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       M U S I C   T H E O R Y   O N L I N E

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TITLE: Theories of Categorization and Theories of Music
KEYWORDS: music cognition, categorization, Bruckner

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ABSTRACT: Processes of categorization are known to be fundamental to
human cognitive processing. This essay reviews the characteristics of
two types of categories that give rise to conceptual representations.
One type, which has been demonstrated to have a graded structure, is
then used to model dynamic processes for thematic materials in the
first movement of Bruckner's Sixth Symphony.

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[1] In this essay I want to contemplate a relatively simple question:
how do processes of categorization, which are one of the primary means
by which we organize our understanding of the world, manifest
themselves in our understanding of the organization of musical events?
In recent years questions concerning our understanding of the
organization of musical events have been treated in studies of music
cognition; I shall take the position that music theory in general also
deals with these questions, if not always explicitly.

[2] Eleanor Rosch and Barbara Lloyd proposed that the segmentation of
the environment into classifications by means of which nonidentical
stimuli can be treated as equivalent -- that is, categorization -- is
a basic task of all organisms, and indeed, one mark of living things
(1978). In general, processes of categorization appear to be a
pervasive feature of human cognitive structure, extending from basic

functions of perceptual discrimination through to sophisticated products of the imagination (see, for example, Edelman 1989, 1992). In the following, I shall concentrate on categorization at the level of conceptual representations, for this engages the issues most immediately relevant to music theory. Although such representations are relatively "high-level" constructs, I assume them to be intimately related to "low-level" constructs, and to share some of the same structures. In the first main section below I shall consider general features of category structure for categories that arise naturally from our interaction with our environment; of course, the specific environment I am interested in is one that includes musical events.

[3] The explicit use of theories of categorization has not played a large part in recent accounts of music cognition or in analyses of music. Exceptions are Robert Welker's study of the abstraction of a thematic prototype from melodic variations based on the prototype (1982), and Robert Gjerdingen's study of self-organizing neuronlike networks (1990). However, Welker views categorization as but an analogue for musical processes, and Gjerdingen's work focuses on categorization at what is arguably a pre-conceptual level. In the second main section of this essay I shall try to show how theories of categorization can be used to model dynamic processes in music through an analysis that takes as its point of departure Carl Dahlhaus's observations on the first movement of Anton Bruckner's Sixth Symphony (presented in Dahlhaus 1989). Dahlhaus's concern in these observations is with a connection between musical events that is both compelling and difficult to articulate. As one example (not discussed by Dahlhaus), consider two themes from Bruckner's first movement; the first is given in the lower strings in mm. 2-6 (see Example 1), the second in the violins and flutes in mm. 159-162 (see Example 2). Is there something more than shared rhythmic profile that connects these two events, separated by well over one hundred measures, as "thematic" entities? Connections of this general sort have been a primary focus of much of the recent work on categorization, and I believe the perspective offered by theories of categorization can do much to account for some of the elusive yet persistent "intuitions" we have about musical structure.

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Ex. 1 Bruckner, Symphony no. 6, mm. 2-6

Ex. 2 Bruckner, Symphony no. 6, mm. 159-162
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[4] My main argument is that theories of categorization have a contribution to make both to music cognition and music theory. However, I do not believe that the relationship between cognitive theories and music is a one-way street: in a brief concluding section of this essay I shall propose that the study of music has contributions to make to theories of categorization which stem from music's status as a temporal art form and a cultural artifact.

[5] Section 1. Most of the categorization that is crucial to our understanding of the world seems to proceed automatically and unconsciously. Current cognitive theory recognizes that some categories do indeed result from automatic, unconscious processes. However, the majority of categories that are at the level of concepts are the result of rather more complicated processes which may not occupy the center of our attention, but which are by no means automatic or unconscious. The category *dog* can serve as an example. We are all pretty sure we know what a dog is. This confidence is manifested in the rapidity with which we can draw a crude, stick-figure representation of a dog; in our ability to discriminate quickly and accurately between small dogs and Vietnamese pot-bellied

pigs; and in our behavioral interactions with dogs. *Dog*, as I have described it here, represents what I shall call a Type 1 category. This sort of category is a result of our interactions with our environment, and provides the basis for actions toward and thought about the entities grouped together in the category.

[6] For social animals such as humans, our environment includes not only the physical world that surrounds us, but the actions and activities of our fellow humans as well. Type 1 categories capture regularities within our individual experience and in what we observe of others' experience; they also reflect what we are taught by those around us. Although the establishment of a Type 1 category involves thought, it does not involve contemplation (that is, a deliberate pondering of what sort of things should go in what sort of categories); the proper domain of Type 1 categories is the sort of awareness of the world Martin Heidegger called *circumspection* (1962), Natsoulas calls *Consciousness 3* (1978), and which Richard Shweder has called *naive realism* (1991). And as Hubert Dreyfus has pointed out, most of our lives are spent within just this domain of consciousness (Dreyfus 1991). Because of the immediacy and transparency of this domain of consciousness, Type 1 categories often appear to represent the way the world *is*, even though these categories are heavily influenced by our social environments and reflect the regularities in the physical environment that we as humans perceive (but which other species may not perceive).

[7] For general tasks of the sort I have listed the frame of reference provided by a Type 1 category is usually adequate. However, under certain circumstances a finer level of discrimination is required: sometimes we need to know the differences between a dog and a wolf. In these cases it may be necessary to specify, in some fashion, the conditions under which a large mammal is called a wolf, and under which it is called a dog. Such specification often gives rise to what I shall call a Type 2 category, membership in which is determined by a set of conditions that are individually necessary and jointly sufficient. That is, the members of Category X must have features Y and Z; if things have features Y and Z they are members of Category X. Because of their specificity, Type 2 categories often provide a basis for discourse, and for complicated, abstract, and imaginative thought about the entities grouped together in the category. Where Type 1 categories are immediate and seemingly transparent, Type 2 categories are closer to what Roger Brown has called "achievements of the imagination" (1965, 320). Type 2 categories *are* a result of contemplation on the constituency of categories, and are thus proper to the domain of consciousness occupied with thinking about thought -- what in Heidegger is *thematic consciousness* (1962), what Natsoulas calls *Consciousness 4* (1978), and Shweder calls *artful realism* (1991).

[8] In recent writing on categorization, Type 1 categories have been called *natural* categories, based on the emergence of this sort of category from the interaction of humans with their natural environments (see Barsalou 1992a). Type 2 categories have been called *classical* categories (a term that traces the heritage of the type back to Aristotle; see Smith and Medin 1981; Lakoff 1987; Barsalou 1992a; and the discussion in part I of van Mechelen et al. 1993). Most evidence indicates that Type 2 categories simply represent a specialized form of Type 1 categories -- take a Type 1 category, specify limits for the category through the imposition of necessary and sufficient conditions for category membership, and you've created a Type 2 category (however, for another view see Sutcliffe 1993).

[9] The specification of the conditions for membership in a Type 2 category results in a clear structure for the category: a given entity

either is or is not a member of the category; category membership is typically an all-or- nothing affair. In the case of Type 1 categories the boundaries of membership are less clearly defined: category structure tends to be more variable. In fact, every Type 1 category studied thus far has been found to have a *graded* structure (Barsalou 1987, 1992a). To clarify what is meant by the notion of graded structure, let's consider the category *bird*. Experimental rankings show that subjects view robins and sparrows as the best examples of birds, with owls and eagles lower down in the rankings and ostriches, emus, and penguins among the worst examples (Lakoff 1987). All are considered members of the category *bird*, but some better represent the category than others. Category structure is consequently graded according to typicality: category members range from the most typical to the least typical, with the former securely inside the bounds of the category (robins and sparrows) and the latter in danger of being excluded from the category (emus and penguins).(1)

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(1) Following the work of Rosch and Mervis 1975, Lakoff 1987 and others have called categories with a graded structure "prototype-effect categories," where the prototype is the most typical member of the category, and prototype- effects are those of grading. For a discussion of prototype models see Hampton 1993.
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[10] Since Type 1 categories are pervasive, category membership for most of the categories we use tends to be approximate and fluid. Although vexing for those who would prefer a neat and orderly view of the world, the cognitive advantages of this type of categorization are clear. When confronted with an animal that has all the characteristics of a typical dog, but lacks visible ears and a tail, we quickly categorize the creature as a sort of earless, tailless dog. We are aware that it is not a very good example of the category *dog*, but, thus categorized, we have a first approximation of how we should act toward it. Towards variants of other categories ("extremely large house- cat," "miniature horse"), similar in outward appearance to members of the category *dog* but excluded for any number of reasons, we would act differently. The utility of Type 1 categories is immediate, the process of categorization rapid. Both features have application to the understanding of music. Given musical material and variations on that material we need not construe each variation, as well as the original material, as a separate entity, but can collect all of them within a single class ("Material X and its variations"), graded according to typicality. Because what counts as "musical material" or "variations on musical material" reflects information gathered through experience and stored in memory, categorization can be a rapid affair. Where experience is extensive, categorization can be virtually simultaneous with listening, although subject to revision on the basis of specific musical context.

[11] Although the graded structure of Type 1 categories appears to be universal, the sheer number of these categories and variation among them mitigates against a single explanation for the phenomenon of typicality, upon which grading is based. As Barsalou has noted, "It is safe to say that there are many reasons why exemplars are typical and that no single factor or invariant set of factors is solely responsible" (1987, 105). (The complexity of the phenomenon of typicality may be one reason Zadeh's theory of fuzzy sets (1965) has met with only limited success in characterizing the structure of Type 1 categories.) One aspect of cognitive structure that contributes coherence and stability to Type 1 categories are inference structures called frames, which provide the necessary context upon which determinations of typicality are based. Even a passing consideration of frames (or frameworks) is beyond the scope of the present essay; the interested reader may consult the important and original

contributions of Minsky (1975, 1985) and Schank and Abelson (1977), or
refer to the useful summaries and expansions by Barsalou (1992a,
1992b) or Barsalou and Hale (1993); I provide my own summary in
Zbikowski 1991. The importance of frames for the present line of
thought has to do with the account of category structure they make
possible (through a recursive hierarchical system of attributes and
relations for the category -- see Barsalou 1992b or Barsalou et
al. 1993); the constraint they impose on inference (and thus on
category structure that relies on frames); on the probability that we
construct new frames to deal with novel situations; and on the
almost-certain absorption of frame-like structures from the culture
that surrounds us (see Quinn and Holland 1987; Zbikowski 1991, chapter
4). In the following analytical section I shall model frame-like
structures through sets of informal propositions; the full context for
this methodology is developed in Zbikowski 1991.

[12] Categorization is a process through which we organize our
understanding of the world; categories, in an important sense, *are*
that understanding. In my own recent work I follow Barsalou 1992b,
Barsalou 1993, and Barsalou et al. 1993 (and to a certain extent
Edelman 1989) and regard concepts and categories as intimately
related. Following a trend in the writing on cognitive science in the
last decade and a half (for example, Edelman 1989; Hampton and Dubois 1993;
Langacker 1987; Smith and Medin 1981; Barsalou 1992a; and Barsalou et
al. 1993), I take concepts to be relatively stable information stored
in long-term memory. Categories are then structured representations
of perceived or imagined entities based on rules provided by concepts.
Conceptualizations are temporary representations of categories in
working memory (this distinction between *concept* and
conceptualization relies on Barsalou et al. 1993). In all cases, it
is assumed that these cognitive structures can stand apart from
language. Although this will be a source of confusion for those used
to placing concepts in privileged correspondence with linguistic
entities (as Jackendoff 1987 does) it fits well with the larger
picture of cognition I am interested in, and opens a path to the
definition of conceptual representations specific to music and
distinct from language. Simply put, conceptualizations that
correspond with Type 1 categories can be pre- or para- linguistic,
since the stability of the category relies not on association with a
linguistic entity but instead reflects regularities within our
individual experience and that of others. The experience of musicians
(especially those who compose or improvise) includes sounds (both real
and imagined) susceptible to stable-enough mental representation that
they can become the basis for musical expression; the material
transformation of these sounds into words or notation may indeed occur
at some later point, but I believe these sounds do not *necessarily*
rely on such transformation for their stability. The notion of a
conceptual representation of music independent of language is indeed
elusive, but I am convinced there is ample evidence we readily employ
similar representations in our daily lives.(2)

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(2) I am reminded here of Augustine's central conceptual pivot in his
remarks on time in his *Confessions* (Book XI, Chapter XIV): "What, then,
is time? If no one asks of me, I know; if I wish to explain it to him who
asks, I know not."
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[13] In the preceding I discussed two basic types of categories
through which we organize our understanding of the world. Type 1
categories emerge from our interaction with our natural environment,
an interaction conditioned by both culture and perception. One
reflection of this interaction is the graded structure of Type 1
categories: category members are organized according to the degree to
which they resemble a central exemplar or group of exemplars; what is

taken as typical for a particular category appears to be constrained by frames, aspects of which are taken from culture. Type 2 categories are a result of our desire for order and for stable bases for communication; membership is determined by necessary and sufficient conditions, and category structure has clear, determinant bounds. In terms of music, the concepts associated with Type 1 categories reflect our intuitions about musical events; the concepts associated with Type 2 categories represent theoretical constructs. However, a word of caution is in order: if we have learned anything from the intense study of human cognition that has been undertaken in the last three or so decades, it is that human cognition is staggeringly complex. It goes (almost) without saying that the foregoing is a gross oversimplification of the processes of categorization that are so important for human cognition. Having said this, I nonetheless believe that the basic distinction between Type 1 and Type 2 categories is essential for understanding how we organize our understanding of musical events.

[14] Section 2. Dahlhaus's remarks on the first movement of Bruckner's Sixth Symphony (1881) come at a point where Dahlhaus is probing the unique way Bruckner achieved symphonic monumentality without following the path of developing variation laid out by Brahms. Dahlhaus argues that the answer lay in Bruckner's emphasis on retaining rhythmic figuration while seeming to disregard the careful development of pitch material. After discussing two sections of the second theme that he hears as analogous (mm. 53-54 and mm. 61- 62), Dahlhaus comments, "That the one version is able to substitute for the other means, aesthetically, that instead of developing variation, where each variant represents . . . a consequence of the preceding one and a prerequisite for the next one, Bruckner makes use of an analytically elusive but clearly perceivable similarity by association, which makes the later version seem like a written-out memory of the earlier one. The logic of discourse, as conceived by Brahms, gives way to a system of approximate correspondences" (1989, 273). The language Dahlhaus uses here -- "similarity by association," "written-out memory," "approximate correspondences" -- seems to reflect a struggle to come to terms with the "analytically elusive" basis of Bruckner's symphonic style, given Dahlhaus's own skepticism about the value of analyzing this music in terms of its "diastematic" (or pitch) structure: it is practically a commonplace that our conceptual framework for dealing with the comparative verities of pitch structure is well developed, but that for dealing with other aspects of music less so. I don't intend to offer a complete, worked-out conceptual framework for dealing with these other aspects of music within the confines of the present essay. My goal is far more modest: to suggest a methodology for approaching dynamic processes in music by analyzing some of the thematic material from Bruckner's first movement as a Type 1 category. By this means I hope to show that Bruckner achieves symphonic monumentality, in part, through a process that draws wide-spread "blocks" of material (as Dahlhaus characterized them) into dynamic categorical relationships.

[15] I shall consider the first main theme (mm. 3-6, with pickup) of the work to be a category structured by four informal propositions (3):

    (P1) The rhythmic figuration of the theme consists of events the notation
    for which (in cut time) would be (a) two half notes, preceded by a
    sixteenth-note pickup; followed by (b) a triplet-quarter-note rest, five
    triplet-quarter-notes, a dotted half, a quarter, a half note and a half
    rest.
    (P2) The first interval of the theme is a falling fifth.
    (P3) The overall contour of the theme (reckoned in directed pitch
    intervals) is as follows: 0 -7 -2 +2 +1 -1 -2 +2 +8 -1.
    (P4) The theme is stated by a unified group or choir of instruments in
    relief against an accompanimental pattern.

The actual intervals of the contour of the theme recorded in P3 are, of
course, not essential to the general notion of contour; I list them here as
a means of compactly representing the contour of the theme and to
facilitate further comparisons.(4) The importance of P4 is arguable: I
introduce it to strengthen the notion of "theme," and to exclude the echo
of the final portion of the theme by the horn in mm. 7-8. (I shall comment
on this exclusion below.)

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(3) Although I believe there are good reasons for isolating the "theme" as
I do here, they rely on aspects of categorization I did not discuss in
Section 1. In particular, basic-level categories and what I have called
m-categories are important (see Zbikowski 1991); aspects of the latter have
connections to Lerdahl and Jackendoff's notion of a group (1983).

(4) Basic discussions of contour can be found in Friedmann 1985 and Morris 1987.
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[16] It should be noted that the structure of the category does not
rely on a specification of scale step, and does not, for that matter,
invoke a diatonic frame of reference (except in the characterization
of P2's interval as a "fifth"). Neither pitch class or pitch (the
latter including an indication of register) are specified. All of
these things, as well as others, could be specified in the structure
of the category should they be deemed essential to the
characterization of musical material. The category also relies on
background models -- in particular, that there are such things as
musical works, and that musical works have clearly identifiable
"themes" that stand out against "accompaniments," and that such themes
are important for musical structure. The assumption, then, is that
the given propositions model an understanding of the musical material
associated with the *frame* for this particular category of musical
events, and that this understanding is part of a contextual
understanding gleaned from encounters with this piece and with the
broader repertoire of which it is a part (for further discussion see
Zbikowski 1991, chapters 5 and 6).

[17] The second thematic statement, in mm. 8-12 (see Example 3), meets
P1, P2, and P4, but does not meet P3; a comparison of the contour of
the two passages (again given in directed pitch intervals) is given in
Figure 1. As can be seen, the contour pattern of the third through
seventh intervals of the second thematic statement is the reverse of
the pattern of the first thematic statement. In the following, I
shall offer an informal ranking of typicality according to the number
of structural propositions met (and the completeness with which they
are met) by each thematic statement: if mm. 2-6 are typical of the
category that constitutes the theme of this movement, mm. 8-12 are
less somewhat typical. I should note that my ranking of typicality,
here and in the following, is intended only as a guide to category
structure; it is by no means the case that the first statement of
musical material is always the most typical, although this is a
strategy often used by composers. A further consideration of some of
the factors impinging on typicality is taken up below.

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Ex. 3 Bruckner, Symphony no. 6, mm. 8-12
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mm. 2-6:   0 -7 -2 +2 +1 -1 -2 +2 +8 -1
mm. 8-12: +1 -7 +1 -1 -2 +2 +1 +1 +7 +1

Figure 1   Contour comparison of directed pitch intervals in the first

[18] The next thematic statement, which occurs in mm. 24-28, is an
orchestrally reinforced version of mm. 2-6. Because it meets the
structural propositions for the category we can consider it to be
typical. It is followed, in mm. 30-34, by a similar restatement of
the less-typical mm. 8-12. However, embedded in the orchestral detail
of both statements are quasi- imitative statements of thematic
material in the horns (mm. 26-28 and mm. 32- 34). These statements
each represent only one of the structural propositions completely
(P2); P1 and P3 are met partially, and P4 is not met at all. They are
consequently even less typical versions of the theme. Finally, in
mm. 35- 36, the horns state the head of the theme; here, P2 and P4 are
realized completely, but P1 and P3 are met almost not at all. In the
informal ranking I have offered, it might be argued that these
fragmentary gestures are actually slightly *more* typical of the
category that constitutes the theme than the more-complete statements
in mm. 26-28 and mm. 32-34. Although this does violence to our basic
intuition that, for the purposes of representing the identity of
musical material, more is better, it does throw the *thematic* aspect
of the theme (that is, that portion of the musical notion of a theme
that has correspondences to the theme as subject of discourse,
literary or otherwise) into relief: mm. 26-28 and mm. 32-34 may be
more complete, but they lose the competition for our attention in the
welter of information with which we are beset, and thus fail as a
subject or topic.

[19] With the final, fragmentary statements of thematic material in
the horns Bruckner departs for other musical ground. He does not
return to his introductory material until well into the movement, and
then only shortly before the recapitulation of his opening ideas. The
first intimation of this return (as was the last gesture of departure)
is given again to the horns: in mm. 147 and 148 they state the falling
fifth of the theme in half notes. In terms of categorical structure,
P2 is realized, P1 and P3 are met almost not at all, and P4 is only
partially met, and rather weakly (in that the triplet- quarter-note
figures in the strings are strongly associated with the second theme
group, and are thus somewhat less "accompanimental"). With regard to
typicality, these statements of thematic material are the least
typical of those I have considered.

[20] In mm. 159-62 Bruckner begins in earnest the process of returning
to his opening ideas. The thematic material stated here at first only
faintly resembles the theme: although P4 is met and P1 is almost
perfectly realized (the only lack being the sixteenth-note pickup), P2
(which was of importance for the fragmentary statements of the theme
discussed above) is not met (the opening leap is not a fifth in
descent, but an octave in ascent), nor is P3. Or, if P3 is met, it is
in a rather unusual and convoluted way: if we compare the contour of
mm. 159-62 with that of mm. 3-6 (not including the pickup) we find an
exact mirror of the pattern of the contour (see Figure 2). The
typicality of this statement, within the category of thematic
material, ranks with the fragmentary statements of mm. 26-36, and
sounds as something fainter than what Dahlhaus called a "written-out
memory" of the earlier material.

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mm. 3-6:   -7 -2 +2 +1 -1 -2 +2 +8 -1
mm. 159-62: +12 +2 -2 -3 +3 +2 -2 -9 +1

Figure 2   Contour comparison of directed pitch intervals in the first
movement of Bruckner's Sixth Symphony, exposition and end of development.
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[21] What happens next is striking, especially in terms of the musical
analysis by way of processes of categorization I have undertaken here.
Where only four more-or-less complete versions of thematic material were
presented in the opening thirty-six measures (two typical [mm. 2-6 and
24-28], two less typical [mm. 8-12 and 30-34]), in the twenty-odd measures
that follow m. 159 Bruckner presents six versions of thematic material, all
highly similar to that given in mm. 159-62. These six statements could
even be viewed as forming their own category, with a structure strongly
related to that of the first category proposed above. The structural
propositions for this second category would be as follows:

> (P1) The rhythmic figuration of the theme consists of events the notation
> for which (in cut time) would be (a) two half notes, preceded by a
> sixteenth-note pickup; followed by (b) a triplet-quarter-note rest, five
> triplet-quarter-notes, a dotted half, a quarter, a half note and a half
> rest.
> (P2n) The first interval of the theme is an ascending octave.
> (P3n) The contour of the theme (reckoned in directed pitch intervals) is
> as follows: 0 +12 +2 -2 -3 +3 +2 -2 -9 +1.
> (P4) The theme is stated by a unified group or choir of instruments in
> relief against an accompanimental pattern.

Of course, P1 and P4 are identical to P1 and P4 in the first category.
With regard to the new propositions, P2n addresses the new opening
interval, and P3n is a strengthened version of P3, reflecting that the only
differences between the six thematic statements are the size of interval
for the first nine intervals, and the direction and size of the last
interval (see Figure 3). Again, typicality effects can be observed: one
ranking might take the first and fifth statements as most typical of the
category, the sixth and second as somewhat less typical, and the third and
fourth as least typical. (The matter of the typicality of mm. 159-62, which
does not have a sixteenth-note pickup, will be addressed below.)


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mm. 159-62: ()  +12  +2  -2  -3  +3  +2  -2   -9  +1
mm. 163-66:   0  +12  +2  -2  -3  +3  +3  -1  -11  -1
mm. 167-70:   0  +12  +1  -1  -4  +4  +1  -1   -7  -1
mm. 171-74:   0  +12  +1  -1  -4  +4  +1  -1   -7  +5
mm. 175-78:   0  +12  +2  -2  -3  +3  +2  -2   -9  +1
mm. 179-82:   0  +12  +2  -2  -3  +3  +2  -1   -9  +1
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Figure 3   Contour comparison of directed pitch intervals in the first
movement of Bruckner's Sixth Symphony, end of development.
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[22] Are these six thematic statements in fact a category independent
of, yet related to, the first category? The answer depends, to a
large extent, on what one hears as typical, and how typicality
emerges; to expand on this a little, I offer the following
observations. I hear the first statement in mm. 159-62 as a pale,
awkward reminiscence of the theme, most strongly related through
rhythmic figuration and thematic status -- I find I really miss the
half-step of the written-out turn of mm. 2-6 and 24-28. However, as
this new version is restated (in its variant forms) I find it more and
more believable, such that at the point of its abandonment in m. 182
it seems a thing worthy of thematic status. The change in my attitude
could be attributed to the more- or-less simple, successive repetition
of the rhythmic figure, clad in slowly changing pitches. However, it
could also be attributed to the cycle of typicality the material is
taken through. The cycle starts with typical material (statements one
and two), ventures into less typical material (statements three and
four), and then returns to typical material (statements five and six).
The reaffirmation of typicality accomplished by the statement of the

transposed version of mm. 159-62 in mm. 175-78 can be seen as a way of revealing that the earlier measures were no accident (that is, *not* a pale, awkward reminiscence of the theme), but were in fact exactly what the composer wanted at that point. The contrast provided by the less-typical material serves to emphasize this revelation.

[23] As viable as the modified thematic material of mm. 159-82 may seem at m. 182, within the context of the movement as a whole the impression of viability is but an illusion (although an important one). A transformed version of the transitional material first heard in mm. 15-24 leads, through the course of mm. 183-94, to a magnificent reprise of the opening theme in the full orchestral tutti following m. 195. For the remainder of the movement the echo figures of mm. 7-8, 13-14, and 29-30 are absent; the absence of these figures in the latter portion of the movement is one reason the structure of the category for the theme excludes them. Typicality here reflects the overall "environment" of the movement, and accommodates repeated passes through this environment. An analysis that would read the theme together with its echo (mm. 3-8 inclusive) as typical is possible, but seems a distortion given the context of the entire movement. A more interesting alternative would be one that takes *both* mm. 3-6 and 9-12 as typical, resulting in a binary basis for typicality. I have opted for a somewhat less complicated analysis which reflects my current hearing of the movement and which permits me an overall analysis I find intriguing. Similarly, I readily hear a match between mm. 159-62 and mm. 175-78 (even though the former lacks the characteristic sixteenth-note pickup of the theme), and consequently rank them both as typical.

[24] Given these thoughts, my preferred reading of categorical structure would subsume the thematic material of mm. 159-82 under the basic category of the theme. This subsumption need not suppress the intriguing cycle of typicality manifested within these measures, but only subordinate it to the larger pattern played out across the entire range of category members. And it is on this larger pattern that I now want to focus, for I believe it makes a significant contribution to the monumentality observed by Dahlhaus. As Dahlhaus observed, Bruckner tends to present thematic material in rhythmically distinct blocks, favoring a system of approximate correspondences over the logic of discourse associated with developing variation. The material of these blocks tends to be static, but in a complicated way. Although there is motion away from thematic material (and the cognitive stability that typicality represents), there is always a return as well: blocks tend to be "about" thematic material. There is also an enormous amount of surface rhythmic activity (especially at the reprise following m. 195), but it is made up of consistent and recurrent patterns. The result of both these features is agitated material that tends to move only within circumscribed limits: to stay within its "block." However, there is a larger process at work as well, one that is anything but static.
 In the opening thirty-six measures Bruckner introduces thematic material, which he then neglects for over one hundred measures. When he does return to it (in m. 159), it is in a veiled, atypical form. This form then presses forward into our awareness, threatening to supplant the memory of the earlier, "original," version. The stage is then set for a triumphant and massive return of the original material, vanquishing the pretender to the thematic throne as it claims its right. Bruckner's strategy, as I read it, differs from the conventions of sonata form it presupposes in two important ways. First, the variant material vanquished by the return of the theme is "developed" only in the most minimal sense: it clearly lacks the contingency associated with developmental strategies. Second, the triumphant return of the theme is not coordinated with a return to the original key of the first theme. Given the progress of the movement as a whole, I find it difficult to argue that the statement of the theme in the original key following m. 209 is somehow more dramatic or, at that moment,

cognitively more significant than the statement that starts in m. 195.

[25] In the analysis I have offered here, I have supposed that musical
events are susceptible to categorization, and that these categories
show typicality effects. Although I have reflected category structure
in terms of informal propositions, my assumption is that a listener
would arrive at this category without recourse to even these informal
formalizations -- musical categorization instead goes on quickly and
without seeming effort, unless one is in an unusual musical
environment. I have interpreted the typicality effects that
categories show in terms of a dynamic model, wherein the most typical
category member is stable, and the least typical is unstable. This
then leads to a reading of one aspect of the dynamic profile of
Bruckner's first movement as a pattern of typical material yielding to
less typical material, which in turn yields to the typical. The
movement as a whole, then, plays out the cycle of typicality discussed
in connection with mm. 159-82. Thus Bruckner makes use of a system of
approximate correspondences *and* exact correspondences, playing out
in a dynamic process stretched over close to ten minutes, to achieve
symphonic monumentality.

[26] Section 3. My argument has been that theories of categorization
have a contribution to make both to music cognition and to music
theory. For music cognition, theories of categorization offer one way
of describing how musical events are grouped together, which in turn
provides a basis for describing how one group of musical events
relates to another. For music theory, theories of categorization
offer a way to model musical process as a set of dynamic (and
temporally bounded) relationships that obtain among groups of musical
events. However, I believe the study of how processes of
categorization can be applied to our understanding of music has at
least two contributions to make to cognitive theory. First,
categorical processes adequate to music must deal with a large amount
of auditory information streaming by in real time, which requires a
model of categorization that is extremely rapid (at least in its gross
aspects) and highly flexible. Second, since music is a cultural
artifact the structure of musical categories must reflect the
influence of culture in some way; it would appear, based on
preliminary investigations, that the relationship between
categorization and frame-like structures will be extremely important
in this connection. I feel confident that there are rewards for both
the study of music cognition and the study of processes of
categorization in a consideration of how it is we understand music.
Music, at its best, speaks with immediacy and import to the core of
our being, and categorization, as one of the most fundamental of
cognitive processes, seems destined to be associated with this
immediacy and import.

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