a journal of the Society for Music Theory

Volume 2, Number 4, May 1996

The Aims of Music Theory and Neurath's Boat: A Reply to Jonathan Walker and Matthew Brown*

Josh Mailman

REFERENCE: http://mto.societymusictheory.org/issues/mto.96.2.2/mto.96.2.2.brown.html

KEYWORDS: aesthetic, statistics, music theory, analysis, philosophy, science

ABSTRACT: In this commentary, I will first clear the air of a criticism Walker has made of Brown's "Adrift on Neurath's Boat." Secondly, I will look at what issues arise when *naturalizing* music theory, by allowing revisions. Thirdly, I will critically address two proposals made by Brown regarding testing theories and the connection between aesthetic and nonaesthetic properties. Finally, I will consider the ramifications of Brown and Dempster's scientific model of music theory and discuss alternatives to this model.

Overview

---

1. Naturalizing Music Theory: What It Is, What It Isn't

[1.1] There seems to be a confusion about Brown's suggestion to *naturalize* music theory. In response to Brown, Walker objected that "Neurath was able to keep his boat afloat only because, as a logical positivist, he still believed that analytical [*sic*] and synthetic propositions were logically distinct [from each other], and accordingly upheld the dichotomies of theory/observation and form/content. Quine's project of a naturalized epistemology arises precisely from his denial that any

such logical distinctions can be made. Because of this denial, Quine can never keep Brown, Neurath or anyone else afloat."[1]

[1.2] Walker's criticism of Brown is unfounded and stems from Walker's misreading of Quine. Brown does not equate *naturalizing* music theory with putting observational (synthetic) and foundational (analytic) statements on the same footing. Rather, Brown makes the point, taken from Quine's view of science, that observational statements differ from foundational ones in degree but not in kind. Consider this example: "The distribution of interval-class invariant pc-set classes contributes to organic coherence in Webern's music." In one context, this statement would be considered observational, in another context it would be foundational. In other words: in one case the analyst might try to analyze and explicate Webern's pitch organization (observational), while in another case, assumptions concerning Webern's pitch organization may enter into the analysis of some other aspect of his music—or perhaps another composer's music (foundational).

[1.3] Quine's central contention is that "all statements are revisable": there is no *strict* dichotomy between observational statements (synthetic/revisable) and foundational statements (analytic/non-revisable). Whether a statement is observational or foundational is not a philosophical question. It's an empirical question. It's a question about how humans reason. Therefore, it's a question for behavioral psychology, which is a natural science—hence the term *naturalized*.[2]

[1.4] When there's friction between observations and foundational principles, it may be a good idea to revise foundational principles. When faced with such friction, we can amend a theory, or theories, in various places to accommodate it. Of course, our tendency is to disturb the entire system of theories as little as possible (call it laziness). So, we focus our revisions upon the specific observational statements which aroused the friction.[3]. In this sense, revisability is like a continuous field. At least, for science, the perimeter of this field is comprised of simple observations such as "That leaf is green." At the center are axioms of mathematics and logic, such as the *law of excluded middle* and *modus ponens*, etc. Revising statements at the center of the field is like rebuilding the entire foundation of the Empire State Building (not a task for theorists with a busy teaching schedule). Such a task requires evacuating the whole building and rebuilding it from scratch (not to mention redecorating): revising all analytical strategies (not to mention all actual analyses). Nevertheless—and this the thrust of the *naturalized* viewpoint—the logical distinction between making minor repairs and rebuilding foundations is only one of degree: the foundation is part of the building itself. What *naturalizing* music theory suggests, is that no statement or theory is immune to revision; however, it does *not* suggest that all statements and theories are equally susceptible to revision.[4] That's where Walker is mistaken.

2. What Revisions?

[2.1] What to revise, and what not to revise—that's the question. The answer depends somewhat on what the aims of music theory are. But putting that issue aside for the moment, what other issues are involved? Inevitably, we look at which theories incorporate more details of the music (e.g. pc-set theory), and which theories afford more satisfying analyses (e.g. Schenkerian).[5] Still further, we hope that a theory which affords detailed and satisfying analyses of one class of music (e.g. tonal) will apply somehow to other classes of music (e.g atonal, twelve-tone, serial etc.)

[2.2] Don't think music theory is alone with these dilemmas: detailed, is analogous to what statisticians call *validity*; satisfying, is analogous to what they call *sensitivity*. Validity is, roughly, the proportion of data values included in a statistical procedure (detailed). Sensitivity is the interpretive precision allowed by the included data values (satisfying). Increasing validity decreases sensitivity, and vice-versa. A statistical procedure is called *robust* if it retains validity *and* sensitivity when applied to data sets which differ from the expected profile (e.g. classes of music to which we didn't expect to apply the analytic procedure).[6]

3. What is Our Aim?

[3.1] Now, the degree of robustness we want in analytical strategies, and also the criteria for what we consider satisfying (sensitive), depend on our expectations of music theory and analysis: what is our aim? Is it scientific or is it aesthetic? Brown, and his colleague Douglas Dempster, tell us that our goals should be scientific. On the one hand, they tell us that there's already a precedent for scientific goals in music theory. On the other hand, they tell us that modifying music theory, to make it truly scientific, isn't such bitter medicine after all.

4. Precedents

[4.1] As for precedents, Brown and Dempster cite Boretz, Rahn, and Babbitt. In "The Scientific Image of Music Theory" Brown and Dempster somehow labeled Boretz, Rahn, and Babbitt scientific music theorists because Boretz, Rahn, and Babbitt espouse a scientific language for analytical and theoretical discourse. Brown and Dempster then assumed that these three theorists espouse such language *because* they adopted the goals of science. Brown and Dempster then claimed that Boretz, Rahn, and Babbitt aren't really doing what they set out to do, because they cannot support predictive models, which constitute science.(7) But Brown and Dempster failed to show that these three theorists adopted empirical scientific goals in the first place. And in fact Boretz, Rahn, and Babbitt *never* ascribed to the predictive aims of empirical scientists, regardless of whether they emphasize uniqueness of a musical work over similarity to other "masterworks."(8) It is more likely that Boretz, Rahn, and Babbitt espouse a scientific language of discourse because they recognize that less precise language is inadequate for conveying the critical points they want to make, to do full justice to the music they are critiquing. Brown and Dempster confused choice of language of discourse with choice of goals. So much for precedents.

5. Brown's (and Dempster's) Medicine

[5.1] Now let's look at the medicine Brown is prescribing. It seems that Brown's intent in "Adrift on Neurath's Boat" is to beef up the credibility of music theory in the wake of criticisms from the New Musicology corner. In his final remarks he makes proposals for improving the discipline of music theory in light of a naturalized model (allowing revisions). Brown proposes that "we must tighten up the ways in which we test theories and analyses," and emphasizes "the need to find law-like relationships not only among aesthetic properties, but also between aesthetic and nonaesthetic properties."(9) Can music theory live happily with these modifications?

[5.2] What about testing theories and analyses? I presume that testing theories and analyses means taking aim at dubious claims about a particular musical work or a particular dimension (e.g. the role of pc-set structures) of a body of musical works (e.g. music in the twelve-pitched equal tempered system).

[5.3] In an analysis, we inevitably highlight selected nonaesthetic properties which we claim have aesthetic *significance* in the global interpretation of the work. Let's assume our theories and analyses are logically consistent and not counterfactual. We may then question the claims by asking how, why, and how much are *these* nonaesthetic properties significant?

[5.4] We might deem a nonaesthetic property significant because it is a contextual anomaly with respect to analogous contexts in other musical works or in the same work. We can debunk such a claim of aesthetic significance by demonstrating that, in fact, the nonaesthetic property in question is a consequence of the musical system or the compositional technique. Babbitt demonstrates how nonaesthetic properties of a musical work which seem to be anomalous, can actually be consequences of the twelve-tone system. In one instance, he discusses the significance of Stravinsky's choice of the 6-9 hexachord in his "Variations." Babbitt demonstrates that the inversional relationship between the "verticals" resulting from order rotations is *not* due to properties peculiar to the 6-9 hexachord. Rather it is a consequence of the order rotation procedure.(10) Once we know that Stravinsky was using that rotation procedure, it becomes evident that Stravinsky's choice of the 6-9 hexachord isn't so significant after all. Babbitt emphasizes the importance of formal music theory techniques in separating "particularity" from "generality" and therefore significance from irrelevance.(11) We determine such significance by deduction from axioms. Therefore, Brown's empirical testing doesn't apply to debunking such a claim of aesthetic significance (a claim that the nonaesthetic property is a contextual anomaly: unlikely to occur by accident).

[5.5] We may also deem a nonaesthetic property aesthetically significant because it is easily heard. Suppose the property in question is a similarity between two particular sonorities in the musical work. We note that the two sonorities contain the same interval classes. Brown would have us refer to psychoacoustic test results to decide how easy it is to hear that two sonorities contain the same interval classes. However, such psychoacoustic experiments inevitably use out-of-context listening examples. It's not hard to imagine that, in an *actual* musical context, the interval content of set-classes is reinforced if it occurs first as a melody and then as a harmony, or vice-versa.(12) Psychoacoustics cannot account for such specific contextual factors. We will always have to weigh on a case by case basis out-of-context empirical results against contextual

factors in order to gauge the audibility of a nonaesthetic property. Therefore, we can't develop across-the-board standards to test how easily a nonaesthetic property is heard, to decide on aesthetic significance. We can't scientifically test theories and analyses, unless they cease to employ (implicitly or explicitly) aesthetic concepts of significance. So much for scientifically testing theories and analyses.

[5.6] Brown's medicine seems innocuous (even tasteless) at first glance because it purports to help us understand aesthetic properties better. (That sounds OK. It's already part of the agenda of music theory, so maybe Brown and Dempster's scientific model is compatible with the aesthetic aims of music theory.) In fact, understanding aesthetic concepts is one of his main ingredients: Brown emphasizes "the need to find law-like relationships not only among aesthetic properties, but also between aesthetic and nonaesthetic properties."

[5.7] Finding law-like relationships between aesthetic and nonaesthetic properties is an enterprise which might seem sensible at first glance. But it's not. Frank Sibley explained the problem, in a general way in his essay "Aesthetic Concepts."(13) Now let's apply it to the case of music theory.

[5.8] Generally, we may say that the presence of a nonaesthetic property can be determined by some mechanical procedure, whether simple (e.g. observing the notes in a chord) or involved (e.g. invariance matrices and pc-similarity measures). On the other hand, the application of an aesthetic term is anything but mechanical. Sibley explains "the making of such judgments as these requires the exercise of taste, perceptiveness, or sensitivity, of aesthetic discrimination or appreciation. One would not say this of the first group, [nonaesthetic terms]."(14) Aesthetic terms enter when we interpret the role of particular nonaesthetic properties in a given musical context. (e.g. how pitch-relationships [nonaesthetic] contribute to organic coherence [aesthetic]).

[5.9] In order to find law-like relationships between aesthetic and nonaesthetic properties, we must assume that the mere presence of certain nonaesthetic properties in a musical work can determine whether or not a certain aesthetic term is appropriate for that work, dimension of the work, or section of the work. We're looking for laws of appropriateness for saying that a musical work has such-and-such an aesthetic property?

[5.10] Often we support the application of an aesthetic term by referring to other aesthetic properties which we claim are present in the musical work. However, in other instances we support the application of an aesthetic term by referring to purely nonaesthetic properties which are present. We may eagerly jump to the conclusion (as Brown does) that the dependence of aesthetic properties on nonaesthetic properties can be formulated into rules or laws. Not so. "[T]here are no nonaesthetic features which service in *any* circumstances as logically *sufficient conditions* for applying aesthetic terms. Aesthetic or taste concepts are not in *this* respect condition-governed at all."(15)

[5.11] Many readers will know that Wittgenstein, among others, illustrated that familiar everyday concepts are governed only loosely by conditions, not strictly by necessary-and-sufficient conditions.(16) Some may therefore think it's plausible that aesthetic concepts are, like familiar everyday concepts, governed in a loose way by conditions. However, this is not the case: the use of aesthetic concepts differs radically from that of everyday concepts.

[5.12] When there are no *necessary-and-sufficient* conditions for applying an everyday concept, there are usually relevant features which, if present, warrant the use the concept. For example, in claiming that someone is *intelligent* we can start to list features which are relevant to *intelligence*. Such relevant features are "ability to grasp and follow various kinds of instructions, ability to master facts and marshal evidence, ability to solve mathematical or chess problems," etc.(17) The presence of these features can only support the claim, not count against it. Although no one feature can clinch the matter entirely, it is always possible to look at previous cases to decide what group of features were sufficient to warrant the use of the term *intelligent* in previous cases.

[5.13] We can even accept that with everyday terms, such as *intelligence*, the mere reporting of the presence of some group of features will unquestioningly justify the use of the term. "We are able to say 'If it is true he can do this, and that, and the other, then one just cannot deny that he is intelligent.'"(18) However, for aesthetic terms, this just won't do. The mere reporting of the presence of some nonaesthetic features of a musical work can never unquestioningly justify the application

of some aesthetic term, such as *organic coherence*. We would not expect a music theorist or analyst to say something such as "If it is true that the successive chords of piece have such-and-such an interval class invariance scheme and the rhythm is generated by such and such a pattern," *et cetera ad infinitum*, "then one just cannot deny that the work is organically coherent." No theorist, analyst, or knowledgeable reader would unqualifiedly accept a particular claim of *organic coherence* without having heard the musical work in question, or having access to the entire score. To be even more crude, we would not expect a deaf (from birth) person to discriminate aesthetic properties in a musical work, no matter how well he has learned to identify and relate nonaesthetic musical properties from scores, no matter how familiar he is with precedents, no matter if he is a brilliant cognitive psychologist or neurobiologist. In short, aesthetic concepts differ from everyday concepts in that their proper use depends on first hand experience, not just testimony. We expect the reader of an analysis to follow the score and/or listen to a recording of the work. Evidently, Brown doesn't have such expectations.

[5.14] Brown is asking us to seek law-like relationships between aesthetic properties and nonaesthetic properties—prediction is his game. So he must be asking us to assume that the mere presence of certain *nonaesthetic* properties in a musical work can determine the aptness of applying a certain *aesthetic* term to the work, dimension of the work, or section of the work. Beware—the consumption of this assumption might cause indigestion.

[5.15] Allow me to introduce SMT (scientific music theorist). Suppose SMT gathers together paradigm cases of musical works, or excerpts, which are said to have a particular aesthetic property. Then, using these paradigm musical examples as stimuli, SMT carries out psycho-acoustic, neurobiological, and cognitive psychological experiments (using musicians and nonmusicians as subjects). Then SMT analyzes the data; he correlates the responses of the study subjects with nonaesthetic properties found in our paradigm musical examples. Through this process SMT develops a predictive model, one that provides laws describing the dependence of a particular aesthetic property on the presence of particular nonaesthetic properties. He can then, as an analyst, apply such models, analyzing other musical works, ascribing aesthetic properties to these musical works based on an assemblage of information regarding nonaesthetic properties they exhibit.

[5.16] It is now time for SMT to become SMA (scientific music analyst) in order to demonstrate the application of his research. Now, imagine behind a curtain is a musical work. In front of the curtain is SMA. SMA stands before an audience of other music analysts, theorists, performers, and educated music enthusiasts. SMA knows his audience well; he knows they have a predilection for musical works deemed *organically coherent*. SMA is prepared to present an analysis of the musical work to his audience, to convince them that the work is indeed organically coherent. He also knows that organic coherence is not just a matter of nonaesthetic properties, but a matter of aesthetic ones as well. SMA has never actually heard the musical work behind the curtain, nor seen the score; his audience is equally unfamiliar with the musical work. But SMA fears not: he is equipped with laws, derived from empirical experiments, predicting the dependence of aesthetic properties on nonaesthetic properties. His audience is equally knowledgeable of these empirically tested laws (they do their homework). SMA has chosen his musical specimen by the following process: He has a host of musical scores, with accompanying audio recordings, encoded in all detail and stored in a database. SMA has developed a complex querying program which probes the musical works in the database to find works which have the requisite combination of nonaesthetic properties to have certain aesthetic properties, which are in turn required in order to make his analysis convincing.[(19)] SMA then delivers his analysis to his audience, citing the aesthetic properties exhibited by the work. Here and there he also cites some nonaesthetic properties, in order to make his analysis more concrete. The crowd follows the analysis point for point. In the end they're absolutely convinced that the musical work behind the curtain is indeed *organically coherent*. They all go home with a heightened understanding and appreciation of the musical work, without having heard it, without having seen the score.

[5.17] The absurdity of this music-behind-the-curtain scenario points to the problem with devising laws defining the relationships between nonaesthetic properties and aesthetic properties: to devise such laws is simply to turn the aesthetic terms into nonaesthetic terms. Furthermore, the notion that music analyses can proceed and be understood without first hand experience of the particular musical work, serves as a kind of unintentional Ursatz of Brown and Dempster's program. In "The Scientific Image of Music Theory" Brown and Dempster rhetorically asked the questions "[H]ow are analytical prescriptions justified? Should a naive listener simply place faith in the authority of some particular analyst? If so, which one?," and "[H]ow can we be sure that the judgments of one self-professed connoisseur are more trustworthy than those of another?"[(20)] That Brown and Dempster even asked these questions suggests that they haven't properly considered that an

analysis is meant to be corroborated by the reader. Naive listeners can only benefit from a so-called prescriptive analysis in so far as they can corroborate the claims made in the analysis by inspecting the score and listening to the piece. They do not benefit by blindly swallowing claims made by the analyst. Therefore trust and faith are a nonissue, contrary to what Brown and Dempster suggest. A music analysis must in some way (implicitly or explicitly) involve aesthetic concepts. Otherwise, it could be carried out, and be read and understood without first hand experience of the specific musical work; such an analysis, is *no aesthetic analysis at all*. In fact it is a nonaesthetic analysis, and it proceeds from the assumption that the music analyst, and the reader of the analysis, are to maintain a somehow neutral *and remote* relationship to the musical specimen being analyzed. Such an assumption suggests that the relationship between people and music is analogous to the relationship between people and neutrino particles. I guess Brown and Dempster do indeed propose a truly scientific model of music theory—one that leads to the music-behind-the-curtain scenario, one in which music theory adopts the aims of empirical science.

6. Aesthetic Model or Scientific Model

[6.1] Brown and Dempster don't see the conflict between their scientific aims and our aesthetic aims. But in fact, there are three fundamental differences between scientific knowledge/inquiry and music theory/analysis. They can be spelled out as follows: First: Science serves as a tool, ultimately, for predicting future experience in the light of past experience.[(21)] Music theory primarily develops tools for doing critical analysis, ultimately for "communicating critical experiences" in order to help others "hear the piece better."[(22)]Second: What scientists study can be considered static in light of the following distinction: the behavior of the physical world is not intrinsically or fundamentally changed by the creativity of human beings, whereas music *is created* by human beings and, therefore, what constitutes music is being redefined every day by people who make it.[(23)] Third: Value judgments (those depending on subjective and intersubjective taste or preference) are not intrinsically important in science, whereas subjective and intersubjective taste are intrinsically a part of music theory and analysis (at some level or other) no matter how many objective facts and scientific techniques the theorist employs.

[6.2] As the smoke clears, it looks like Brown and Dempster thought, that by asking us to be more scientific, they were asking us to grow stronger roots for the tree that Boretz, Rahn, and Babbitt have already grown (music theory as a science). But in fact, Brown and Dempster are asking us to grow a whole new tree, with completely different roots (predictive aims of empirical science)—roots which neither Boretz, Rahn, Babbitt, nor the rest of music theory ever had.

[6.3] Brown and Dempster direct deserved attention to the notion that empirical science could be extremely fruitful for music theory: psycho-acoustics, cognitive psychology, and neurobiology can be *invaluable* for helping us understand how we hear, remember, and physically respond to music. But that says nothing about choosing empirical scientific *aims* (prediction) instead of critical aesthetic *aims*. Contrary to what Brown and Dempster assumed, *there is no inconsistency in enlisting the study of psycho-acoustics, cognitive psychology, and neurobiology to pursue critical aesthetic aims. There is no inconsistency in choosing a precise language of discourse to pursue critical aesthetic aims. There is no inconsistency in probing nonaesthetic properties with computerized techniques and statistical correlation to pursue critical aesthetic aims.*

7. Aesthetic Model

[7.1] In contrast to Brown and Dempster's scientific model, I propose the following aesthetic model, which is, for the most part, already operative: First: The only way to challenge a music theory or analysis is simply to scrutinize it, not test it. Such scrutiny can only take the form of a critical dialogue among theorists and analysts. Scientifically testing theories and analyses won't work. Second: Aesthetic properties must remain aesthetic properties: they cannot be defined by laws of dependence on nonaesthetic properties. First hand experience of the particular musical work will always be necessary for making and corroborating aesthetic claims about a work or components of a work. Third: The analyst's role is to use aesthetic concepts to arbitrate between the importance of formal aspects of a musical system, data regarding music perception, and peculiarities of the musical work. And the adequacy of a *theory* can be gauged by its eventual application in analysis.

[7.2] In this aesthetic model, a music analysis should offer the reader a perspective by, in effect, saying "If you look at it this way you will see the aesthetic property I see" (organic coherence, etc.). We tacitly ask the reader to observe, from the score,

the aesthetic (and nonaesthetic) properties discussed in the analysis. We mention nonaesthetic properties to support our claim of an aesthetic property; we guide the reader to the proper perspective to observe the aesthetic property first hand. A music analysis, like any critical analysis, serves to direct attention to what is not obvious to casual or uninstructed inspection; it doesn't substitute for first hand experience of the particular musical work. The analyst's presentation "will always reflect a *critical* attitude toward the piece."(24) The reader of the analysis verifies the adequacy of this critical attitude through first hand observation, in an effort to "hear the piece better."(25) Of course, the aesthetic model should allow for revisions of theories and analyses also (naturalizing), but with critical aesthetic aims in mind, rather than empirical scientific ones.

8. Conclusion

[8.1] So why is it so easy to lose sight of the critical aesthetic aims of music analysis and theory? That's open for speculation. Perhaps we don't need medicine so much for the tree and its roots (theory and its ultimate aims), but for the branches of the tree (the mode of presentation of analyses): they just don't seem to get us close enough to the sky (hearing the music better). Music analyses typically take the form of a combination of prose, selected musical examples, and mathematical formulations. When global pictures of a work are presented, they usually are either sketchy reductions (e.g. Schenkerian graphs), or pictures of a single dimension of the music (one dimensional pitch space).(26) Recently, computer technology has made it possible to present ideas, and data, more flexibly, more creatively. Perhaps, more intuitive and comprehensive ways of presenting the subtle and precise concepts of music theory and analysis are on the horizon.

Josh Mailman
225 West 15 Street
New York, NY 10011
jmailman@panix.com

Footnotes

* This essay was written in response to Brown's article in MTO 2.2, and to the discussion that ensued on mto-talk.
Return to text

1. Jonathan Walker, posting to mto-talk@societymusictheory.org of 3/3/96: 2.
Return to text

2. Willard V. O. Quine, "Epistemology Naturalized," *Ontological Relativity* (New York: Columbia University Press, 1969): 83.
Return to text

3. Willard V. O. Quine, "Two Dogmas," in *From a Logical Point of View* (Cambridge: Harvard University Press, 1961/1980): 44.
Return to text

4. Quine, "Two Dogmas," 42.
Return to text

5. Jonathan Walker, posting to mto-talk@societymusictheory.org of 3/3/96: 5.
Return to text

6. See, for example, Lambert Koopmans *An Introduction to Contemporary Statistics* (Boston: Duxbury Press, 1981): 224–233.
Return to text

7. Brown and Dempster point out that Boretz, Rahn, and Babbitt cannot sustain the Deductive-Nomonological model proposed by Hempel. See Brown and Dempster, "The Scientific Image of Music Theory," *Journal of Music Theory* 33 (1989): 65–106.
Return to text

8. Babbitt has in several places emphasized a scientific approach to musical problems. But his allusions to "prediction" are not concerned with predicting, per se, the behavior of music in aesthetic terms. Rather, his concerns are the inherent formal properties of the twelve-pitch equal tempered system and more specifically the twelve-tone system. He has emphasized that investigation of these properties can serve not only to uncover resources for the composer, but also to forecast possible attributes to be observed in future musical works. The investigation Babbitt has in mind is directly concerned only with nonaesthetic properties, not empirically driven prediction of aesthetic properties. Milton Babbitt, "The Structure and Function of Music Theory," in Boretz & Cone, ed., *Perspectives on Contemporary Music Theory* (New York: Norton, 1972): 14, 20.

According to Rahn, "The game played by music theorists emphasizes communication, not segregation or prediction." John Rahn, "Notes on Methodology in Music Theory," *Journal of Music Theory* 33 (1989): 150.

Boretz emphasizes that analysis serves to demonstrate the coherence of a musical work by showing the multiplicity of significant relationships between pitches. Benjamin Boretz, "Meta-variations," *Perspectives of New Music* Part 2, 8/2 (1970): 64, Part 3/1,9/1 (1970): 24, Part 3/2, 9/2 (1971): 258.
Return to text

9. Matthew Brown, "Adrift on Neurath's Boat," *Music Theory Online* 2.2 (1996): 16.
Return to text

10. Milton Babbitt, "Contemporary Music Composition and Music Theory as Contemporary Intellectual History," in *Perspectives in Musicology* (New York: Norton, 1972): 165–67. For a discussion of the probabilistic significance of the Rp pc-set class similarity relation see Allen Forte, *The Structure of Atonal Music* (New Haven: Yale University Press, 1973): 47, 49.
Return to text

11. Babbitt, "Contemporary Music Composition and Music Theory as Contemporary Intellectual History," 165–67.
Return to text

12. The contextual significance of harmonic (vertical) and melodic (horizontal) presentations of the same set class in the second movement of Webern's Concerto Op.24 are discussed by Christopher Hasty, "Segmentation and Process in Post-Tonal Music," *Music Theory Spectrum* 3 (1981): 54–73.
Return to text

13. Frank Sibley, "Aesthetic Concepts," *Philosophical Review* 67 (1959): 421–450.
Return to text

14. Sibley, 421.
Return to text

15. Sibley, 424.
Return to text

16. Ludwig Wittgenstein, *Philosophical Investigations*, 3rd ed. (New York: Macmillan Publishing Co.): 33–40.
Return to text

17. Sibley, 425–26.
Return to text

18. Sibley, 426.
Return to text

19. Computer aided analysis has indeed been insightful regarding structural relationships of nonaesthetic properties and their correlation to possible segmentations (i.e. No criticism of computer aided analysis is intended.) See, for example James Tenney and Larry Polansky, "Temporal Gestalt Perception in Music," *Journal of Music Theory* 24/2 (1980): 205–242. See also Yayoi Uno and Roland Hubscher, "Temporal-Gestalt Segmentation," *Computers in Music Research* 5 (1995): 1–38.

Return to text

20. Matthew Brown and Douglas Dempster, "The Scientific Image of Music Theory," *Journal of Music Theory* 33 (1989): 92, 96.
Return to text

21. Quine, "Two Dogmas," 44.
Return to text

22. David Lewin, "Behind the Beyond," *Perspectives of New Music* 7/2 (1969): 63.
Return to text

23. In fact, music theory can actually determine, or at least influence, directions which music composition takes. Milton Babbitt's theoretical work taken together with his own compositional output and that of others is a good example of this phenomenon.
Return to text

24. Lewin, "Behind the Beyond," 63.
Return to text

25. Ibid.
Return to text

26. See, for example, Jane Piper Clendinning, "The Pattern-Meccanico Compositions of György Ligeti," *Perspectives of New Music* 31/1 (1993): 192–234.
Return to text

Prepared by Lee A. Rothfarb, General Editor and Tahirih Motazedian, Editorial Assistant