrence. "Seeger's Unitary Field Reconsidered." In *Foundations of Modern Musicology: Understanding Charles Seeger, Pioneer in American Musicology*, edited by Bell Yung and Helen Rees 130-149. University of Illinois Press, 1999.

————. "Conceptual Models and Cross-Domain Mapping: New Perspectives on Theories of Music and Hierarchy." *Journal of Music Theory* 41, no. 2 (Fall 1997): 11-43.

————. *Conceptualizing Music: Cognitive Structure, Theory, and Analysis*. Forthcoming, Oxford University Press.

————. "Metaphor and Music Theory: Reflections from Cognitive Science." *Music Theory Online* 4, no. 1 (January 1998).