MELODIC CONTOUR TYPOLOGY[1]

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I

INTRODUCTION

The concept of melodic contour (shape, configuration, outline) is frequently encountered, but its precise meaning and significance in musical analysis is elusive. The literature evidences varied concerns with the nature and typology of melodic contour, from simple descriptive comments, to the use of contour replication in jazz improvization (Coker 1964:55-56), to the design of programs for computer assisted descriptions of melodic contour (Brown 1968). Few definitive studies of the concept, or its systematic application, however, are to be found.

Melodic analyses often include some description and discussion of melodic contours (e.g., Densmore 1918; Herzog 1928; McAllester 1949; Merriam 1967; Roberts 1933), but this practice is not consistent and consensus on procedures is relatively low. Similarly, methods for song classification have rarely used melodic contour as a major typological criterion (cf. Elscheková 1966), with the notable exception of Hustvedt's classification of Child's ballads (1936). Nevertheless, Herzog noted in a review of song classification techniques that

> the most suggestive method which is occasionally proposed, is that by melodic contour. This method seems very worth testing on a large scale, since often the melodic contour turns out to be the most stable element in melodies which have been in the process of differentiation. (1950:1047)

The more general and theoretical works on melody and melodic analysis indicate a further disparity of concerns. In some of these works there is little mention of melodic contour (e.g., Smits van Waesberghe 1955: Szabolesi 1965), while others discuss a few *types*. For example, Toch described three contour types: (1) a level line undulating around a single pitch axis, (2) a continually ascending line with its highest point near the end, and (3) an arch type which has a wave-like ascent (1948:78-80). Edwards was concerned exclusively with the *arch*, suggesting that its "natural and logical" shape may have evolved from early Gregorian chant, and "was supposed to represent the 'logical trajectory of thought.' In other words the arch contour is a graphic illustration of the general history of all organisms: 'élan, épanouissement et chute'" (1956:73). Such organic and and geometric analogies dominated Schillinger's concern with melodic contour:

> The constitution of a melody is equivalent to that of an organism. It is a variation of stability in frequency and intensity.... all our pattern conception and pattern-making are merely the geometrical projection of electro-chemical processes, in the making, that occur in the brain. This geometrical projection is thought itself.
>
> Melody when recorded has the appearance of a curve. There are various families of curves, and the curves of one family have general characteristics. Melodic curve is a trajectory, i.e., a path left by a moving body or point. Variation of pitch in time continuity forms a melodic trajectory. (1946:234, 229-230)

The differential concern with melodic contour raises questions concerning its role in melodic analysis, its significance in musical description, its cross-cultural applicability, and comparative utility. It can be assumed that a well defined concept of melodic contour would provide a useful analytical tool and valid baseline for comparative research. To that end this paper reviews the basic approaches and assumptions in melodic contour description and typology, and constructs a formal definition and typology whose usefulness in descriptive and comparative analysis is explored.

SYMBOLIC NARRATION

The simplest kind of description of melodic contour consists of "narrating the story" of melodic events, as in this description of Navaho corn grinding songs:

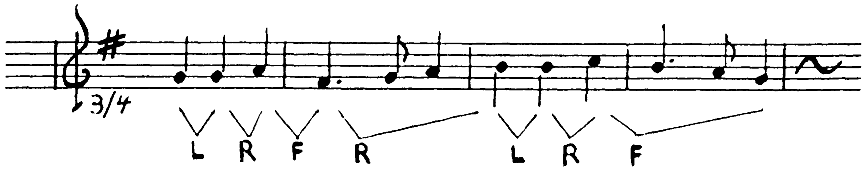
> After starting on the tonic, many of them skip to a higher point and slowly wind their way back to the tonic for a momentary plateau; then, another upward skip occurs, this time to a peak lower than that reached before. The line again gradually works its way downward, finally resting on a lengthened tonic plateau. (Johnson 1964:104)

Generally, such narrative descriptions of melodic contour are too lengthy, unwieldy, and particularistic to have much typological potential, especially if used on a large scale. Even as a descriptive technique verbal narration does little more than highlight the general sequence of critical melodic events.

The use of symbols has somewhat simplified the use of narrative descriptions of melodic contour. La Rue has noted that "the characteristics of a melody that one most frequently needs to describe are level, rising, falling, and undulating" (1964:165). These characteristics can be symbolized (L, R, F, U respectively) and the symbols applied as in Example 1.

Insofar as musical notation is itself a form of symbolic description, a partial translation of one set of symbols into another set "gives too little information to be of much practical use" (McLean 1966:179). The best one

Example 1



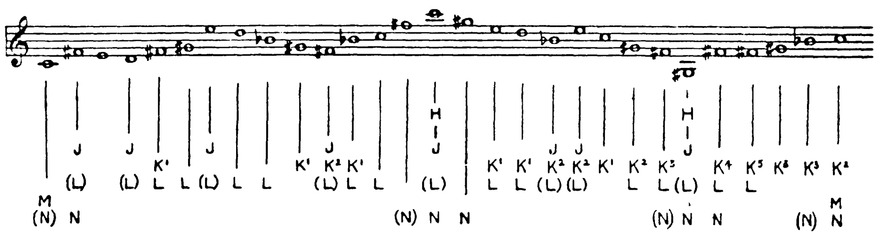
can hope to achieve with such techniques is a one-to-one correspondence between the notation and another symbolic representation, a procedure useful in coding music for computer input (Example 2), but which is not in itself analytical or typological.[2]

Example 2

(A11♭BE24)y8 tB 3C D(6BAC)(BAE) /(CBD)(CBF) 8Dz-/

It is possible, however, to approach melodic contour analysis and typology through symbolic narration. Rather than directly translating notational symbols, Ortmann identified and symbolized a set of salient melodic features: "H = absolute pitch, very high or very low; J = change of ascent to descent or v.v.; K = tone-repetition; L = interval relationship, or minor pitch change; M = first and last tone; N = first and last, highest and lowest interval" (1926:18). The exemplary application shown in Example 3 suggests both the analytical and typological possibilities of this approach.

Example 3 (Copyright 1926 by the American Psychological Association. Reprinted by permission).



These three examples contribute little to a definition of melodic contour or the problem of contour types, but they do indicate that melodic contour can be approached in different ways—by symbolizing relations between contiguous pitches, letter names of individual pitches, or melodic features. Such considerations are a preliminary step in the direction of defining melodic contour.

DEPICTION AND WORD-LIST TYPOLOGIES

Another approach to the descriptive and typological problems of melodic contour is the use of metaphoric depiction, such as "the outline of an African tune is like a succession of the teeth of a rip-saw" (Jones 1958:11). Underlying this practice is the frequently expressed assumption that melodic contour is a qualitative product of a variety of specific melodic events. Melodic contour analysis

> recalls and may substantiate the contention of the German configurational or *Gestalt* school of psychology, that melody at large is a prime example of a true "configuration": a pattern which remains essentially intact as long as its shape or contour remains the same, even if its elements shift and change. (Herzog 1950:1047)

The notion of general melodic configuration lends itself easily to metaphoric characterization, and a number of "word-list" typologies of melodic contour have emerged in this connection.

> Other aspects of melody have been less formalized in description than scale and tonality. Melodic contour, for example, is usually described by very general terms, such as 'arc,' 'pendulum,' 'gradual descent,' etc. While a more comprehensive system of classification would be helpful here, the use of generally understood terms has advantages over specialized and rigid systems which—as in the case of scales—sometimes obscure rather than amplify the music to be described. (Nettl 1964:147-148)

What convenience word-list typologies might have for ordinary communication is, however, far outweighed by the disadvantages attending their use.

First, while there is some consensus in different lists, they are not wholly consistent in the features which differentiate generic and specific types, in the terminology used, or in their comprehensiveness. For example, Siegmeister proposed ten metaphoric types of melodic contour: (1) wave, (2) wave with climax at end, (3) rising wave, (4) falling wave, (5) arch, (6) inverse arch (bowl), (7) rising line, (8) falling line, (9) horizontal line, (10) combination (1965:64-77). But, on the other hand, Courvoisier identified only six types: (1) descending, with three subtypes—straight, terrace, sequential (cascade), (2) generally ascending, (3) level, with very limited tonal material and mostly conjunct movement, (4) arc, with proper arc and inverted arc as sub-types, (5) pendulum, an undulating type of motion, usually around a tonal center, using intervals chiefly of the third, (6) mixed, combination of the above types (1957:10). Neither author explains the rationale of the list, each of which seems more to be an empirical summary of the kind of data with which each author was concerned than a theoretically based typology.

Second, it seems characteristic of word-list typologies that they contain a *mixed* or *combination* category, a contradiction of the major objective of any typology: differentiation between and homogeneity within types according to explicit criteria. This is a major problem since most actual melodies could be described as having a *mixed* contour in some sense, as in Hood's description of a Central Javanese puppet play song: "the overall Melodic Contour resembles a kind of bow . . . with infixed deformations that mix several other contours" (1971:306).

Third is the problem of the musical referents of the terms. As metaphoric depictions, most of these terms are more closely related to the visual and graphic representations of music than to its acoustical and auditory characteristics. Indeed, word-list typologies of melodic contour are frequently accompanied by "explanatory" graphics.

> Melodic Contour, as the term implies, is simply the predominant configuration of melody such as the contour of an arch, ; a bow, or ; or inversions of the bow or arch; or the rise and fall of the saw tooth, , or diagonal lines, or , or undulations, ; or combinations or variants of these. (Hood 1971:302)

Fourth, it is in the nature of metaphoric depictions to leave definitive and contrastive criteria implicit and undefined, and this confronts readers with a plethora of unanswered questions. While this problem is common to numerous other analytical concepts in ethnomusicology (Herndon 1974:239), it is particularly evident when dealing with melodic contour types. For example, what differentiates a *bow* and an *arch*; while *descending* and *ascending* are in opposition, is there a similar contrast between *pendulum* and *saw-toothed*; while some terms, such as *undulating,* seem to refer to overall melodic shape, why do others, such as *terrace* and *cascade* refer primarily to internal variation; to what degree are these terms based on consideration of pitch relations, interval patterns, temporal characteristics, or other melodic features?

Fifth is the issue of the comparative utility of word-list typologies. An informative example has been provided by Lomax in the cantometrics project (1968). Four ("very general") types of melodic *shape* were coded for each song in the world sample: arched, undulating, descending, and terraced. The first three were indicated by the most characteristic (frequent or important) phrase pattern in a song, while the last was coded for whole songs (Lomax 1968:57-58). Data on the frequency distributions of these types, taken from the submodal profiles of nine world song style regions (Lomax 1968:328-337), is presented in Table 1.[3]

TABLE 1

	ARCHED	UNDULATING	TERRACED	DESCENDING
South America (230 songs, 9.01%)	23 10%	161 70%	9 .4%	35 15%
North America (374 songs, 14.79%)	26 7%	232 62%	75 20%	41 11%
Insular Pacific (309 songs, 12.34%)	40 13%	238 77%	3 1%	31 10%
Africa (666 songs, 26.34%)	40 6%	433 65%	- -	193 29%
Old High Culture (422 songs, 16.69%)	59 14%	317 75%	8 2%	38 9%
Europe (383 songs, 15.15%)	42 11%	295 77%	8 2%	38 10%
Australia (32 songs, 1.26%)	3 8%	9 29%	8 24%	12 39%
Arctic Asia (92 songs, 3.63%)	6 6%	79 86%	2 2%	5 5%
Tribal India (19 songs, .75%)	3 15%	15 80%	- -	1 5%

While interpretation of this data is difficult because of the differential coding of contour types for phrases and whole songs, it can be noted that little if any significant differences occur in the frequency distributions of the four melodic contour types. One possible exception is the distribution for Australian songs; however, their relatively small number (32 songs or 1.3% of the 2,527 songs in the total sample) makes the significance of this distribution doubtful. Other possibilities are the higher percentages of *terraced* songs and *descending* phrases in North America and Africa respectively, but even in these larger samples there is insufficient statistical differentiation of the regions. While this application may be indicating some world-wide similarities in melodic shapes, the use of a word-list typology seems far too general and imprecise for productive comparative research.

GRAPHS

A third approach to melodic contour description and typology is through the use of graphs.[4] While the assumptions underlying melodic graphs are similar to those implied by narrative and depictive procedures, a variety of methods have been used. For convenience these are classified into "event" graphs and "relation" graphs, with further attention given to the types of matrixes used in graphic representation.

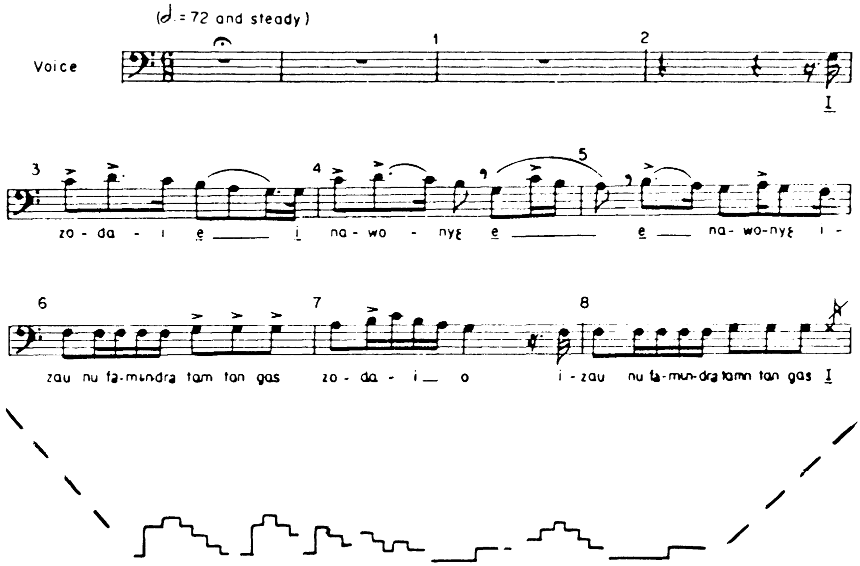
Melodic event graphs variously plot tones, pitch levels, pitch changes, durational values, phrases, measures, and other melodic events whose interrelationships are regarded as defining melodic contour. Of the simplest kind of event graph is that suggested by Herndon as a preliminary step in musical analysis (1974:238). This represents pitch levels or changes; breaks in the line indicate phrases, and some relative durations are also indicated (Example 4).

The matrix or frame of reference on which a graph is plotted affects the amount and kind of information in the graph, but not so much the general representation of a contour. Although a matrix is implicit in Example 4, the information communicated by the graph is essentially a matter of its internal relationships. Point-reference graphs can increase the information slightly, as in Johnson's representation of a Navaho corn grinding song (1964:104), which indicates the tonic (point) as well as phrase sections (Example 5).

Axis graphs provide at least one dimensional framework for plotting melodic contour. García used this technique to compare eighteen variants of the Mexican popular song "Los Magueyes" (1971). Only one axis is specified, the mode pitches. The graph is constructed by plotting each articulated note, and phrase junctures are shown by a dotted line. Example 6 shows the graphs of two variants.

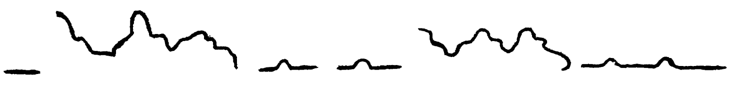
The extensive use of two axis (pitch × time) graphs is exemplified by Densmore's study of the music of the Teton Sioux (1918). Densmore assumed

Example 4



Example 5

tonic level



Example 6 (Copyright 1971 by Ediciones Framong. Used by permission).

Example 6 (Continued)

that the differences between variants of a song were in unimportant progressions between unaccented tones, so that melodic structures could be graphically represented whereby

> the pitch of accented tones in a melody is indicated by dots placed at the intersections of coordinate lines, the horizontal coordinates representing scale degrees and the vertical coordinates representing measure lengths. (1918:51)

Omitted from the graphic representations are

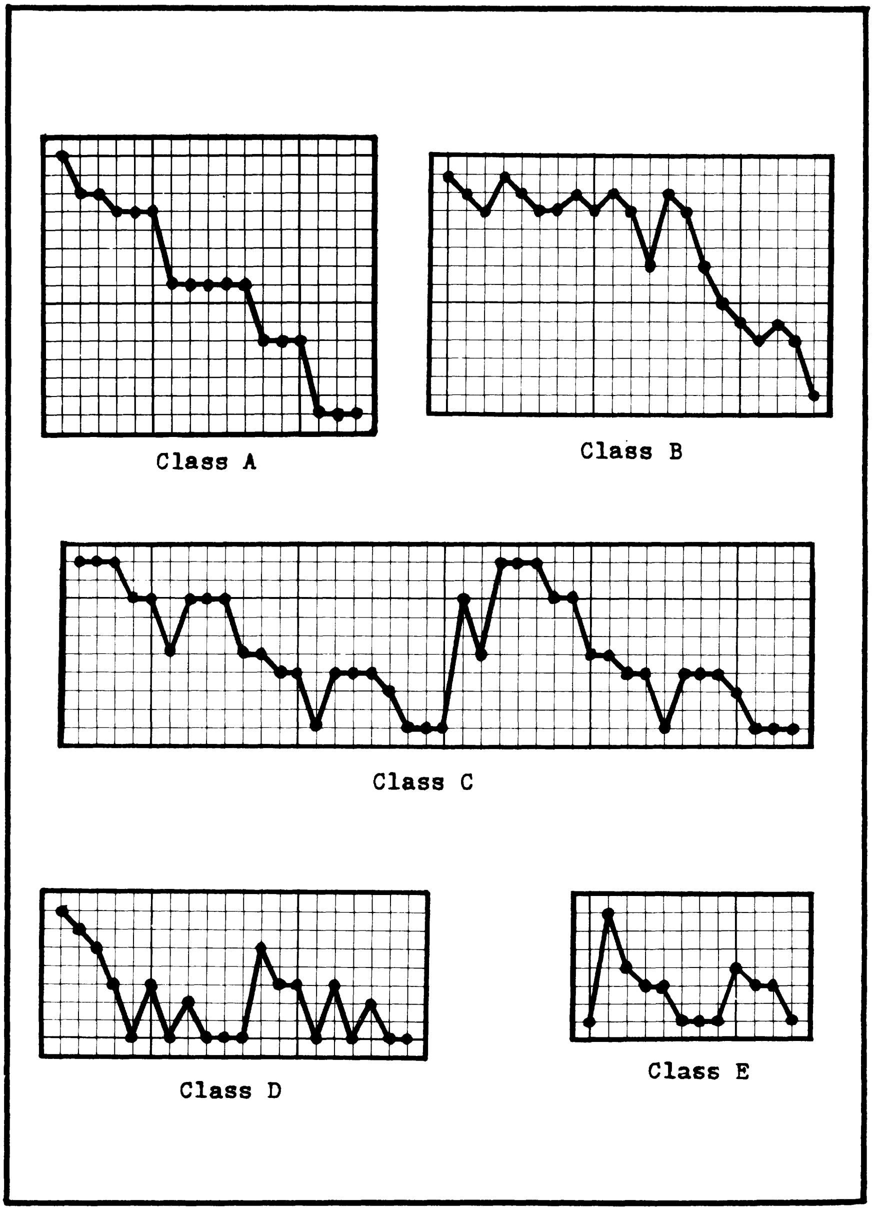
> not only the unaccented tones occurring in the melody, but also a distinction between whole tones and semitones in progressions, and a distinction between double and triple time in measure-lengths. (1918:52)

Using these criteria, Densmore plotted the graphs of 234 Teton Sioux songs and clustered them by inspection of the graphs. This yielded five contour types, regarded as "primary outlines," which were represented by the graph of a characteristic song in the cluster (1918:53), as shown in Example 7.[5]

A significant aspect of Densmore's research was the use of melodic contour graphs to arrive at empirically definable types of melodic contour as an integrated aspect of the analysis of a large corpus of songs. Particularly, she associated the contour types with thirty Sioux-designated song types (use categories), titles of songs, and other "content" elements of Siouxan music (Densmore 1918:52-54):

> Class A – no ascending intervals; not associated with any use categories.
> Class B – horizontal followed by descent; all more than fifty years old; no associations.
> Class C – repetition of lowest tone; associated with songs for the treatment of the sick; contain an element of affirmation and confirmation; associated with titles containing ideas of victory, strength, self-confidence.

Example 7 (Copyright 1918 by U.S. Government, Bureau of American Ethnology. Reproduced by permission).

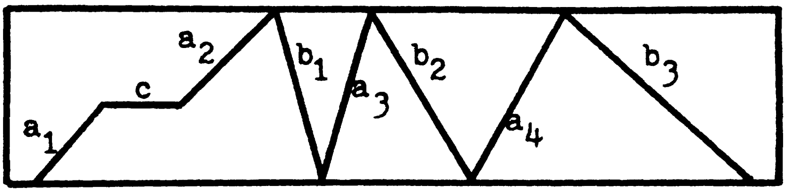


Class D – short ascent and descent frequently repeated; associated with songs received from animals in dreams, and with titles concerning men or animals in motion.
Class E – first progression ascending; associated with songs expressive of grief, dissatisfaction, disappointment or suffering.

While melodic event graphs in more than two dimensions are theoretically possible, no examples have been encountered. Rather, graphs of the relations between melodic events have been used. Relation graphs are concerned with the representation of salient relations in a melody, usually intervals or a sequence of melodic directions.

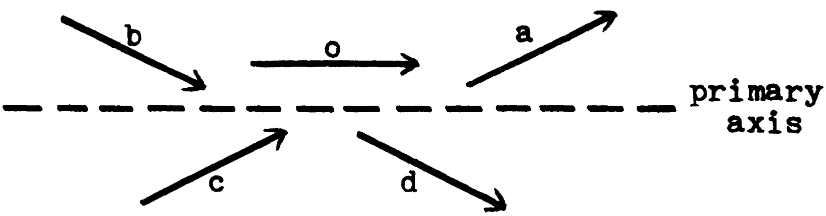
One relation graphing technique is the "contourogramme," a graphic representation of a melodic line as a sequence of *directions* of melodic movement (Hoshovs'kyj 1965:280). Three defined directions are rising (a), falling (b), and horizontal (c); numeral subscripts on these letters indicate the sequential order of the "movement" (e.g., a_1 is "first rising"). Example 8 shows the "contourogramme" kind of melodic graph.[6]

Example 8 (Copyright *Studia Musicologica.* Used by permission.)



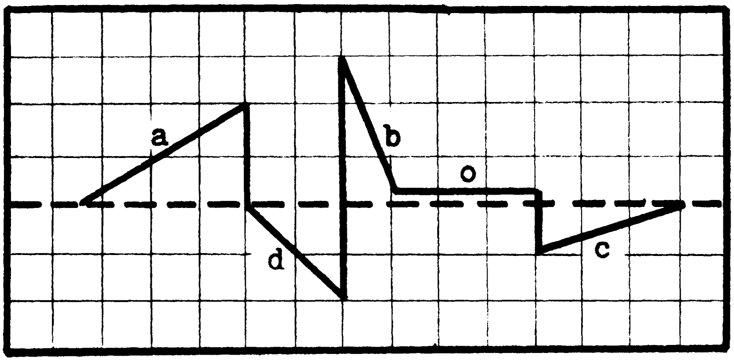
A similar technique for graphing melodic relations was used by Schillinger (1946). Assuming that each melody or melodic segment has a primary "axis" based on a tonic or a maximum duration tone, Schillinger defined five "secondary axes" which are directional in relation to the primary (Example 9): motion parallel to the primary (o), motion ascending from the primary (a), motion descending toward the primary (b), motion ascending toward the primary (c), and motion descending from the primary (d).

Example 9 (Copyright 1946 by Carl Fischer, Inc., New York. Copyright renewed. International Copyright Secured. All rights reserved. Used by permission).



"Every melody represents a combination of different directions as represented by the o, a, b, c, and d axes" (Schillinger 1946:253). The directions can be treated both graphically and as symbol strings in which "P" equals a unit or pitch and "T" equals a unit of time (Example 10).

Example 10 (Copyright 1946 by Carl Fischer, Inc., New York. Copyright renewed. International Copyright Secured. All rights reserved. Used by permission).



a4T2P + d2T2P + b1T3P + o3T + c3T1P

MELODIC CONTOUR AND OTHER MELODIC ANALYSES

At this point it is appropriate to attempt clarification of some analytical distinctions. Insofar as melodic contour is generally regarded as an artifact or product of pitch-time events and relations in a melody, its status as an analytically independent aspect of music is in question. Melodic contour has not been kept as distinct from melodic interval patterns and melodic motion analysis as might be desired for analytical clarity.

When von Hornbostel cited four basic melodic patterns—*Treppen Melodik* (stair-like), *Fanfaren Melodik* (fanfare), *Enge Melodik* (narrow), and *Kanonische Nachahmung* (canonic-imitative)—he referred to a variety of different aspects of music: tonal range, melodic shape, formal patterns, and harmonic relationships (1932:55). Similarly, Brandel's discussion of types of melodic movement in central Africa, while concerned specifically with interval patterns, subdivided the "octave melody type" by shapes.

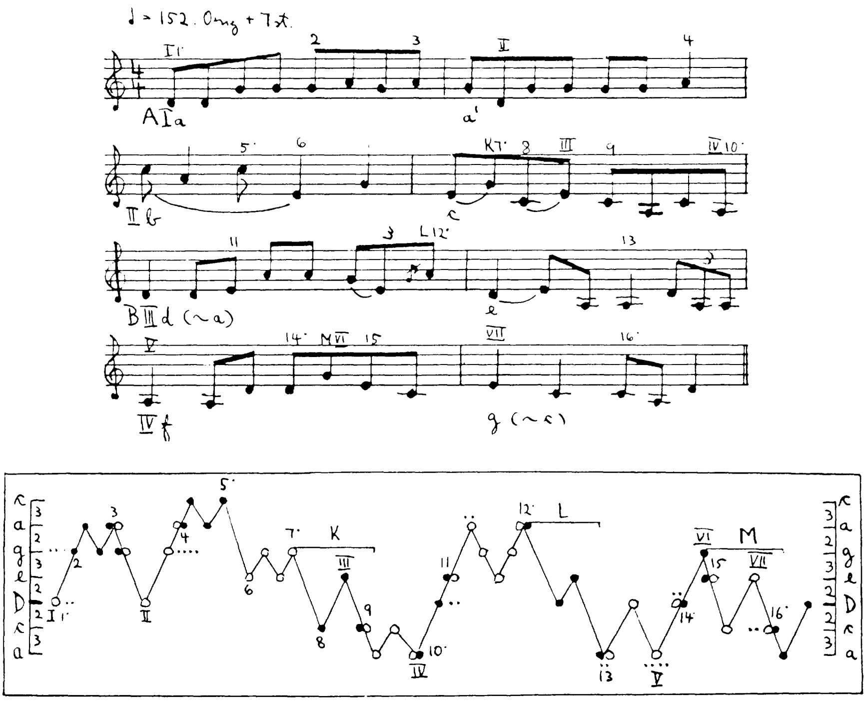
> The curving [octave] melody is more usual, however, and may assume several shapes, . . . and is obviously strongly allied to the predilection for the third. In this type of melody the movement is distinctly zig-zag, conjuring up an almost exact picture of a jagged line, thus: . (Brandel 1962:83-84)

The problem of the analytical independence of melodic contour has been compounded by some writers, concerned with the analysis of melodic features other than contour, who have used graphic representations which strongly suggest contour graphs. Kolinski's approach to the analysis of melodic *movement* was designed, in part, as an alternative to melodic contour analysis, and assumed that

> a fruitful and exhaustive analysis of melody is not possible unless the fundamental structural elements of melodic movement and their merging into larger configurations have been established. [Some approaches originate] from the erroneous assumption that melody can be equated to a sum of ascending and descending tone steps, and does not realize that a melody represents a more or less richly organized whole. Having this in mind, some scholars represent the melodic line by individual diagrams which reproduce the up and down of the melodic progression without leaving out of account the proportions of the time values; but in fact one does not learn much more from such diagrams than from the musical notation itself which reflects to a certain extent the melodic contour. (1965b:96)

With the objectives of analyzing melodic movement and classifying its components, Kolinski nevertheless used single-axis graphs which obscure the analytical distinction between melodic movement and melodic contour (Example 11).[7]

Example 11. Dahomean Song (recorded by Melville J. Herskovits). Copyright © 1965 Oak Publications, Div. of Embassy Music Corporation, New York. Used by permission.



Another approach to music, Seeger's analysis of the "moods of music logic" (1960), was predicated on a different set of assumptions and objectives, but also used graphic representations suggestive of melodic contour analysis. Seeger assumed that three dynamic functions–tension (+), detension (-), and tonicity (=)–operating on the four basic resources of music (pitch, dynamics, tempo, timbre) constitute the elements of a music logic and in combination make up its formal units (moods). "Any individual mood can be considered to consist of components added together until they define a unit of logical form" (Seeger 1960:252).

Variance in extent or magnitude of the functions is included in a symbolism that represents the direction of any progression (x) and its opposite direction (y). In combination these make up two binary possibilities (xx and xy) and four ternary possibilities (xxx, xxy, xyy, and xyx). Graphed as simple tonal relations in tense and detense modes, these combinations yield twelve basic moods (formal patterns) of music (Table 2).

Seeger comments that the extent or magnitude of the functional relations does not affect the mood or formal pattern (1960:236), that is, the pitches represented by dots in Table 2 could span an octave, third, or any interval without affecting the formal pattern. However, when he defines variants of each of the basic moods by adding the tonicity or centric function (=), extent in fact becomes important. Example 12 gives five variants of Seeger's basic "D" mood. While the sequential pattern of directions in all five variants is ++-, the extent of the "-" determines the variant. If it is an *interval* equal to the second "+," variant D_4 is produced, but if its extent is greater than the total of the first two "+"s', variant D_2 is the result, and so on.

Example 12 (Data used by permission of the American Musicological Society, Inc.)

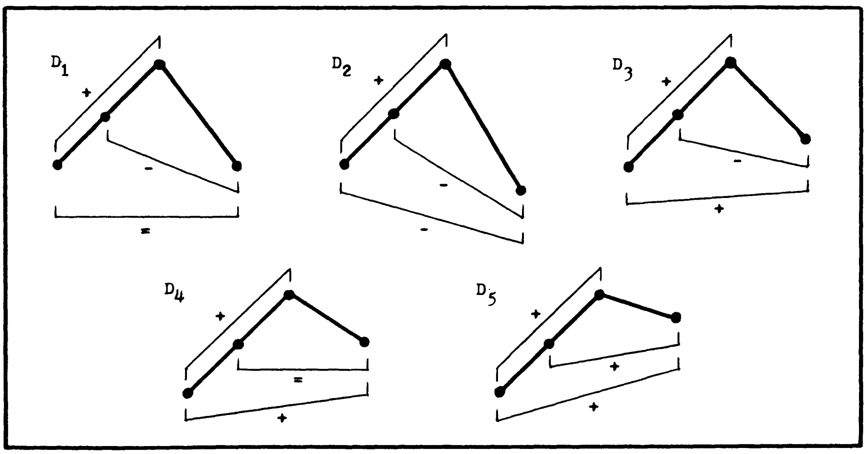
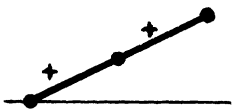
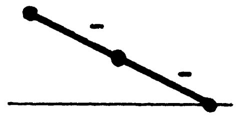
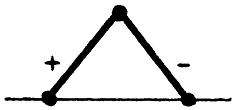
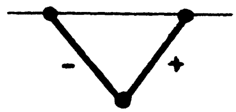
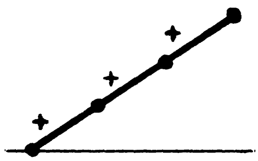
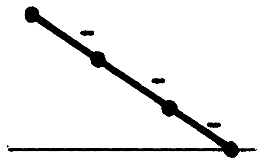
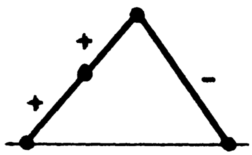
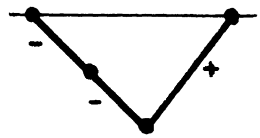
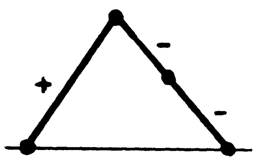
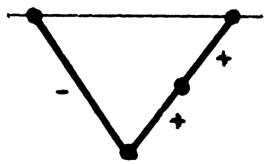
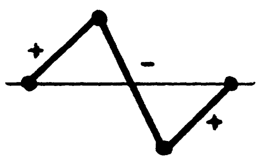
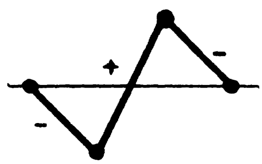


TABLE 2

(Data used by permission of the American Musicological Society, Inc.)

TENSE				DETENSE
BINARY				
	A	xx	a	
	B	xy	b	
TERNARY				
	C	xxx	c	
	D	xxy	d	
	E	xyy	e	
	F	xyx	f	

While Seeger's "moods of musical logic" were not designed as a melodic contour typology, the graphic representations of the moods suggest this possibility. However, as general melodic shapes, moods A and C are the same (both ascending) and moods B, D, and E are the same (arch), their differences arising from the placement of medial or internal pitches.

SUMMARY

Finding a substantial consensus about the nature of melodic contour and contour types in the foregoing studies is difficult; too great a variety of assumptions and objectives has been encountered. As for the methods used to describe melodic contour, narrative descriptions and symbol-string translations seem too specific and particularizing, and metaphoric depictions too general and vague, for productive insights. Similarly, the variety of graphic approaches, including the distinction between "event" and "relation" graphs, offers little clarification of the meaning of melodic contour.

Additionally, many authors have used more than one basic approach, perhaps assuming that the different techniques for describing melodic contour are wholly commensurate, and this has tended to blur analytical distinctions. Rather than searching for consensus, a strategy for investigating melodic contour is suggested: first, a formal definition of melodic contour, its constituent features and types, which will establish the analytic independence of the concept and specify its basic underlying assumptions; second, to initiate an experimental application designed to deal systematically with testing the productivity of the formal scheme as an investigative rationale.

Both aspects of this strategy are needed to clarify and explore the large number of extant hypotheses concerning melodic contour and contour types. A list of these hypotheses was given by Poladian (1942), and, with minor additions, it warrants repetition here.

(1) Predominant melodic contour types characterize the musical styles of some individual composers, individual ethnic groups, related ethnic groups (e.g., the "rise" in Yuman music, Herzog 1928), and possibly larger style regions (Lomax 1968).

(2) Melodic (intonation) contour is common to both speech and music; relationships between speech and music contours, in songs with texts, are generally expected to be closer in tonemic languages than in non-tonemic ones.

(3) Within certain musical traditions specific melodic contour types are associated with use categories, emotional content (e.g., Teton Sioux, Densmore 1918), structural types (e.g., 13th to 16th century German ballads, Poladian 1942:208), and functional categories (e.g., Appalachian hymns, lullabies, and party songs, Poladian 1942:208).

(4) In some cultural traditions melodic contour can be regarded as one manifestation of broader esthetic principles:

> the predominant melodic movement [of Armenian folk songs] is a continual curvilinear or zigzag shape. These folk songs are a series of arabesques, fundamentally circular in form, not sharp, angular, or decisive; their lines curve and curve again, one within the other, like a spiral, and their patterns recur in gradation within themselves, like those in the borders of Persian prints . . . the general contour of these melodies, with their uninterrupted curved lines, parallels to a surprising degree the designs of Armenian decorative arts on objects such as illuminated manuscripts, miniatures and rugs. (Poladian 1942:208)

(5) Melodic contour is perceived as a distinctive *Gestalt* (Herzog 1950), with psychologically important boundaries and features (Ortmann 1926). Melodic contour has a significant psychological role in the recognition and differentiation of melodies transposed from their original keys; and, melodic contour is more important than harmonic patterns in the identification of folk songs (Dowling and Fujitani 1971).

(6) Melodic contour types might be associated with specific physiological processes and states.

Two additional observations can be added to this list.

(7) The importance of melodic contour and contour types varies according to different cultural models and theories of musical production. Melodic contour is an elementary generative device in jazz improvization (Coker 1964:55-56), but not in the improvizational techniques of "nuclear theme" systems employing *raga, maqam, paṭet,* and so on.

(8) It is generally assumed that melodic contour types do exist and can be empirically defined. Densmore's inductive approach (1918) sought to define actual contour types in an existing corpus; and Herzog noted that "it is through a discovery of types that we hope to find the stylistic relationships, which are often genetic and historical relationships between different melodies" (1937:50). On the other hand, Seeger's deductive approach (1960) defines only what is possible within a given set of logical constraints, and from such a formal viewpoint melodic contour would be considered only an analytical construct with no necessary correspondence to empirical patterns.

II

COMPONENTS OF A MELODIC CONTOUR TYPOLOGY

Melodic contour is defined as the product of distinctive relationships among the minimal boundaries of a melodic segment.

Melodic segment refers to any series of differentiated pitches. Selection of any specific kind of melodic segment (motives, phrases, songs, sections between junctures in intoned speech, and so on) is not an aspect of the typology itself but a part of research applications subject to different research objectives.

Minimal boundaries are those pitches which are considered necessary and sufficient to delineate a melodic segment, with respect to its temporal aspect (beginning-end) and its tonal aspect (tonal range). Bounding a series of pitches by an *initial pitch* (I), a *final pitch* (F), a *highest pitch* (H), and a *lowest pitch* (L), satisfies these conditions, while defining fewer or more boundaries does not.

> The first and last tones of a melody mark the end-points of the auditory series, and more than other tones, they bound the melody. In the pitch-series the highest and lowest tones are the psychological equivalents of the first and last tones in the temporal series. (Ortmann 1926:4)

While these psychological assumptions obviously need experimental and cross-cultural confirmation, there is considerable consensus among ethnomusicologists as to the importance of these four melodic boundaries, especially since they are used in various melodic level formulas (cf. Kolinski 1957; 1965a).[8]

Three possible relationships can exist between any two pitches in series: *higher* or greater than (>), *the same as* or equal to (=), and *lower* or less than (<). Following Seeger's suggestion (1960), variance in extent or magnitude of these relationships (e.g., higher by a semitone or octave) is not included in the melodic contour typology proper. However, since this and other aspects of melodic relations do affect specific melodic *shapes*, it will be considered below.

Given the four minimal boundaries of a melodic segment (I, F, H, L) and the three possible pitch relationships, twelve unique combinations are possible, assuming that H cannot be lower, nor L higher, than any other pitch in the segment (Table 3).

TABLE 3

H = I > F = L	H = I = F = L	L = I < F = H
H > I > F = L	H > I = F = L	L = I < F < H
H = I > F > L	H = I = F > L	L < I < F = H
H > I > F > H	H > I = F > L	L < I < F < H

Within these combinations it is possible to identify typological features (distinctive relationships among the minimal boundaries) which account for the uniqueness of each combination, eliminate any ambiguities, and adequately differentiate melodic contour types.

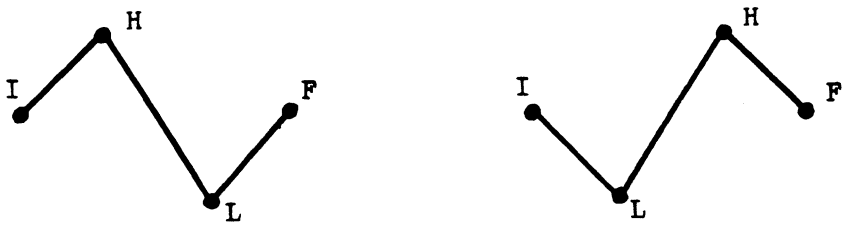
PRIMARY FEATURES (MELODIC CONTOUR TYPES)

One feature common to the twelve combinations is based on the relationship between I and F. This feature is identified as the *slope* of the contour (S), and its possible values account for three subsets of the set of twelve combinations (specifically the three columns in Table 3): S_1 (I > F, or *descending*), S_2 (I = F, or *level*), S_3 (I < F, or *ascending*). It can be noted that these three terms are frequently encountered in word-list typologies, but as melodic contour "types" they are defined by only two of the four boundary pitches.

A second feature to be defined is the relationship of H and L to I and F, that is, between the tonal boundaries and the temporal boundaries. This feature is defined as a *deviation* (change of direction) in the slope of the contour (D), and it is indicated by any H or L pitch which is different than I or F. If neither H or L is different than I or F, there is no deviation ($D_\emptyset$). If either an H or L is different than I or F, there is one deviation (D_1). If both H and L are different than I and F, there are two deviations (D_2). These three values of the D feature divide the set of twelve combinations into three subsets.

Each of three of the twelve relational combinations (H > I > F > L, H > I = F > L, L < I < F < H) can be represented graphically in two different ways. Example 13 shows the ambiguity for the combination H > I = F > L which has a level slope and two deviations (S_2D_2).

Example 13



Thus, a third primary feature must be defined in order to differentiate the possibilities of whether the first (sequential) deviation is an H or L. This feature is defined as the *reciprocal* of deviation in the slope of the contour (R), and it can be expressed as the relationship between the first (or only) deviation (D′) and I. Where there is no deviation, there is no reciprocal ($R_\emptyset$). If the first deviation is higher than I (D′ > I), the reciprocal is R_1; if the first deviation is lower than I (D′ < I), the reciprocal is R_2. The two contours depicted in Example 13 are then differentiated by the expressions $S_2D_2R_1$ and $S_2D_2R_2$. The values of the R feature divide the set of combinations

(Table 3) into three subsets, eliminate a possible ambiguity in the combinational expressions, and increase the number of unique possibilities from the original twelve combinations to fifteen distinct melodic contour types.

Using the three primary features of melodic contour thus far defined (S, D, R), it is possible to construct a paradigmatic typology of melodic contours, where each type is differentiated from each other type by at least one value of one feature (Table 4).

TABLE 4

$S_1\ D_\emptyset\ R_\emptyset$	$S_2\ D_\emptyset\ R_\emptyset$	$S_3\ D_\emptyset\ R_\emptyset$
$S_1\ D_1\ R_1$	$S_2\ D_1\ R_1$	$S_3\ D_1\ R_1$
$S_1\ D_1\ R_2$	$S_2\ D_1\ R_2$	$S_3\ D_1\ R_2$
$S_1\ D_2\ R_1$	$S_2\ D_2\ R_1$	$S_3\ D_2\ R_1$
$S_1\ D_2\ R_2$	$S_2\ D_2\ R_2$	$S_3\ D_2\ R_2$

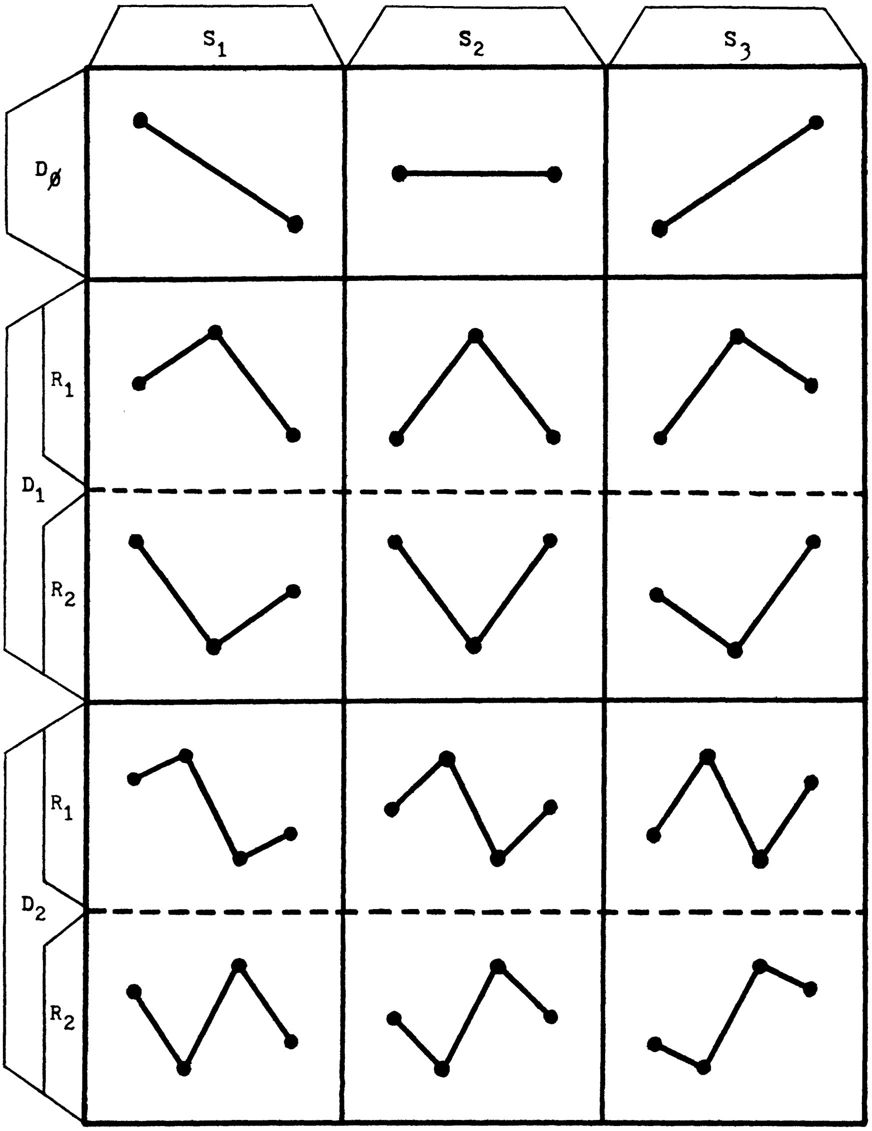
Thus, the product of distinctive relationships (features) among the minimal boundaries of a melodic segment defines fifteen melodic contour types. A graphic representation of the typology is given in Table 5.[9]

SECONDARY FEATURES (MELODIC CONTOUR SHAPE)

While three primary features combine to define a melodic contour *type*, secondary features which determine the general *shape* of a contour can also be determined. The distinction between melodic contour *type* and *shape* is analogous to that between the set of features that defines a rectangle as a type of geometric figure and the set of features that define a rectangle's size and specific shape. The secondary features which define melodic contour shape include the repetition and recurrence of boundaries of the melodic segment, variations in the extent (magnitude) of tonal relations, and variations in the temporal relationships among minimal boundaries.

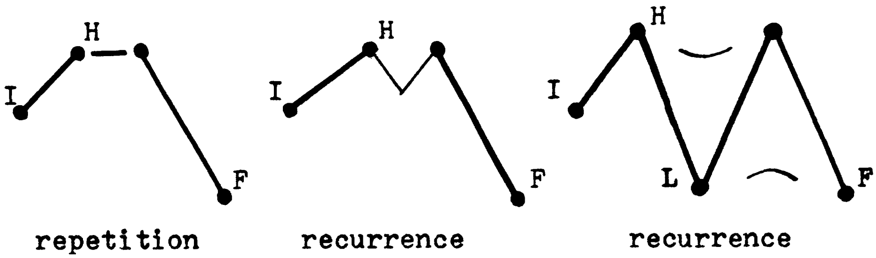
Repetition of an $\underline{H}$ or $\underline{L}$ can be regarded as a secondary feature of melodic contour. This feature is descriptive of such melodic contour characteristics as the "final flattening" found in American Indian songs as a repetition of $\underline{L}$. The possibilities of repetition of an $\underline{H}$ or $\underline{L}$ (REP) are: no repetitions ($REP_\emptyset$), repetition of $\underline{H}$ only (REP_1), repetition of $\underline{L}$ only (REP_2), and repetition of both $\underline{H}$ and $\underline{L}$ (REP_3).

TABLE 5



In contrast to the repetition of an H or L where there are no different intervening pitches between repetitions, *recurrence* of an H or L with different intervening pitches is another feature affecting melodic contour shape. The difference between the repetition and recurrence of H is shown in Example 14.

Example 14



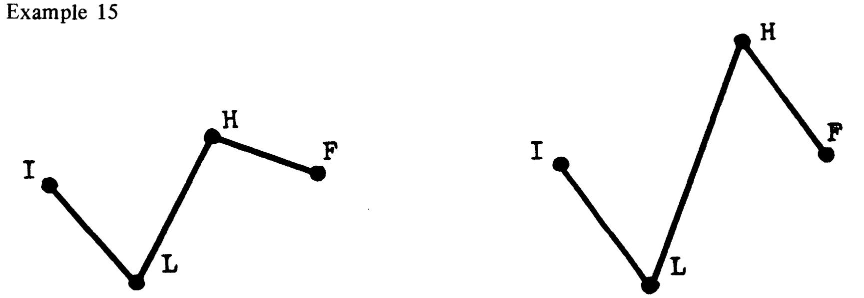
Two kinds of recurrence of H or L can be defined: (1) the recurrence of an H or L where no intervening pitch is an H or L (RA); the possible variations are no recurrence of this kind ($RA_{\emptyset}$), recurrence of H only (RA_1), recurrence of L only (RA_2), recurrence of both H and L (RA_3); and, (2) recurrence of an H or L when an intervening pitch is an H or L (RB). The possibilities are no recurrence of this kind ($RB_{\emptyset}$), recurrence of H only (RB_1), recurrence of L only (RB_2), and recurrence of both H and L (RB_3).

In the second kind of recurrence (RB) there is an apparent change of melodic contour *type* in certain contours; however, it is the *shape* and not the *type* of contour that is affected. For example,  appears to be a $S_1D_2R_2$ contour type, but is, by definition of the relations involved, a $S_1D_1R_1$ contour type with a recurrence of L (RB_2).

Repetition and recurrence of the I and F boundaries, if they are different from H or L, are not considered here since they have no effect on the *shape* of a contour, as it has been defined. It can be noted, however, that Ortmann's melodic contour analysis did include these features (cf. Example 3).

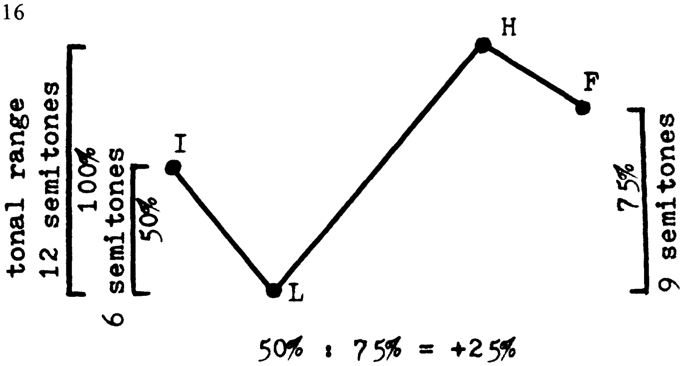
Variation of the extent of the tonal relations among the minimal boundaries of a melodic segment is a further secondary feature affecting melodic shape (Example 15).

Example 15



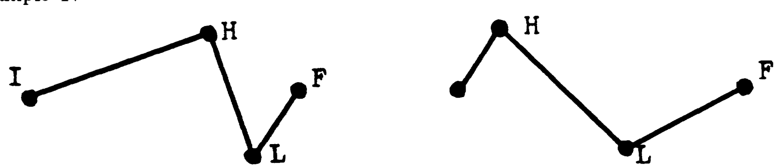
The melodic level formulas designed by Kolinski (1957; 1965a) provide a precise measure of this feature by defining the placements of I and F as percentages of the tonal range (L to H in semitones) of a melodic segment. The absolute difference between these two percentages defines the proportion of the tonal range contained between the I and F pitch levels. Kolinski adds signs to the "melodic level difference" to indicate slope: ascending (+), descending (-), and a "0" value indicates level, as in Example 16.[10]

Example 16



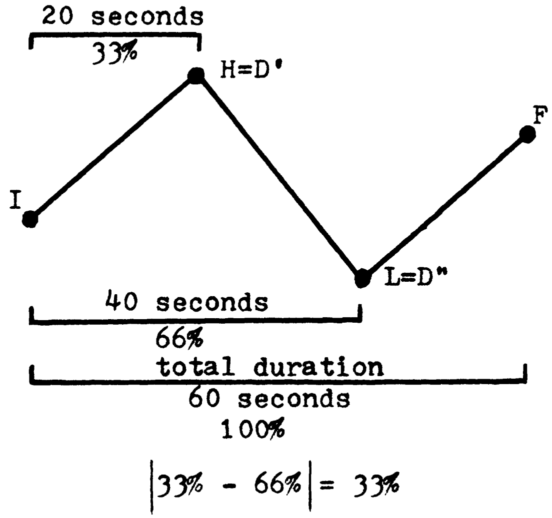
Analogous to the way in which tonal relations among the minimal boundaries of a melodic segment affect contour shape, the temporal relationships among the boundaries also constitute a secondary feature of melodic contour. In Example 17 both contours are of the same type ($S_1 D_2 R_1$) and have identical melodic level formulas, but they differ in the temporal relationships among the boundaries.

Example 17



By determining the total duration of the melodic segment (I to F in seconds) and the times from I to the first and second deviations (or first and second H or L if there is only one or no deviations), a temporal index of the melodic contour shape can be computed (Example 18). The absolute difference (without a sign) between the percentages of the total duration to the first and second deviations (or H or L) defines the proportion of the duration of the melodic segment included between the H and L boundaries.

Example 18



In summary, melodic contour *types* have been defined as the product of three primary features (*slope, deviation,* and *reciprocal*). Secondary features, which determine melodic contour *shape,* are *repetition* of H and L, *recurrence* of H or L without intervening boundary pitches, and *recurrence* of H or L with intervening boundary pitches. Tonal and temporal relationships among the minimal boundaries of a melodic segment also determine contour *shape,* and they are expressible as numerical indexes.

It must be mentioned that this typology does not include some conventional melodic contour "types," *terrace* and *cascade* in particular. The characteristics of these contours are matters of variation in melodic interval patterns between pitches other than minimal boundaries. It is felt that such melodic patterns can be described better with existing techniques of melodic analysis (e.g., Kolinski 1965b) than by any extensions of the typology outlined here. Thus, the problem of sub-types of melodic contour, in both formal and empirical terms, remains an open problem. However, in this typology one melodic contour type, rarely mentioned in other schemes, is specifically defined—the monotonic melodic segment or contour type $S_2D_{\emptyset}R_{\emptyset}$.

III

APPLICATION

While treating analytical concepts formally and constructing typologies systematically reduces their ambiguity and increases their replicability in research applications, this alone does not determine the usefulness of a concept or the significance of its features in musical analysis. These are matters for further consideration in which the productivity of a typology must be assessed relative to specific research objectives.

A preliminary investigation of the comparative utility of the proposed typology of melodic contour has been undertaken. Merriam's collection of 138 Flathead songs (1967) and Sapir's collection of 197 Southern Paiute songs (1910) have been used.[11] Both are relatively large and well documented samples and have been chosen for their similarities as well as differences; a productive comparative typology should yield information on both these aspects. Insofar as the typology is systematic and the defined features of melodic contour easily quantified, elementary statistical procedures have been used in this application.

The melodic segments used for this study were whole songs excluding repetitions, as notated; the minimal boundaries of each song were determined without any special considerations. The following variables were coded for each song in each collection. Variable labels are given in capital letters, and their possible range of variability is indicated.

(1) SONG NO., following Meriam's and Sapir's designations.

(2) CATEGORY, designated use category (24 for Flathead, 14 for Southern Paiute).

(3) TONRANGE, tonal range in semitones; varies 0 to *n*.

(4) I-PCT-TR, placement of initial pitch (I) as a percentage of the tonal range; given for Flathead, computed for Southern Paiute: (*L* to *H* in semitones)/TONRANGE; varies 0 to 100%.

(5) F-PCT-TR, placement of final pitch (F) as a percentage of the tonal range; given for Flathead, computed for Southern Paiute: (*L* to *F* in semitones)/TONRANGE; varies 0 to 100%.

(6) ML-DIFF, Kolinski's melodic level difference (1957; 1965a); given for Flathead, computed for Southern Paiute: FPCTTR-IPCTTR; expresses the proportion of the tonal range included between *I* and *F*; varies -100% to +100%.

(7) SLOPE, relation between *I* and *F*, coded (1) descending, (2) level, (3) ascending.

(8) DEVIATION, deviation from direction of slope, coded (0) none, (1) one, (2) two.

(9) RECIPROCAL, reciprocal of deviation in the direction of slope, coded (0) none, (1) *H* first, (2) *L* first.

(10) REPETITION, repetition of *H* and *L*, coded (0) none, (1) *H* only, (2) *L* only, (3) *H* and *L*.

(11) RECUR-A, recurrence of *H* or *L* without intervening *H* or *L* coded (0) none, (1) *H* only, (2) *L* only, (3) *H* and *L*.

(12) RECUR-B, recurrence of H or L with intervening H or L, coded (0) none, (1) H only, (2) L only, (3) H and L.

(13) I-TO-H, initial pitch to first highest pitch measured in number of basic durational values (♩'s); varies 1 to n.

(14) I-TO-L, initial pitch to first lowest pitch measured in number of basic durational values (♩'s); varies 1 to n.

(15) N-PULSES, number of pulses in melodic segment, given in number of ♩'s; varies 1 to n.

(16) N-ARTIC, number of independent articulations in melodic segment; varies 1 to n.

(17) TMM, metronomic tempo, given in number of ♩'s per minute. Appropriate conversions were made in order to retain the quarter-note as a common unit in all songs, e.g., ♩. at 69 equals ♩ at 104, and ♪ at 158 equals ♩ at 79. Songs notated without a tempo were assigned an arbitrary tempo of ♩ at 100 (eleven Flathead songs and one Southern Paiute song). In songs with more than one tempo notated, tempos were averaged (one Flathead song and seven Southern Paiute songs); varies 1 to n.

From this list of seventeen observations that were coded for each song in the two collections, the following additional variables were computed.

(18) ML-MEAN, melodic level mean, computed: [(IPCTTR + FPCTTR)/2]; this expresses the location of the average of the I and F placements as a percentage of the tonal range; varies 0 to 100%.

(19) CONTYPE, melodic contour type; slope deviation, and reciprocal treated as a composite variable (cf. Table 4); fifteen types.

(20) CONMOD, contour modifications, the secondary features repetition, recurrence-A and recurrence-B treated as a composite variable; 64 possible combinations.

(21) MAXTYPE, maximal melodic contour, a composite of CONTYPE and CONMOD; 960 possible combinations.

(22) TEMPFIG, tempo figure (Kolinski 1959), computed: [(NARTIC × TMM)/NPULSES]; the "apparent" tempo or average rate of articulations; varies 1 to n.

(23) DV-RATIO, durational value ratio, expresses the average number of articulations per pulse; computed: [NARTIC/NPULSES]; varies 0 to n.

(24) H-IN-SEC, time in seconds from I to first H; computed: [(ITOH/TMM) × 60]; varies 0 to n.

(25) L-IN-SEC, time in seconds from I to first L, computed: [(ITOL/TMM) × 60]; varies 0 to n.

(26) T-IN-SEC, total time of melodic segment in seconds, computed: [(NPULSES/TMM) × 60]; varies 0 to n.

(27) H-PCT-T, location of first H as a percentage of the total time of the melodic segment, computed: [HINSEC/TINSEC]; varies 0 to n.

(28) L-PCT-T, location of first L as a percentage of the total time of the melodic segment, computed: [LINSEC/TINSEC]; varies 0 to n.

(29) DIFF-MCT, percentage of the total time of the melodic segment included between first H and first L, computed: [HPCTT-LPCTT]; varies 0 to 100%.

(30) MEAN-MC-T, location of the average of the locations of the first H and first L as a percentage of the total time of the melodic segment, computed [(HPCTT + LPCTT)/2]; varies 0 to 100%.

The variables which have been listed constitute a complete set of observations on the features in a song which define its melodic contour type and shape. An application of the principal variables to a Southern Paiute song is shown as a schematic graph in Example 19. In order to indicate the descriptive potential of these observations, the specific values for all variables of the song shown in Example 19 are listed in Table 6.

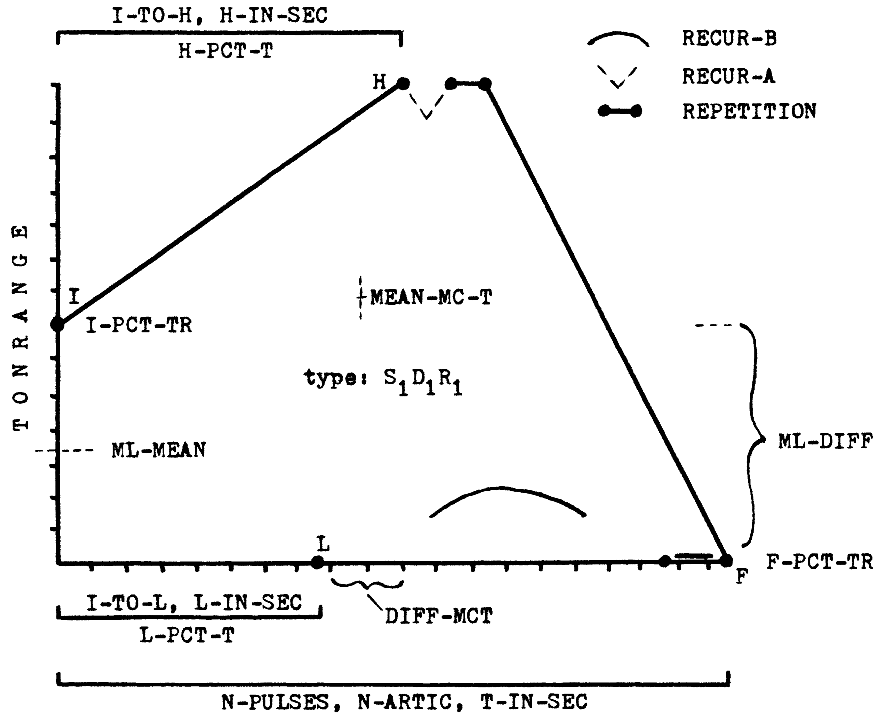
Following tabulation of the data for all songs in each of the two collections, the next stage of the procedure was to compile summaries of the observations for the 138 Flathead songs and 197 Southern Paiute songs. These data are essentially self-explanatory and need few comments.

Table 7 gives the frequency distributions and relative percentages of the primary and secondary features of melodic contour. It can be seen that

TABLE 6

SONG NO.	65 (Southern Paiute - Sapir)	I-TO-L	19.0 (♩'s)
CATEGORY	2 (Bird song, mourning ceremony)	I-TO-H	14.5 (♩'s)
		N-PULSES	37.0 (♩'s)
TONRANGE	14 (semitones)	N-ARTIC	65 (articulations)
I-PCT-TR	at 50% (of tonal range)	TMM	114 (♩'s per minute)
F-PCT-TR	at 0% (of tonal range)	ML-MEAN	at 25% (of tonal range)
ML-DIFF	-50% (of tonal range)	TEMPFIG	200.27 (articulations/minute)
SLOPE	1 (descending)		
DEVIATION	1 (one)	DV-RATIO	1.76 (articulations/pulse)
RECIPROCAL	1 (H first)		
REPETITION	3 (both H and L)	H-IN-SEC	10.00 (seconds)
RECURRENCE-A	1 (H only)	L-IN-SEC	7.63 (seconds)
RECURRENCE-B	2 (L only)	T-IN-SEC	19.47 (seconds)
H-PCT-T	at 51% (of total duration)	DIFF-MCT	12% (of total duration)
L-PCT-T	at 39% (of total duration)	MEAN-MC-T	at 45% (of total duration)

Example 19. Song no. 65 (Southern Paiute–Used by permission of the Sapir family).



the distribution of these features is remarkably similar in Flathead and Southern Paiute. The principal differences are the higher proportion of level slope (S_2) songs in Southern Paiute and the general absence of recurrence (type B) in Flathead. Nevertheless, the modal distributions (most frequent values of the variables) are the same in both collections.

TABLE 7

FLATHEAD (Merriam) 138 songs					SOUTHERN PAIUTE (Sapir) 197 songs			
descend	level	ascend		SLOPE	descend	level	ascend	
118	17	3			102	86	9	
85.5%	12.3%	2.2%			51.8%	43.7%	4.6%	
none	one	two		DEVIATION	none	one	two	
26	72	40			11	98	88	
18.8%	52.2%	29.0%			5.6%	49.7%	44.7%	
none	H-first	L-first		RECIPROCAL	none	H-first	L-first	
26	89	23			11	152	34	
18.8%	64.5%	16.7%			5.6%	77.2%	17.3%	
none	H-only	L-only	H-and-L	REPETITION	none	H-only	L-only	H-and-L
23	8	77	30		47	22	75	53
16.7%	5.8%	55.8%	21.7%		23.9%	11.2%	38.1%	26.9%
none	H-only	L-only	H-and-L	RECURRENCE A	none	H-only	L-only	H-and-L
12	23	38	65		19	22	73	83
8.7%	16.7%	27.5%	47.1%		9.6%	11.2%	37.1%	42.1%
none	H-only	L-only	H-and-L	RECURRENCE B	none	H-only	L-only	H-and-L
97	5	7	29		85	6	42	64
70.3%	3.6%	5.1%	21.0%		43.1%	3.1%	21.3%	32.5%

Table 8 shows the frequency distributions and relative percentages of the combination variables <u>CONTYPE</u> (SLOPE + DEVIATION + RECIPROCAL), <u>CONMOD</u> (REPETITION + RECUR-A + RECUR-B), and <u>MAXTYPE</u> (CONTYPE + CONMOD); only the higher frequencies of the latter two are indicated. Of the fifteen possible melodic contour types (CONTYPE), nine occur in the Flathead sample and eleven in the Southern Paiute sample. The frequency distributions of types in the collections are similar; the modal type in both cases is $S_1D_1R_1$, although melodic contour type $S_2D_2R_1$ is nearly as frequent in Southern Paiute. For the variable <u>CONMOD</u>, 31 and 47 of 64 possible combinations occurred in Flathead and Southern Paiute respectively, a greater variety than might generally be expected. This suggests that melodic contour *shape* defining features differentiate these musical styles more than

TABLE 8

FLATHEAD (138 songs)			SOUTHERN PAIUTE (197 songs)	
		CONTYPE		
f	%	S D R	f	%
26	18.8	1 0 0	11	5.6
43	31.2	1 1 1	54	27.4
21	15.2	1 1 2	17	8.6
27	19.6	1 2 1	18	9.1
1	.7	1 2 2	2	1.0
5	3.6	2 1 1	20	10.2
11	8.0	2 2 1	52	26.4
1	.7	2 2 2	14	7.1
3	2.2	3 1 1	6	3.0
-	-	3 1 2	1	.5
-	-	3 2 1	2	1.0
		CONMOD		
f	%	REP RA RB	f	%
-	-	0 2 0	11	5.6
6	4.3	0 3 0	10	5.1
6	4.3	2 1 0	-	-
19	13.8	2 2 0	18	9.1
-	-	2 2 2	11	5.6
20	14.5	2 3 0	17	8.6
8	5.8	2 3 3	10	5.1
19	13.8	3 3 0	-	-
-	-	3 3 3	12	6.1
* * *		* * * * * * *	* * * *	

TABLE 8 (Continued)

MAXTYPE									
f	%	S	D	R	REP	RA	RB	f	%
8	5.8	1	0	0	3	3	0	-	-
12	8.7	1	1	1	2	2	0	-	-
-	-	1	1	1	2	2	2	7	3.6
9	6.5	1	1	1	2	3	0	-	-
7	5.1	1	1	2	3	3	0	-	-
-	-	2	2	1	2	2	0	12	6.1
-	-	2	2	1	2	3	0	8	4.1
	* *	* * * * * * * * *						* * *	

the melodic contour *type* defining features. Of the 960 possibilities of the variable MAXTYPE, 73 occur in Flathead and 111 occur in Southern Paiute; this is a weak reduction of the data insofar as there are only 138 and 197 songs respectively in the collections, and the comparative utility of the variable is, consequently, doubtful.

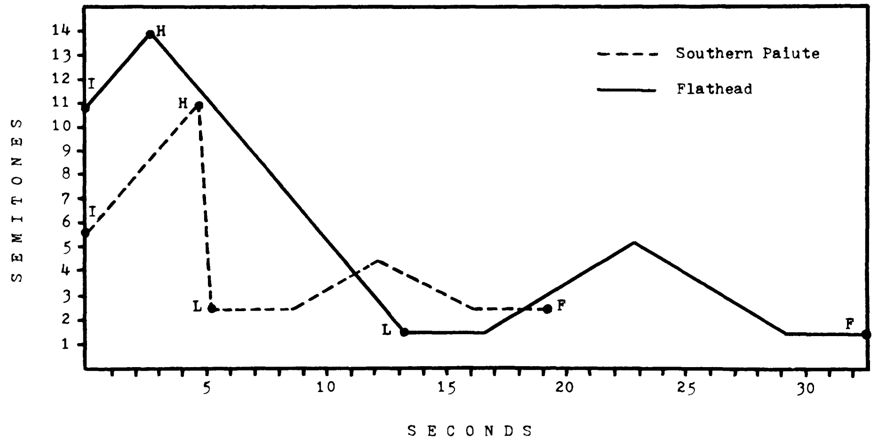
In Table 9 the mean values and range of variability of the remaining variables are given for each collection of songs. While there is considerable similarity, again, in the two collections, including an unexpected one in mean tonal range, major differences are encountered in the melodic level difference (ML-DIFF), DV-RATIO, tempo figure (TEMPFIG), total duration of melodic segments (T-IN-SEC), relative locations of the H and L boundaries (especially H-PCT-T) and their numerical difference (DIFF-MCT). All these are *shape* defining characteristics of melodic contour.

The information contained in Tables 7, 8, and 9 can be presented in a more succinct way, by graphing the mean profiles of the modal melodic contour types for Flathead and Southern Paiute. The modal contour type is $S_1D_1R_1$ in both cases and the most frequent secondary features are REPETITION$_2$, RECUR-A$_3$, and RECUR-B$_\emptyset$. The mean values of the remaining *shape* defining features are plotted on an absolute matrix (semitones × seconds) in Example 20. In comparison the mean shapes of the modal profiles appear to be quite different, particularly in terms of the total duration of the songs and the temporal distance between H and L. While the melodic contour *type* features account for similarities between the Flathead and Southern Paiute

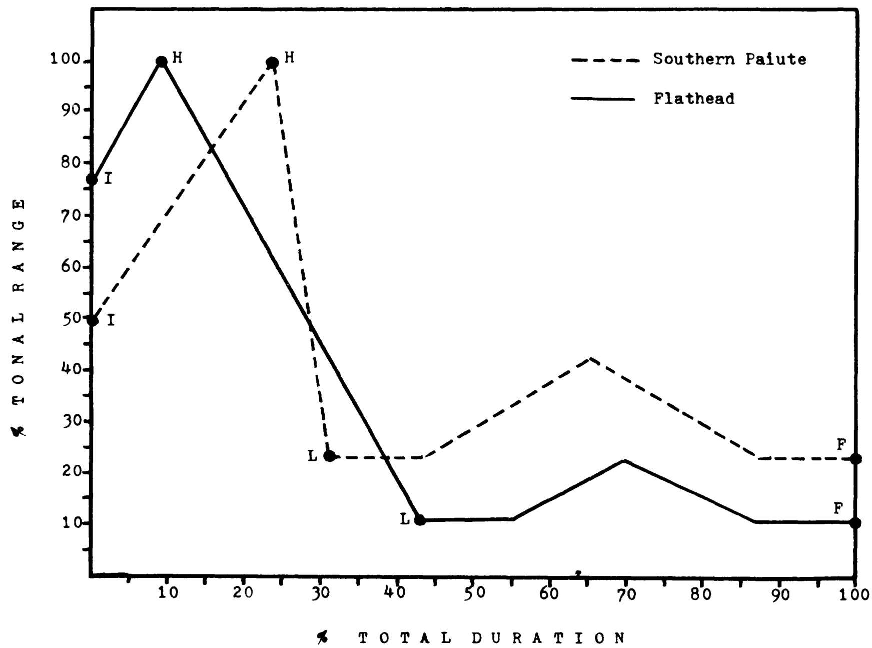
TABLE 9

FLATHEAD (138 songs)				SOUTHERN PAIUTE (197 songs)		
mean	unit	range	variable	mean	unit	range
13.9	semitones	5 to 24	TONRANGE	11.1	semitones	3 to 22
77.6	%	0 to 100	I-PCT-TR	49.8	%	0 to 100
11.0	%	0 to 76	F-PCT-TR	22.6	%	0 to 88.2
-66.6	%	-100 to 36.0	ML-DIFF	-27.1	%	-100 to 58.3
44.3	%	0 to 78	ML-MEAN	36.2	%	0 to 88.2
24.0	♩'s	1 to 94	I-TO-L	10.6	♩'s	1 to 61
4.6	♩'s	1 to 48	I-TO-H	10.3	♩'s	1 to 75
13.2	seconds	.38 to 52.2	L-IN-SEC	5.2	seconds	.38 to 33.9
2.7	seconds	.28 to 28.8	H-IN-SEC	4.7	seconds	.36 to 35.5
32.5	seconds	4.4 to 85.1	T-IN-SEC	19.2	seconds	4.8 to 95.8
58.6	♩'s	8.5 to 171	N-PULSES	39.9	♩'s	8.0 to 127.5
66.5	articulations	13 to 215	N-ARTIC	71.4	articulations	21 to 223
110.8	♩ per min.	58 to 212	TMM	126.2	♩ per min.	52 to 188
125.4	apparent tempo	45.1 to 214.5	TEMPFIG	228.7	apparent tempo	108 to 416.9
1.2	artics/pulse	.52 to 2.15	DV-RATIO	1.9	artics/pulse	.96 to 3.16
9.2	%	.7 to 73.1	H-PCT-T	24.3	%	.8 to 92.5
43.7	%	1.5 to 100	L-PCT-T	31.3	%	.8 to 96.6
34.4	%	-92.9 to 59.7	DIFF-MCT	6.9	%	-92.2 to 89.2
26.4	%	3.6 to 61.8	MEAN-MCT	27.8	%	2.0 to 58.0

Example 20



Example 21



musical styles, specific features of melodic contour *shape* account for their differences.

However, if the same data is plotted in a different matrix, a relative matrix (% tonal range X % total duration) as in Example 21, the relative *shapes* of Flathead and Southern Paiute modal contours appear to be closely congruent. The principal differences are the tonal location of $\underline{I}$ and the temporal locations of $\underline{H}$ and $\underline{L}$. Most noticeable is that in Flathead 34.4% of the total duration of the average song lies between $\underline{H}$ and $\underline{L}$, while this span in only 6.9% in Southern Paiute.

Insofar as it is the purpose of this application to make a preliminary assessment of the productivity of the melodic contour typology and its constituent features, rather than extend its statistical potential or analyze specific musical styles, a sufficient demonstration has been given. The application of the typology to the Flathead and Southern Paiute data yields specific information on both similarities and differences between these musical styles, and suggests that further, more sophisticated statistical comparisons would also be productive.

Finally, the typology has also been found useful for analyzing the variability of melodic contour *types* and *shapes* within a single corpus, especially in terms of their relationships with extra-musical characteristics. For example, some of the fourteen designated use categories of Southern Paiute songs are closely associated with melodic contour types: 38 of 52 (73.1%) roan songs (mourning ceremony) are type $S_2D_2R_1$; 6 of 13 (46.2%) bear dance songs are type $S_1D_1R_2$; 30 of 68 (44.1%) of bird songs (mourning ceremony) are type $S_1D_1R_1$; and, 5 of 13 (38.5%) gambling songs are type $S_2D_1R_1$. No similar associations are found in the Flathead corpus; for example, 5 of 10 (50%) vocal love songs, 9 of 18 (50%) stick game songs, 7 of 11 (63.6%) scalp dance songs, and 8 of 24 (33.3%) war dance songs are of one melodic contour type, $S_1D_1R_1$.

This study introduces some precise considerations for the rather elusive concept of melodic contour. By no means have all the issues discussed been resolved. It is felt, however, that the proposed definitions and typology of melodic contour are a necessary preliminary step for the clarification and potential resolution of some specific aspects of the concept while not altering its basic underlying assumptions in any significant way.

NOTES

1. My interest in melodic contour, and the consequent development of the formal typology outlined in this paper, was originally inspired by discussions with Alan P. Merriam in an ethnomusicology seminar at Indiana University some years ago.

2. Example 2 is taken from Cole (1974:118) who derived it from an article by B. S. Brook and Murray Gould in *Fontes Artes Musicae* XI, 1964. The music is from Mozart's Piano Sonata, No. 3, K. 281. Used by permission.

3. Data concerning the number of songs under each contour type were reconstructed from Lomax's tables, which give only group totals and percentages of types, so that the song frequencies listed are approximations at best.

4. Musical graphics is a broad area of concern in the field of notation (cf. Cole

1974; Karkoshka 1972). Included in this area are melodic contour-like neumatic notations as well as the "automatic melody writers used by Seeger in America, and by Dahlback and Bengtsson at Oslo and Uppsala. These electronic devices can produce a pitch-time graphical record of monophonic music, on any desired scale" (Cole 1974:109). However, only the graphic procedures designed specifically for the description of melodic contours are of concern here.

5. The graph of the Teton Sioux Type 'D' has been corrected to a more accurate representation also given by Densmore (1918:419).

6. Hoshovs'kyj additionally represents this graph by a symbol string (a_1+c+a_2+b_1+a_3+b_2+a_4+b_3) which can be further expanded by defining the set of possible modal pitches in each "movement" (e.g., a_1=3), and the actual mode pitches occurring in each "movement," where the lowest pitch of each section is "1": a_1 = 3(1,3); c=0; a_2=2(1,2); b_1=3(3,1); a_3=3(1,3); b_2=4(4,3,1); a_4=3(1,3); b_3=4(4,3,2,1).

7. In more recent publications Kolinski indicates the formal structure underneath the graphs (cf., e.g., 1972:425).

8. Placement of minimal boundaries, like the selection of a melodic segment for analysis, depends on individual research considerations: the resolution of an anacrusis, rather than the anacrusis itself, might be regarded as initial in a melodic segment by reason of its "function"; or, the highest and lowest pitches might be selected without regard to whether they are "basic" or "decorative" pitches. Again, this is a problem of research application and design and not a formal typological consideration.

9. These fifteen types of melodic contour are essentially the same as those used by Brown (1968); and, a comparison can be made with Seeger's basic *moods* shown in Table 2.

10. It has become customary to represent Kolinski's melodic level formula using "degree" symbols (e.g., 50°:75° = +25°); however, the numbers represent proportions or percentages and should not be interpreted as "degrees of slope."

11. I am gratefully indebted to George Herzog as well as Frank Gillis at the Archives of Traditional Music, Indiana University, for making available to me copies of Sapir's Southern Paiute manuscripts.

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