

Review of The analysis and cognition of melodic complexity: the implication-realization model, by E. Narmour, Univ. of Chicago Press, Chicago, 1992. *Music Perception*, 1995, 12 (4), pp 486-509.

Recently, chatting with a well-known composer, I mentioned that I was engaged in reviewing Eugene Narmour's most recent book. "Narmour?", he mused, "Oh yes, doesn't like Schenker much, does he? Or harmony." Such a response is not wholly surprising in view of the level of controversy generated in the music-analytic community by Narmour's "Beyond Schenkerism" following its appearance in 1977. However, to define Narmour's views as expressed in that book in terms of what he argued against is to do his thesis less than justice; read as an attempt to re-evaluate the premises of the dominant music-analytic framework in the context of an informed understanding of cognition, the book excited as many readers in the vistas that it opened up as it dismayed in the criticisms that it raised. Perhaps, though, the idea of Narmour as being an opponent rather than a proponent was reinforced by the seemingly unfulfilled promise made therein that his "forthcoming book will attempt to make explicit the principles of the implication-realisation model". Now, however, there is no excuse for such a view. *The Analysis and Cognition of Basic Melodic Structures* (1989) established a comprehensive foundation for the detail of his theories; now, *The Analysis and Cognition of Melodic Complexity* builds on its predecessor and bids fair to present one of the most complete theories of music cognition of recent decades.

It is not possible to review *Melodic Complexity* (hereafter *ACMC*) in isolation from its predecessor, *Basic Melodic Structure* (hereafter *ACBMS*). The themes of the two volumes are intimately interwoven, and the material presented in *ACMC* is heavily dependent on ideas introduced in *ACBMS*. Indeed, although *ACMC* starts by summarising those aspects of the theory introduced in *ACBMS*, I suspect that the condensed nature of the presentation here would be of more benefit as reference material to one who has already read *ACBMS* than to someone encountering the theory for the first time. A brief account of the fundamental tenets of the theory as presented in *ACBMS* will be provided before the enriched theory as expounded in *ACMC* is discussed.

Narmour's theory treats melody primarily as a note-to-note phenomenon, as a "continuity of melodic relations whose intelligibility fundamentally derives from lower-level bottom-up structures". This, he feels, is justified because (*ACBMS*, p331) "it is the dynamic non-reductive individuated melodic motion on the note-to-note level that captivates music lovers." In effect, the analytic method that Narmour expounds in these volumes is intended to track and to reflect the fluctuations in arousal that arise from the validation or invalidation of the moment-to-moment subconscious inferences made by a listener concerning the way that a piece of music will unfold.

Narmour starts by defining the bases for differentiating between simple melodic patterns in terms of their implications for continuation. His theory is predicated on a small number of general "hypothetical constants". Two formal hypotheses - that similarity between elements or events implies continuing similarity (A+A implying A), and differentiation implies continuing differentiation (A+B implying C) - together with concepts of "closure" and of "syntactic parametric scale" produce five kinds of "melodic archetype", of which some can be combined to generate a further five "archetypal derivatives".

In differentiating-out these archetypes and archetypal derivatives, he applies his hypotheses separately to intervallic motion, register and pitch specificity, using pitch, interval and registral direction as separable parameters. Within his theory, the implication of continuation (“process”) arises through the operation of Gestalt principles of similarity, proximity or common direction when consecutive pitches lie in relatively close proximity to one another. Proximate pitches imply continuation of pitch direction (“register”) and size of interval; thus the implication of an ascending major second is of continued ascent by a small interval. The implication of differentiation (“reversal”), arising when consecutive pitches span a large interval, is conceptually symmetrical to continuation in that the registral and intervallic implications and resultant syntactic function of reversal are opposite to those of continuation. Two pitches spanning a large interval will thus imply reversal of direction of pitch movement and differentiation in size of interval, yielding, as the implication of (e.g.) an ascending major sixth, a descent by a small interval such as a major second.

As degree of similarity (A+A) or differentiation (A+B) varies in melody between patterns and elements and degree of implication fluctuates, he hypothesises a syntactic parametric scale that is (ACBMS, p4) “an automatic input system that determines what is similar or different, closural or non-closural function...and the extent to which a melodic pattern is closed or open”. He suggests that “any pair of melodic pitches transmits separate intervallic and registral messages to the listener...a small melodic interval generates registral and intervallic implications of similarity, while a large interval generates intervallic and registral implications of differentiation or reversal”.

He puts forward a “syntactic parametric scalar” ordering of intervals from small to large, implication of continuation gradually yielding to implication of reversal as pitches making up intervals became less proximate and more differentiated. If intervals differ by a minor 3rd or less than they are deemed “similar”, while if they differ by a major 3rd or greater then they are “differentiated”. The size of the difference thus determines whether a pattern is one of similarity or differentiation, although different criteria for intervallic differentiation are adopted when registral direction changes; when registral direction is reversed, a difference of \pm major 2nd or less is now regarded as a “similar” interval, whereas a difference of \pm minor 3rd or more is now “differentiated”. He suggests that this is because registral change itself adds differentiation to the intervallic pattern. An analogous syntactic parametric scale is proposed for register, going from lateral to lateral (sameness), ascent to ascent or descent to descent (similarity) to ascent to descent, ascent to lateral, etc. (differentiation). The reason for having separate parametric scales governing interval and register is to enable the quantification of melodic motion, so that while, say, a succession of ascending minor 2nds is going nowhere intervallically (i.e., no differentiation is occurring between successive intervals) it is going *somewhere* in terms of register.

Narmour’s five kinds of melodic archetype are: (i) **process** or **iteration** (symbolised respectively as P and D);(ii) **reversal** (symbolised as R); (iii) **registral return** (aba); (iv) **dyad** (two-element groupings, the unrealised implications of i and ii); and (v) **monad** (one-element groupings, closed or unclosed with no generation of implication). The five archetypal derivatives are based on process and reversal, each constituting a partial denial of the realisations implied by the initial interval. These are: (a) **intervallic process** (symbolised IP, a small interval to a similar small interval in a different registral direction); (b) **registral process** (VP - small interval to large

interval, same registral direction); (c) **intervallic duplication** (ID - small interval to same small interval, different registral direction); (d) **intervallic reversal** (IR - large interval to small interval, same registral direction); and (e) **registral reversal** (VR - large interval to even larger interval, different registral direction). The symbol “V” here stands for register.

Narmour integrates the idea of “closure” into his discussion of these theoretical archetypal patterns, process being non-closural and reversal being fundamentally closural. Closure functions as the mechanism whereby multiple levels arise in the analysis and cognition of melody. In his theory, “closure” is defined in terms of the termination, blunting, inhibition or weakening of melodic implication, brought about by its realisation or its denial. Strong closure produces the “transformation” of notes (that is, their selection as events functioning at a structural level above that of the musical surface), moderate closure brings about “formation” - “closure that bids fair to generate a new level but does not actually create one” - and weak closure simply gives rise to various degrees of melodic articulation. Closure here largely determines the way in which patterns of melodic notes may be grouped, but Narmour’s theory is more than a theory of grouping; as he suggests (*ACBMS*, p104) “the nature of the [melodic] “trip” is as important as how it begins and ends”.

This caveat notwithstanding, closure here generates higher levels of structure, the level immediately above that of the musical surface typically consisting of the notes that begin and end each pattern in that surface. An example should help clarify the operations involved. An isochronous sequence of notes such as b'-d"-f#" -g"-f#" -c#" -f#" could be parsed as Process (P, b'-d"-f#"), Intervallic Duplication (ID, f#" -g"-f#"), and again Intervallic Duplication (ID, f#" -c#" -f#"). Note that each successive pattern starts with the pitch that ended the previous one. The “transformed” pitches - i.e., those deemed to function at the immediately superior structural level - would be the first and last pitches of each successive, and hence closed, group, giving the series of notes b'-f#" -f#" -f#" as the sequence’s representation at the structural level immediately above that of the musical surface. The structural description of the higher-level sequence itself might be a Reversal (R, b'-f#" -f#") **combined** with (as opposed to succeeded by) a Duplication (D, f#" -f#" -f#"), by virtue of sharing an interval (unison). Narmour makes use of the idea of combining in the analyses he presents in *ACBMS*, but only explicitly lay out the conditions under which it occurs in *ACMC*. Hence, the principles by which patterns can be parsed may be applied recursively, each application generating a higher-level description.

Narmour makes clear that closure is not all-or-nothing; different degrees of closure are exhibited by each of the archetypal patterns. As he points out, (*ACBMS*, p337) “degree of closure is dependent on functional differences between first and second interval. The greater the amount of initial implication, the more closure occurs. the greater the amount of implication in the terminal interval the less closure occurs.” He provides (*ibid.*, p361) a table of archetypal patterns ranked from most open to most closed, in the order VP, P, D, VR, IP, ID, IR, R, ranked in terms of their intervallic motion and their registral motion.

Implication functions here not only prospectively but also retrospectively. Prospective interpretations of implications arise when the implied realisation actually occurs, and retrospective interpretation of implications when the implied realisation does **not** occur. An instance of this would be when an interval that normally implies continuation realises a reversal pattern. Thus the difference between an IP - small interval to small interval, different direction - and (R)

(retrospective reversal, the retrospection symbolised by the parentheses) - small interval to small interval, different direction - is that IP occurs when intervals are close together in size (i.e. similar) whereas (R) will have occurred when the intervals are sufficiently differentiated as in, say, a leap upwards of a major third followed by a descent of a minor second.

Apart from intervallic and registral motion, a number of other factors interact in determining how a melody may be parsed into contiguous archetypal patterns. Metre and duration play crucial roles. As he says, "Metric accent always has an articulating effect on melody...metre also has the potential to combine with other parameters to cause the transformation of melodic tones to higher levels". For metre to play such a role it is required that its establishment be unequivocal. "Durational cumulation" (i.e., a long note succeeding a shorter one, relative durations standing in - at least - the ratio 1:2) can convert the last note of the final interval of a pattern from an open pitch into a closed one. Metre figures in the clausal evaluation of durational cumulation in that (i) it indicates to the listener whether the metrically specified place of the realisation has passed by or not, and (ii) metric stress figures in the perceptual evaluation of cumulation in the sense of emphasising the long note and thus marking it for closure on the level of its differentiation. Dissonance may also act alone or interact with cumulation in terms of determining degree of closure or continuation.

Narmour differentiates sharply between what he sees as the immutable properties of the basic "archetypal patterns" and any specific stylistic implications that these might be identified as having. The functioning of the archetypal patterns is referred to "reflexive" bottom-up processes, whereas any invocation of stylistic considerations is held to be "top-down". In his words (*ACBMS*, p9), "In the implication-realisation model we keep the top-down mapping of style separate from the bottom-up input of the primitive shapes making up the style...from the listener's perspective, style is thus replication of experience, instantiated learning that leads to inductive inference...It operates directly on learned structures of relations influencing input shapes like single melodic intervals only as such shapes occur within learned style structures." For Narmour, "style shapes" are the properties that individual parameters exhibit, while "style structures" are complex patterns organised by many different parameters.

The efficacy of the primitives of the theory - implications of similarity, differentiation, and parametric scales - is referred by Narmour to their instantiation in bottom-up processing: in his words, "a kind of automatic cognizing...hard-wired, innate and unavoidable in its consequences" wherein "the listener subconsciously constructs her musical perception solely out of the individual parametric features presented to her". However, he warns (*ACBMS*, p88) that the operation of the primitives of the theory "must not be invoked simplistically because style structures may override style shape under the right circumstances". In other words, despite the specificity of the hypotheses that he outlines in his theory, he leaves considerable scope for interpretation of implication on the basis of style, whether intra- or extraopus (the influence of both levels of style being symbolised within his theory as, respectively, "os" and "xs"). In fact, most of the analyses that are presented in the course of the two volumes are employed by him to demonstrate the potentially determinant role that style may play in shaping melodic implication. It should be noted in this context that his theory treats the "scale-step" properties of pitch as being stylistically derived. He states (*ibid.*, p82) that "In terms of traditional tonal music theory my argument is that the stylistic scale step functions usually assumed

about tonal music operate as a learned top-down schema influencing the intervallic implications hypothesised in the parametric scale of the model”, and proposes that scale-steps are nothing more than top-down atomic schemata (*ibid*, p85) and “thus no more deserving of preferential treatment within the implicative theory than any other form of learning”.

ACBMS has largely dealt with successions of archetypal shapes at the level of the musical surface - “consecutive structures” - outlining the structures that may occur and the ways in which they succeed one another. *ACMC* is primarily devoted to the exposition of more complex relations than simple succession between temporally contiguous patterns, as well as to the way in which these successions of temporally contiguous patterns give rise to higher levels of structure, or, to use his term, “transformational” levels. The two aspects of his theory that form the subject-matter of the book are intertwined in that the principles that govern the ways in which patterns succeed (or link with) one another at the musical surface also determine the higher-level “transformed” structures that may emerge, though it must be noted that in his theory, “the word *structure* is not synonymous with transformation to a new level. Structuring in a complex syntactic system like music exists at all levels.”

Narmour in fact introduces some aspects of “transformed” - i.e., higher-level - structuring in *ACBMS*. He proposes a set of “rules of production” (*ACBMS*, p412), which state that “when closed, the initial and terminal tones of processes, duplications and reversals of all kinds (P, IP, VP, D, ID, R, IR, VR) lead to dyads that may imply and realise continuations and reversals on higher levels. On the other hand, the transformed tone of any dyad always leads to a monad which may connect with other structural tones to create implications and realisation of all types.” Despite these ostensibly simple production rules, the musical surface does not constitute a “diminution” (to use the word in its Schenkerian sense) of higher-level structure in his theory; he is emphatic on this point, asserting (*ACMC*, p255) that “Surely, the point of tonal music is not just to prolong a few idealised, top-down, consonant chords”. He further clarifies this in stating (*ibid.*, p352) that “Because musical levels are hierarchical rather than systemic, the higher-level pitch patterns that arise from lower levels embody rather than assimilate implications, realisations and denials at lower levels.” In this, he is again asserting the primacy and autonomy of the bottom-up processes operating at the level of the musical surface.

Narmour states (*ACMC*, p46) that his “main goal in this volume is to explore how the primary and derivative archetypal structures combine into various two-structure groupings and to explain how these in turn create longer structural chains.” He stresses that non-closural contexts cause combining and chaining of structures. These structures - the archetypal shapes or archetypal derivatives - succeed one another by sharing a **pitch**, the terminal pitch of one being the initial pitch of the next (as outlined in *ACBMS*). Two such structures - e.g., P and IP - may **combine** if the terminal **interval** of one is the initial interval of the next, or more than two may **chain** by sharing linking intervals, the conditions that determine combining and chaining being largely metrical/temporal “low-level conditions”, such as the occurrence of a dissonance on a metric accent, the presence of ongoing meter etc. Dyads and monads never function as links in a chain, as individual structures in a chain must have at least three notes.

He outlines, on note-to-note level, the eight low-level conditions that create combining and chaining:

- 1) melodic dissonance on metric accent
- 2) lack of metric accent
- 3) processive envelopment of metric accent
- 4) duplicative envelopment of metric accent
- 5) harmonic processive envelopment of metric accent
- 6) durational processive envelopment of metric accent
- 7) dynamic processive envelopment of metric accent
- 8) ongoing syncopation in isochrony

Conditions 1) and 2) are “the deformed oppositions of harmonic, metric and durational influence” (the other-parametric conditions that would otherwise cause closure, here working to create or reinforce conditions of non-closure), whereas 3) to 8) are, in effect, the realisation of implicative continuation. In all these conditions it is non-closure that causes discrete structures to combine and chain together.

In the case of succession of discrete melodic structures, the initial and terminal notes of each structure (i.e., those shared by consecutive structures) will function as “transformed tones” on a higher hierarchical level. In combinational patterns and chains, however, the initial and terminal tones of the **overall pattern** will function as transformed tones, “non-closure enveloping all tones between these two anchor points”. Thus a sequence formed by a succession of patterns is likely to give rise to a higher-level representation containing more “transformed” notes than would a sequence comprising combinations or chains of patterns. However, it should be noted that although in chains fewer tones will be “transformed” to a higher level, structure within the chain will be delineated by medial tones exhibiting greater or lesser degrees of articulation (being unequivocally located at the lower level) or formation (formational tones being those that portend a higher hierarchical level but nevertheless remain at their level of occurrence).

Narmour starts his account of combined patterns by introducing “Combinational structures of contrasting parentage”, covering combinations of process followed by reversal (PR, PVR, DVR, PIR, IPR, IPVR, IPIR, IDR, IDVR, IDIR, VPR, VPVR and VPIR) wherein each element may be in either prospective or retrospective form. Here, he outlines the conditions that bring about the theoretically simpler forms involving combinations in which closural “reversal” structures succeed and combine with (by sharing an interval) non-closural processive or duplicative structures. In the course of this, he points out that patterns such as DR and DIR are theoretically irrational and thus analytically impossible. This is because the D structure (Duplication) involves note repetition (and hence repetition of the interval of a unison), while R and IR structures both require a differentiated decrease in interval size from first to second interval, not possible if their first interval is a unison. The issue of whether two patterns succeed one another or combine is dependent on whether his eight conditions (above) can be deemed operational or not. The issue of whether any combination is between patterns in their prospective or retrospective forms - e.g., as PR or P(R) - is largely dependent on the degree to which each of the constituent patterns was anticipated or was unexpected. While the nature of the basic patterns involved may play a role in this, it is often the influence of style - particularly intraopus style (symbolised by him as “os”) - that is the determinant factor. Thus (*ACMC*, p52) “Process/reversal combinations at beginnings of pieces tend to be P(R) [i.e., the reversal is unexpected and thus retrospectively identified as a reversal], while subsequent ones become PR with (os) attached, signifying the

influence that intraopus style has on our changing assessment of retrospection and prospection.”

In deciding how patterns are linked, it is important to determine the level at which each pattern is functioning. Two patterns functioning at the same level of implication (typically, metrically-defined) may succeed each other or combine, but if the second of two apparently successive patterns is at a metric or durational level below that at which the principal events are being articulated, it may well be “embedded” within a superordinate structure rather than combined with the preceding pattern. As he states (*ACMC*, p103) “Combinational structures often have lower level patterns embedded within them. Embedding comes about when realisation of lower-level patterns takes place before the implied realisation of higher-level patterns. Such two-tiered patterning is possible because melodic implications specify not only registral direction, intervallic size and specific pitch (when mode is known) but also durational length and metric location of realisation.”

Having dealt with combinational structures formed by ordered pairs of open and closed patterns, Narmour then accounts for the conditions that can give rise to a partially closed reversal pattern combining with a subsequent non-closural one, as in an RP combination. He suggests that for this to happen the closural note of the reversal must be weakened by the occurrence of one or more of his eight “combining” conditions, and that these same conditions must also suppress the primacy of the initial tone of the process. If such conditions pertain then the terminal interval of the reversal will “dovetail” to the initial interval of the process. He has, in fact, referred to such combinations in accounting for “gap-fill” melodies in *ACBMS* (p220, *et seq.*). An exposition of “same-parentage” combinations then follows, describing the conditions that underlie the combining of two consecutive non-closural processive or duplicative patterns (P, D, ID, IP and VP) as well as of two closural reversal patterns (R, IR, VR). Again, these patterns may combine in prospective or retrospective interpretations, factors governing the interpretation deriving either from the specific content of the patterns or from stylistic influences. His account of the forming of combinations is summarised in a figure (*ibid.*, Example 7.13) illustrating the principles that govern the interaction of meter and dissonance in the making of either separate structures or combinations.

Section 3 of *ACMC* provides a detailed account of chains, which are formed when three or more structures interlink by sharing intervals. While archetypal structures and combinational derivations are finite in number, totalling 235 (see his Appendix 5), in melodic chains the possible concatenated orderings of continued interval sharing are limitless. He states (*ACMC*, p138) that “Chained melodic structures result when dissonance, durational patterning (frequently additive) and metric emphasis are sufficiently non-congruent with one another to dovetail several different patterns.” The eight conditions that underlie combinations (see above) also cause chaining, which results from continuing non-closure preventing hierarchical transformation of the initial and terminal pitches of the constituent patterns.

As in his discussion of basic patterns and combinations, Narmour warns that chains cannot be identified by “simplistic” search procedures conducted at each metrical or durational level. Dissonances may displace the implied location of a melodic realisation, and hence “chains frequently mix different durational levels.” As he says (*ACMC*, p186), although “the general rule that ongoing metre in additive durational [isochronous] patterns causes combining and chaining holds...it is subject to numerous contextual qualifications. One cannot apply it - or any other rule of the

implication-realisation model - mechanistically. Indeed, the bottom-up/top-down orientation of the theory frames cognitive reality hypothetically rather than axiomatically, insisting on the cognitive analytical probability of rule violation.”

Chains are “runs” of interlinked (i.e., interval-sharing) patterns at the same hierarchical level. The incorporation of the concepts of combinations and chains in his theory allows for the description of complex melodic structure at the level of the musical surface, providing a means of delineating the internal structure of potentially long sequences of events lying between the two “transformed” (structural) tones that bound a basic pattern, combination, or chain. Combinations and chains permit a coherent account of the microstructure of melody in terms of articulations and formations (portents of closure that do not give rise to higher-level transformations) to be provided by the theory. Common music-theoretic entities such as the appoggiatura are thus explicable as functional elements within chains; “the appoggiatura is a chief cause of structural chaining in melody when resolution of the dissonance is metrically and harmonically weak” (*ACMC*, p190), the appoggiatural note itself frequently functioning formationally.

Narmour stresses the importance of “other-parametric” interference and interaction in creating chains, indicating that (*ACMC*, p207) “In chains, the non-closure of the harmony (an implied or realised dissonance) versus the closure of metre (an accent) and the closure of harmony (a weak resolution) versus the nonclosure of metre (ongoing non-accents) offset one another. It is such offsetting conditions that keep the pattern ongoing.” He makes explicit the ways in which the manifest structural complexity that chains display in his theory is primarily a characteristic of the musical surface, stating that (*ibid.*, p199) “In moving hierarchically from lower levels to higher levels, one will, of course, observe complexity giving way to simplicity as lower level articulative and formational functions of tones are subsumed within higher level transformational [structural] functions.”

Narmour is concerned to demonstrate the potential utility of the theory. Throughout its exposition, he is prepared to draw inferences not only about the perceived structure of melody but also about compositional usage and intent in employing particular structures. For instance, he suggests (*ACMC*, p177) that the “most common chain is that in which a process functions medially, flanked on both sides by contrasting structures”, and that (*ibid.*, p193) “one common syntactic strategy is to vary structures of the chain from partial intervallic realisations of implication at the beginning, to full realisations of implication in the middle to partial realisations of implication that intervallically increase at the very end.” Similarly, he proposes that the typologies available within his theory can help to clarify the details of the process of historical style change in music. He claims (*ibid.*, p254) that because “in a general sense I conceive of articulation, formation and transformation as a spectrum of bottom-up relations across which I imagine a flexible ordering and ranking of the hierarchical functions of tone”, it is thus possible to (*ibid.*, p185) “chart the structural evolution through melodic tones of various strengths...tracing genetic order from articulation to formation to transformation to deformation.”, showing how “the syntactic structures of music gradually undergo historical change”.

Given that combining and chaining are largely motivated by metrical and harmonic factors Narmour devotes space to detailing the dynamics of this interaction, putting forward classifications of dissonance and resolution and outlining how harmonic factors can, either in conjunction with metre or separately, act to delineate melodic structure (see also Appendix 2, p374). He posits three classes of dissonance, strong,

medium and weak, which he symbolises respectively as $_$, x and (x) . He suggests (*ACMC*, p210) that “This threefold division is a bottom-up hypothesis not specifically tied to any restricted conception of tonal style...all that matters is that the invoked style allows for (1) a prospectively perceived vertical (acoustical) difference between consonance and dissonance (2) a perceived difference between chordal and non-chordal properties and (3) a perception that a particular group of tones is a set distinguished from other collections of tones and thus other modes.” An instance of his strong dissonance is one that is a non-chordal dissonance lying out of the key and occurring with a chord change at the moment of the dissonance itself; this he terms “contramodal”, to indicate that it runs counter to the established mode. Moderate classes of dissonance include diatonic non-chordal appoggiaturas over a change of chord introduced melodically by a small interval, and non-chordal diatonic suspensions with a change of chord at the tie. Weak dissonances are of two types (*ibid.*, p212): “first is non-chordal dissonance occurring over the same chord (passing, neighbour, escape tones): the second covers all essential chord-tone dissonances with or without a change of chord - added sixths, sevenths, ninths, even elevenths and thirteenths in the right circumstances regardless of whether such tones are diatonic or contramodal”. His definitions of dissonance are explicitly independent of metric position, being reliant on chord change which he states creates “metric emphasis”. Despite the specificity of the definitions, he does warn (*ibid.*, p214) that “The description of weak, moderate and strong dissonance is variable”.

Balancing his three types of dissonance we find three types of resolution, again weak, moderate and strong. In a strong resolution, the chord change occurs precisely at the consonance, in a weak resolution no chord change takes place on the consonance, while a moderate resolution lies between these extremes. From this hypothesis of three types of resolution and dissonance, nine possible dissonance-resolution pairs can be formed. He further characterises these types of progressions, stating (*ACMC*, p216) that “Weak dissonances or resolutions are those that occur with little other-parametric differentiation, i.e. little metric or textural stress. Strong dissonances possess much differentiation, and high differentiation makes for strong resolution as well. Moderate dissonances are ones that do not belong to the chord but at least belong to the key. Moderate resolutions move with the change of chord but in a rather weak progression and ones involving at least two common tones.” Despite the pervasive influence of harmonic structure and processes in constituting chaining, harmonic influence is not in itself a necessary factor in chaining. As he says (*ibid.*, p226) “[although] normally, chaining occurs because strong dissonance and weak resolution deform the metric organisation ...chaining can take place in the absence of dissonance if the melodic patterning itself deforms the metre making the location of metric accent ambiguous.”

From p219 to p221 he provides the most extended analysis presented in either volume, contrasting Salzer’s (1962) “Schenkerian” analysis of the first four bars of Mozart’s Sonata K311, 2nd movement, with his own implication-realisation analysis. He applies his theory to each voice independently and separately, demonstrating how his theory can account for both the musical surface and higher structural levels in terms of melodic implication. He criticises Salzer’s analysis for “showing the phrase as one more instantiation and confirmation of tonality”, contrasting it with his own which he suggests “shows it as an example where melodic, metric and durational weakening of prolongation of the tonic occurs.” He claims (p221) that while “Schenkerian (Salzerian) theory aims to reduce foreground levels to past learning, to previously known style structures, the implication-

realisation model insists on the possibility that bottom-up low-level patterning permanently has the power to deform these prior invocations”.

The penultimate section of this volume is devoted to the issue of “structural networking”. He deals first with co-existent but mutually irreducible types of structure, which may arise when theoretical primitives that are independent within the theory, yet share fundamental characteristics, can be applied to the same musical material to generate alternative but co-existent representations. This is one of the ways in which his theory appears to deal with structural ambiguity; these “networked structures” do not play a role in the transformation of tones to a higher level, but exist concurrently with the structures and procedures that do fulfil this role, giving rise to “tangled hierarchies”. As he puts it (*ACMC*, p232) “The implication-realisation model everywhere insists on non-congruent networked possibilities”. For example, one of the archetypal patterns - aba, or registral return - is always incorporated in the archetypal derivatives IP and ID, but can occur by itself without requiring these patterns, often in overlap with other, more structurally significant, patterns. He notes (*ibid.*, p231) that “nowhere is this independence [of aba] more felt than in complex harmonic contexts where its termination as a dissonance lies noncongruent with the metre.”

He then proceeds to give a detailed account of the conditions under which tones that are dissonant at the musical surface may nevertheless function at higher levels - “transformational dissonances”. In this, the theory presents a view that is at odds with much of “conventional” music theory, as he notes. He puts forward a scheme for describing the interaction between temporal (i.e., long note) accent and dissonance under a variety of conditions of non-congruence between parameters (e.g., when a strong and hence non-closural dissonance occurs on what would, by virtue of its length in context, be a closural duration). The system that he proposes (*ACMC*, p249) outlines the circumstances in which dissonant tones should be construed as either articulations, formations, or transformations (all other things being equal). He suggests (*ibid.*, p248) that “The stronger the dissonance, the more cumulative must be the duration [i.e. the greater must be the positive difference between the duration of the note on which the dissonance occurs and that of the note immediately preceding it] in order to effect higher-level transformation”. In the context of these proposals he is able to state (*ibid.*, p251) that “appoggiaturas set in additive [isochronous] durations are wholly-nonstructural; those set cumulatively are either articulative, formational or transformational, depending on the degree of dissonance and the degree of cumulation.” and to claim that “The top-down stylistic view that lumps all these into one class ignores how the bottom-up parametric context structurally differentiates them”.

A further chapter explores other potential “networked structures”, dealing with the “post-denial” processive implications of tones, those implications that persist beyond their denial to the extent that they create alternative structures (generally at the level of the musical surface) that are co-existent with those that give rise to transformations. He holds that it is necessary to recognise the existence of such discontinuous realisations (*ACMC*, p260) “because processive melodic implications remain alive during the very moment of their negation”. These “post-denial” implications he refers to as “time-tagged”, meaning by “time-tag” the duration by which a melodic implication persists beyond its denial. He suggests that, all other parametric things being equal, the time tag of a process lasts approximately two to three times as long as the last tone of the interrupted implicative pattern, (the further away being the discontinuous connection, the weaker the connection), and

states (*ibid.*, p264) that such time-tagged structures are “always simultaneously secondary structures, functioning in subservience to the primary structures constructed of contiguous connections”.

The concluding section of the volume starts with a chapter considering the ways in which his theory deals with melodic grouping. As he says (*ibid.*, p293) “All analytical theories entail concepts of grouping. A rule that prescribes the conditions under which a given analytical symbol operates in a syntactic system is essentially nothing more than a rule of grouping.” The most important factor in determining grouping in his theory is closure. In general, within the implication-realisation model, a tone that ends a group (basic pattern, combination or chain) on one level will initiate the subsequent group. Melodic closure (which may be determined by interaction of parameters other than pitch and register, such as duration, metre or harmony) will result in what he terms a perceptual and analytical “startover” on a tone of closure. However, two consecutive groups may be separate in not sharing a common tone as end and beginning; “If a tone of closure and the next following tone are not level equivalent, creating the denial of an implication (and no pattern of registral return, aba, is present) then listeners will tend to forget the unclosed dyadic relation and separation between the two tones will occur” (*ibid.*, p298). Such a separation between groups may also arise as an effect of “modelled repetition” (described earlier on pp129-132), wherein the influence of intraopus (“os”) or extraopus (“xs”) style enables a listener to anticipate the immediate repetition of a sequence already identified as a group.

Narmour points out (*ibid.*, p312) that “What makes the analysis of grouping such a difficult theoretical subject is that music displays both continuous and discrete properties. Ongoingness simultaneously exists with formal disjunction.” The capacity of his theory to cope with both ongoingness and disjunction - though focusing largely on the representation of ongoingness - means that grouping in the theory can take many forms, and that the theory is flexible enough to accommodate a wide range of musical textures and articulations of structure. He suggests (*ibid.*, p312) that while “the norm is for low-level patterns to emerge as separate formal entities while high-level relations establish uninterrupted continuity” it is possible for “high-level events to exhibit much discontinuity while low-level ones remain full of connections”, both extremes being representable within the implication-realisation model. As he says (p352) “melodic analysis and formal analysis are...indissolubly linked. One cannot properly explain higher-level melodic structures without taking into account their lower-level forms.”

His concluding chapter is largely concerned with establishing the utility of the theory and delineating the logistics of its application (including suggestions for some possible variants of the theory). Starting by outlining various formal symmetries that exist between components of the theory, he then seeks to make explicit the value of the theory considered from a music-theoretic and musicological perspective. He suggests (*ibid.*, p336) that “One value of the symbols advocated herein is that they enable us to discover and identify the common ‘word orders’ of melodic ‘sentences’...we have already seen a number of common structural orderings in the ‘sentences’ making up melodic chains, and have shown how such sentences characterise the compositional strategies found in melody...A string of structural symbols therefore represents a syntax, ordered tokens typifying the melodic language of a given composer, a given work, a given genre or any other level of the style hierarchy.”

He also refers to the possibility of using his system on computer because of the “economy” of the symbols, essentially as an element of a database-type application, handling - and enabling the cross-comparison of analyses of - large amounts of musical data. In this respect he suggests a number of extensions to the symbology of his theory in order to represent, e.g., registral direction (which is *not* explicitly encoded in the basic symbols), and the separation or conjunction of basic patterns.

He then examines what he conceives to be the limitations, strengths and possibilities of the theory, pointing out (*ibid.*, p346) that while “The analytical theory offers a way to study the multi-faceted replacement techniques of melodic variation and the kind of structural changes that varied repetition brings about”, nevertheless “the employment of analytical strings of note-to-note relations may lead to erroneous and misleading comparisons unless we accurately track levels and keep them hierarchically separate.” One of the principal benefits of his theory is, he feels, the fact that it can model both the ongoing and the hierarchical aspects of music in cognition; “Music is not either top-down or bottom-up, but simultaneously both, lower levels influencing higher ones and vice versa...as music moves horizontally through time it is simultaneously moving vertically, during which hierarchical levels gather strength Thus perceptual ‘feedforward’ between low and high level and cognitive ‘feedback’ between high and low level constantly takes place. Our analyses and explanations should reflect this psychological state of affairs” (*ibid.*, p349). He concludes by speculating on the appropriateness of his theory for representing how listeners might encode melody in terms of functional similarity and differentiation, raising questions - such as the influence of form on the analysis of melody - that the theory might be developed to address, in the context of outlining aspects of the theory to be covered in future volumes. A series of Appendices presents summaries of his rule-systems and symbologies, a catalogue of archetypes and combinational structures, and sample analyses of early Western music and music from other cultures, which he deems his theory capable of analysing because of its “general panstylistic outlook”.

On first acquaintance, this volume, like its predecessor, appears formidably difficult. It presents a theory that is neither simply conceived nor simply expressed. Nevertheless, even from the inadequate summary presented here it should be evident that this theory could be invaluable in its precise depiction of the ongoingness of musical perception; it attempts to encapsulate the continual flux experienced by a listener as a piece of music unfolds and as perception unfolds with it, sometimes drifting ahead of, and sometimes racing to catch up with, what has happened, what is happening and what might happen. In the level of detail that it achieves in accomplishing this and in its flexibility, the theory appears virtually unique.

Having said this, the theory, and indeed, its presentation in this volume and its predecessor, have several problematic aspects. While the matter of presentation may seem trivial in respect of such a comprehensive and incisively conceived theory, it is important; Narmour’s complex ideas warrant, indeed, require, a wide dissemination in order that their import can be assessed in the different intellectual communities whose central concerns they address. It seems to me that the principal problem with this volume is that for a book introducing a new theory, it reads at times as a slightly awkward amalgamation of textbook and justificatory manifesto: textbook in outlining the elements and their interrelations in the theory and manifesto in its provision of a dense analytical and cognitive contextualisation of those elements and relations. This conflation of functions does not make the book

easy to approach; reading it, one experiences continual conflict between being informed by the exposition of the theory and challenged by the invocation of a vast range of music-theoretic and cognitive phenomena in its justification.

As an instance of this, while the detailed music-analytic examples are welcome, and demonstrate the wide applicability of the theory they can interfere with the clear presentation of the theory by continually making evident its “except-cases”, loosening the reader’s grasp on the import of the theory’s fundamental principles and premises. It might be argued that, after all, unless this theory can be applied to real music, its validity must be questionable; on the other hand, the constant validation and re-validation of the theory in terms of the analytical examples presented seems paradoxically less convincing than the author might have wished, perhaps because of the particularity - the idiosyncrasies - of each musical example, which, while emphasising the theory’s wide musical applicability, act continually to undermine the reader’s understanding of the general principles lying behind the basic elements of the theory.

The issue of general style of presentation aside, there seem to me to be a number of respects in which the theory is itself problematic; these may derive from the way in which certain issues are presented, but may also reflect unclarity or contradictions in the role and function of specific topics within the theory. The main difficulties appear to lie in assessing the status of rhythm and metre, and of harmony, within the theory.

While a considerable part of both volumes is devoted to specifying the operational characteristics of metre and rhythm in the implication-realisation model, on the whole the influences of metre and rhythm are neither clearly nor separately nor separably delineated from the factors that he purports to demonstrate govern note-to-note succession. Given the formality of much of the rest of the theory, his treatment of rhythm and metre appears too discursive. In fact, his emphasis on note-to-note relations (in terms of durational “cumulation” and “countercumulation” relations) might be one of the factors that obfuscates the role of duration in musical patterning; the potential for durational patterning and metrical (accentual) organisation to act independently in structuring the progression of musical time appears unexplored and largely unacknowledged here. At the least, the admixture of rhythm and metre within the theory in influencing patterning tends to undermine the potential “primitive” power (see, e.g., Sloboda and Parker, 1985; Jones and Yee, 1993) of metre (once established through intraopus or extraopus style) as a structuring agent. It could have been helpful to articulate theories of metre and rhythm independently before instancing the influence of metrical and durational factors in the overall implication-realisation model.

Similarly, despite extensive coverage in the text, the role and status of harmony in the theory remains ambiguous. What might be regarded as inseparable correlates of harmonic tonality appear, at times, to be construed as functioning from the top-down - as elements of stylistic and thus variable influence - while at other times their influence is overtly bottom-up and “reflexive”. Thus Narmour’s designation of dissonance as an operational bottom-up factor in forming combinations and chains appears at odds with his identification of the “scale-step” functions of notes within a mode as “top-down atomic schemata...and thus no more deserving of preferential treatment within the implicative theory than any other form of learning”.

To be sure, it could be argued that this ambiguity is in fact resolved in that he lays down ostensibly “style-free” conditions for the existence of dissonance within the theory. In *ACMC*, in defining his three classes of dissonance (see above), he suggests that these constitute a “bottom-up hypothesis not specifically tied to any restricted conception of tonal style”. The existence of dissonance within **any** musical style or genre is referable to the potential for three perceptually operational factors: (1) differentiability of consonances and dissonances on the basis of “vertical (acoustical) difference”, (2) differentiation between “chordal and non-chordal properties” and (3) discriminability of groups of tones. However, there are problems with these specifications.

To start with, his point (1) concerning a “perceived vertical (acoustical) difference” between consonance and dissonance would appear to imply an almost Direct Realist view of perception, i.e., the existence of a direct correspondence between the nature of the physical signal and its perceptual (musical) significance. But without clearly articulating a theory of how such a correspondence might operate such a view is not tenable. In any case, as Helmholtz suggested in the last century, it is more likely that the ways in which our sensory systems make use of the information embodied in a physical signal act to determine its musical functionality than that such functionality is referable to the nature of the physical signal alone. Reference to or inclusion of some such psychoacoustical considerations (as, e.g., outlined by Parncutt, 1989) might well “save the appearance” of this aspect of Narmour’s theory, but such reference is not made here.

In the second place, his point (3) is dependent on the distinguishability in perception of “collections of tones, and thus...modes”. While it is feasible to argue that discrimination *per se* is not dependent on prior identification, it does seem probable that discrimination between “collections of tones” requires the existence of a relatively rich representation in cognition of interrelations between such “sets”. Given that scale-step function - intrinsically tied to mode - is located in Narmour’s theory as being active in the stylistic (top-down) domain, it is difficult to see just how the capacity to discriminate between modes can be simultaneously bottom-up. I suspect that this ambiguity arises because of the way in which Narmour chooses to maintain a strict separation between bottom-up (invariant) and top-down (variable) factors within his theory, a point that requires further consideration in the context of a critique of fundamental aspects of the theory.

The first such aspect to be considered is Narmour’s employment of “syntactic parametric scales” within each separate musical parameter in the implication-realisation model. It is not so much the separation of parameters within Narmour’s model that is problematic - indeed, it is largely the separate treatment of pitch and register that endows the theory with its power - as the fact that the syntactic scales used in conjunction with each separate parameter are largely analogous in structure. Although he refers to the possibility that such scales might differ in structure and function between parameters (see, e.g., *ACBMS*, p311), on the whole the scales that he uses to order harmonic and melodic (interval) movement are unidimensional (for harmony, see *ACMC*, p127, fn 6). Whilst the adoption of such an approach could be justified on theoretical grounds (“rationalistic theoretical construct”), it does appear to underrate severely the degree of complexity that has been shown to be operational in the adjudged perceptual similarity between pitches (see, e.g., Krumhansl, 1990). Narmour might choose to reject such a complex basis for his syntactic scale of pitch on the grounds that it is largely a product of formal learning (as Krumhansl herself seems to suggest) and hence “top-down”. However, such a

contention brings one to the heart of the problem that Narmour's theory - considered as a **cognitive** as opposed to **analytic** theory - presents; is his distinction between "bottom-up" and "top-down" processes as rigid and unchangeable as he presumes ?

If a rigid separation prevails, then the contradiction noted earlier, concerning the simultaneous top-down and bottom-up operation of tonal harmonic factors remains unresolved. If, on the other hand the separation between top-down and bottom-up - between learned and hard-wired - is not so rigid as Narmour proposes, does his theory necessarily fall ? I think not, despite the fact that one of his principal concerns is to separate out the influence of variable stylistic factors from the determining influence of general cognitive propensities. For one of the most evident facts about neural systems on the whole is their plasticity, their capacity to adapt and change as a function of learning, even at the level of "neural wiring" (see, e.g., Rose, 1993). Thus, if a sufficiently common basis for learning could be postulated, and it could be shown that such learning resulted in the general operation of cognitive processes that were effectively reflexive and not amenable to conscious introspection, the question of why such processes should not be considered as effectively equivalent to those that are hard-wired and hence bottom-up would have to be answered.

Why should the results of such common learning experiences be excluded from playing a formative role within the bottom-up elements of the theory ? Narmour does consider and reject this possibility, suggesting that "Although all experienced listeners share style knowledge to some extent, it is not tenable to posit that any one cultural segment of that shared knowledge represents a perceptual whole. Just as there's no such philosophical thing as a language, so there is no such cognitive thing as a style." In making this statement, Narmour does not appear to consider the possibility of trans-genre stylistic constraints that may be orientated around some constant structural core - largely, what the role of tonality can be conceived of as being in the common-practice period, at least, as its historical traces may exist for and in our perceptions *now*, in the present, through our exposure to the music of the last five centuries.

Indeed, to accept such a possibility would severely limit the scope and applicability of the basic principles of his theory. They could not, for instance, be applied hermeneutically in the exegesis of compositional practice and intent. But it would not disqualify the theory from elucidating the experience of melody in our time and within what might be described as Western culture. In fact, the incorporation of such considerations would vastly enhance the explanatory power of the theory, but only in respect of this restricted domain. Such a common basis of learning - a common realm of experience - is, in many ways, no mere hypothesis. Its operation in respect of music can be and has been empirically demonstrated in a number of domains (see, e.g., Sloboda, 1985; Trehub and Trainor, 1993), as has its generally non-introspectable nature (see, e.g., Cross, Howell and West, 1983; Lamont and Cross, 1994) - but only within a particular, though increasingly global, musical culture. Indeed, attempts to predict and predicate the nature of music and musical experience within other cultures on the existence of cognitive universals seem doomed to failure; recent personal experience (Stobart & Cross, 1994; Cross and Stobart, in preparation) has inclined me to believe that cultural particularities are the primary determinants of musical expression, often subverting the operation of cognitive universals in the cause of articulating a culturally acceptable and distinctive aesthetic. While the operation of many universal cognitive principles may be

adduced or invoked in providing an explanation of the listening process, it cannot be assumed that these cognitive principles will operate in the same way - i.e. will be expressed in any way that we can currently empirically observe - within the confines of a different culture (whether that difference is historical, geographical, or socio-economic) unless those cognitive principles can be shown to be so deterministic that their modes of operation are confined to an extremely narrow range. The only way that the sort of approach to the exegesis of cultural artefacts that Narmour espouses could work is in the context of a “deep” immersion in and study of the cultural matrix of that artefact (cf Blacking, 1981).

In effect, the incorporation of certain trans-genre stylistic constants - such as some aspects of generalised scale-step function, perhaps along the lines sketched out in *ACBMS*, pp82-85 - would clarify the operation of Narmour’s theory though restricting its scope, at least insofar as the basic theory, in terms of bottom-up proclivities, has any hermeneutic power that can elucidate compositional intent. But that hermeneutic power derives largely from the stylistic knowledge - the “degree of cultural immersion” - that an analyst brings to an analysis to complement the use of the theory, as Narmour himself indicates. As he says (*ACMC*, p59), “A given analyst may assert that style impinges on, and thus changes the meaning of, an implication normally governed differently by the if-then perceptual constants of the theory. But when such assertions are not self-evident it is the responsibility of the analyst to offer evidence demonstrating that this or that implicative pattern conforms sufficiently to this or that stylistic continuation.”

This is a highly developed theory that is full of rich possibilities, as much for the music psychologist as for the music analyst. It is inevitable that it will be compared - in terms of its analytical efficacy, and its promise as a source for experimental hypotheses - with the only other theory of music cognition that is as comprehensively developed and expressed, that of Lerdahl and Jackendoff (1983). In contrast to Lerdahl and Jackendoff, whose theory sets out to account for “the intuitions of a listener experienced in a given idiom”, Narmour sets out to model - and to account for the nature of - musical experience itself. As he puts it (*ACBMS*, p278), “The theory is intended to capture the everyday experience of competent music listeners”. Hence, features that Lerdahl and Jackendoff represent within separable analytical frameworks, such as relative structural stability of events (represented within the time-span reduction) and the dynamics of tension-relaxation schemata (modelled within prolongational reduction) are integrated and co-articulated within Narmour’s theory to provide an exhaustive account of the ongoing experience of music. Thus direct comparison of their theories, and of the predictions of their theories is difficult, and can be conducted explicitly in only a few domains, one of these being grouping; such a comparison must, however, take into account something of this difference in ostensible aims between the theories.

In Narmour’s theory, a pitch may be shared between two structures, functioning as the end of one and the beginning of the next simultaneously. It will thus be transformed (translated) on to another hierarchical level, functioning at a higher level than that of the musical surface. This is quite different from Lerdahl and Jackendoff’s conception that a pitch will function either in one group or another but not in both unless the second group is contained in the first group (Grouping Well-Formedness Rule 4, “If a group G_1 contains part of a group G_2 , it must contain all of G_2 .”), although they introduce a rule-modification to allow for overlaps or elisions (Grouping Overlap principle, see Lerdahl and Jackendoff, p60) which limits the interaction between successive groups to the sharing of one note that has no

implications for, e.g., the relationships between the notes on either side of the shared note, such notes being capable of playing roles in Narmour's theory (in respect of his "tangled hierarchies"). This betokens a quite different conception of note-to-note relations, though such a "note of elision" (in Lerdahl and Jackendoff's theory) would fulfil a similar function to a shared note between successive style shapes in Narmour's theory in functioning at a hierarchical level higher than that of the musical surface. In a sense, Narmour's treatment of separation is in direct contrast to Lerdahl and Jackendoff's treatment of overlapping. They treat overlapping within grouping as something that is uncommon and exceptional, the rule being separation, whereas Narmour treats overlap as the norm, the exception being separation. In this respect, Narmour's theory encapsulates ongoingness at multiple levels to a much more fundamental degree than does that of Lerdahl and Jackendoff. Despite this difference, the higher-level structures that result from the application of Narmour's theory often look quite similar to those that might result from the application of Lerdahl and Jackendoff's theory.

There are, however, many differences in the conceptual function of basic musical entities and phenomena between the theories. For instance, for Lerdahl and Jackendoff a large melodic leap is likely to function disjunctively, articulating separation of groups. For Narmour, such a leap is likely to give rise to a "reversal implication", essentially fulfilling a function in the "ongoingness" of the music rather than interrupting its flow. In fact, the position that the intervallic leap holds in Narmour's theory is a little difficult to square with its role as empirically determinable within the Gestalt approach (see, for example, Bregman, 1990), which Narmour claims lies behind the operation of his theory. In terms of auditory stream segregation or auditory scene analysis, a large pitch interval occurring in the context of small pitch steps is more likely to function disjunctively - as indicating a separation of streams - than conjunctively. Perhaps Narmour's idea of a large interval as implying "change of registral direction and a sequence of intervallic differentiation" is better conceived of as being derived from the examination of Western Classical musical style structures rather than from any specific and innate properties of our cognitive systems. However, it seems to me that Narmour's position could be squared with the empirical evidence by postulating that a large interval should be generally construed as implying a change of tessitura and hence a disjunction but, if unexpected (i.e. not part of an ongoing process) the original implication of the interrupted process could be held to persist **in the domain of tessitura** so as to imply return in the direction of the same pitch range (a reversal), at least over the short term. If such a return does not come about, then the large interval could be construed as a retrospective disjunction. This redefinition would not involve any great change in the theory, given that all its elements - post-denial implicative persistence etc - are already incorporated in the model.

One other point of necessary comparison between the theories is the degree to which they can account for moment-to-moment musical experience. In fact, Lerdahl and Jackendoff's original (1983) theory does not attempt this, but Jackendoff's recent (1991) proposals for real-time parsing present a direct competitor to Narmour's theory. Again, however, comparison between Jackendoff's "parallel multiple-analysis model" and Narmour's "implication-realisation" model is difficult to make, but this time for the reason that Jackendoff is not nearly so explicit as Narmour in outlining the fine detail of his theory, which seems to me to require integration with the recent theories of Lerdahl (particularly with that of Lerdahl, 1988) to achieve sufficient explicitness. In fact, the theory that Jackendoff sketches out is quite close, in many of its elements - e.g., in allowing both prospective and retrospective

interpretations - to that of Narmour. Moreover, Narmour has certainly dealt with Jackendoff's objection to the "difficulty with basing a theory of musical affect on the standard intuitive notion of expectation", by producing an extremely complex theory that is very far away from the "standard intuitive notion of expectation" that Jackendoff decries, and by allowing sufficient richness in outlining his structural principles to ensure that re-hearing is likely to maintain level of arousal, as well as making explicit provision for this maintenance of arousal by the "reflexive" and thus involuntary operation of his fundamental principles. However, Jackendoff's theory, with its complex dialectic between the abstract structures embodied in our cognitive systems and the consciousness to which they are affectively - indirectly - linked might ultimately present a more appropriate dichotomous framework within which to articulate the dynamics of ongoing musical perception than does Narmour's perhaps over-rigid opposition between top-down and bottom-up processing.

Despite these caveats, Narmour has produced yet another vastly impressive work. His theory seems to be in a continual state of development (as witness not only the more advanced subject-matter of this volume but also the differences in emphasis with its predecessor), and further volumes, dealing with aspects of potential conflict between low and high-level patterning, the nature of harmonic prolongation, and the effect of counterpoint on melodic structure (among other topics), are promised. His productivity and attention to detail inspire awe, and if this review has seemed over-critical it is only because his theory's scrupulous comprehensiveness affords the reader the luxury of indulging in informed engagement with its ramifications. Even if his theory is eventually shown to have no relation to musical perception, he has still produced a method of melodic taxonomy that is Linnaean in its scope. In the current state of knowledge, his theory provides what may be the best - and is certainly the most complete - explanation of the concatenation and accumulation of the tiny fluxes of what might be termed "melodic energy" that make melodies worth listening to.

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