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The Reliability of Transcription

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# THE RELIABILITY OF TRANSCRIPTION<sup>1</sup>

George List

**I**n ethnomusicological studies we frequently wish to compare a number of musical events. Since performed music exists in time space only two means are available for making such comparisons. We can depend upon our memory of the first performance and compare it with the second by ear, or we can prepare visual representations of both events that can then be immediately compared. Human tonal memory is limited. When one wishes to compare two performances in some detail comparison by visual means is usually preferred.

Again, there are two principal methods by which such visual representations can be secured. They can be made by ear and hand or produced by an electronic device. In the first case the result is usually a transcription in musical notation; in the second it may take the form of a graph of the fundamental pitches. To the latter may be added a graph of intensity or amplitude. Other possible methods of visual representation are the making of hand graphs or the measurement of individual tones by the monochord or an electronic device.

Our purpose here is to assess the reliability of transcription in the form of musical notation made by ear and hand. Only transcriptions made of a single melodic line will be considered and only two aspects of melody, pitch and duration.

## I COMPARISON OF NOTATED TRANSCRIPTIONS

When two scholars transcribe the same recorded performance there is rarely agreement on all details heard. No matter how qualified or experienced the two scholars may be, their transcriptions will display differences not only in methods of notation but also in content, in what is notated. On the other hand, much of what is notated may be equivalent.

Our interest here is in the degree of concurrence or divergence that occurs when more than one individual transcribes the same recorded performance. If such transcriptions are to form a reasonably reliable mode of visually representing what is heard they should, at the minimum, display more

A soundsheet (phonorecording) offering the music utilized in preparing this article will be found inserted in this issue. The contents of the soundsheet are listed at the end of the article.

concurrence than divergence. There should be more agreement than disagreement.

### Rumanian Carol

As an initial basis for discussion of this problem let us examine two transcriptions of the first strophe of a Rumanian carol sung by a group of men (Disc, Side A, Band 1). For convenience in reading, transcriptions of the carol, and subsequent transcriptions presented, are written an octave higher than actual pitch.

In Figure 1 the transcription marked K was made by Mariana Kahane, ethnomusicologist at the Institute of Ethnography and Folklore in Bucharest, Rumania, in 1969 while she was in residence at Indiana University. She provided the transcription of the text. The transcription marked L was made by the author. The third staff, marked C, represents those details of pitch and duration in which the two transcriptions concur. When there is agreement concerning pitch but not concerning durational value, this is indicated by means of a stemless black note. When there is agreement on duration but not on pitch, stems and flags or beams without note heads are utilized.

There are three staves to each transcription of Strophe 1, Rumanian carol, each staff representing both a musical and textual phrase. In each of the three staves or phrases there are ten durational values. The degree of concurrence or nonconcurrence in the total of 30 instances is given below.

	Concurrence	Nonconcurrence
Pitch	26	4
Duration	26	4

The points where the two transcriptions do not concur are listed below.

1. Phrase 1 and 3, third rhythmic group (divisions into rhythmic groups are indicated by dotted bars). An  $f^\#$  sixteenth note appears in one transcription but not in the other.
2. Phrase 2, second rhythmic group (as indicated in staff L). One transcription has arrows over two eighth notes, the other does not. (A downward pointing arrow indicates pitch so modified is slightly flat, an upward pointing arrow that the pitch is slightly sharp.)
3. Phrase 3, second rhythmic group. The first two eighth values are represented in one transcription by two eighth notes, in the other by dotted eighth and sixteenth.

In the count of points of agreement and disagreement given above certain aspects of Kahane's transcription were not considered. These include:

1. Phrase 2, last rhythmic group. Indication in a footnote marked with an asterisk that some of the men sing an alternative melodic pattern.

1.

K  Juni cu juni — să'n- tîl - ni - a - ră

L  Juni cu juni — să'n- tîl - ni - a - ră

C  Juni cu juni — să'n- tîl - ni - a - ră

2.

K  Ju - ne — ju - ne - lui bu - nu —

L  Ju - ne — ju - ne - lui bu - nu —

C  Ju - ne — ju - ne - lui bu - nu —

3.

K  Juni cu juni — să'n- tîl - ni - a - ră —

L  Juni cu juni — să'n- tîl - ni - a - ră

C  Juni cu juni — să'n- tîl - ni - a - ră

\*) some of the singers:



Figure 1. Rumanian Carol, Strophe 1. Comparison of Transcriptions by Mariana Kahane and George List (Disc, Side A, Band 1).

2. Phrase 2, last rhythmic group. Indications of vocal glides (short slanted lines) in both melodic patterns notated.
3. Phrase 3, last rhythmic group. Final vocal glide indicated by slur and grace note.

Such melodic phenomena are difficult to evaluate in the type of count made. However, their existence in one transcription and not in the other diminishes to some extent the degree of concurrence indicated in staff C.

Some similarities and differences in approach to the process of transcription should be noted since they affect the results achieved. Kahane transcribed at full tape speed, that is, at a tape speed representing the velocity at which the performance was originally heard. When in doubt she checked at half tape speed. She then reached her final decision checking her transcription at full tape speed. I also transcribed at full tape speed and moved to half tape speed when problems of clarity arose. However, in this transcription I specifically attempted to represent only what I could hear at full tape speed. For example, I could clearly hear at half speed the f# sixteenth note given in Kahane's transcription, Phrases 1 and 3, third rhythmic group. However, I did not find this pitch sufficiently perceptible at full tape speed to be notated.

My procedure is to utilize arrows to indicate that pitches are slightly higher or lower than the unmodified note whenever I find such deviations from pitch to be sufficiently perceptible to notate. Kahane does not indicate all such modifications of pitch that she can hear but only those which she finds essential to the pitch structure.

Kahane's placement of the dotted bar line before *ne* rather than *ju* of *junelui* of the refrain (Phrase 2) is based on her familiarity with refrains of Rumanian carols and with the accent of Rumanian folk speech.<sup>2</sup>

### Yiddish Lullaby

The first comparison was made of transcriptions by two individuals of a full strophe of a particular recorded performance. Comparison will now be made of particular phrases excerpted from transcriptions made by a number of individuals of other recorded performances. Figure 2 compares nine transcriptions of the first phrase of the second strophe of a Yiddish lullaby sung by a woman (Disc, Side A, Band 2). The text in the Latin alphabet was provided by the singer. The transcriptions presented in Figure 2 were made by students in the author's transcription class at Indiana University in 1970.<sup>3</sup> The lowest staff, marked M, represents the majority opinion of the nine transcribers. To be included in staff M a pitch or durational value must be found in a majority of the transcriptions, that is, in at least five of the nine transcriptions. Referring to staff M we secure the following for nine instances involving pitch and ten involving duration.

1.

A  Ge - zunt iz di bes - te s'choy - - re

B 

C 

D 

E 

F 

G 

H 

I 

M  Ge - zunt iz di bes - te s'choy - - re x

Figure 2. Yiddish Lullaby, Strophe 2, Phrase 1. Comparison of Transcriptions by Nine Students (Disc, Side A, Band 2).

	Majority opinion	No majority opinion
Pitch	9	0
Duration	9	1

The only case where there is no majority opinion concerns the final rest. This is indicated by an X placed above the staff.

Examining the transcriptions further we find that there is not only a majority opinion but a complete concurrence on the part of all nine transcribers as follows:

	Concurrence	Nonconcurrence
Pitch	8	1
Duration	8	2

It should be remembered that the term "concurrence" represents here the agreement of nine transcribers. In a similar table for Figure 1 the term represented the agreement of only two transcribers.

The points where all transcribers do not concur are:

1. Pitch: Eighth note in second measure. Five transcribers notate f#, one a slightly sharp f#, and three 'g.'
2. Duration: Final note. Six transcribers notate a dotted quarter, three a quarter. Final rest. Two transcribers notate an eighth rest, one eighth and sixteenth rests. Six transcribers do not notate a rest.

The transcriptions presented in Figures 2 and 3 were made playing the recording at full tape speed. The students made separate transcriptions playing the recording at half tape speed. These are not shown. In most cases the transcriptions made at the slower tape speed display additional detail not found in those made at full tape speed.

Figure 3 compares transcriptions made in the same manner by the same nine students of the sixth and last phrase of the second strophe of the Yiddish lullaby (Disc, Side A, Band 3).

Again referring to staff M, we secure the following for 12 instances of pitch and 13 of duration. The large X within the staff indicates that no majority opinion exists at this point concerning either pitch or duration. In staff A the half circle placed over the half note in the first measure indicates that the durational value is slightly longer than that of the unmodified note.

	Majority opinion	No majority opinion
Pitch	11	1
Duration	11	2

The following are the points at which no majority opinion exists:



6.

rit.

A 

Vet er im-yirt-se - shem blay - - bn

B 

(m)

C 

(um)

D 

5 ritard.

E 

(um)

F 

slightly slower

G 

H 

I 

M 

Vet er im-yirt-se - shem blay - - bn.

Figure 3. Yiddish Lullaby, Strophe 2, Phrase 6. Comparison of Transcriptions by Nine Students (Disc, Side A, Band 3).

1. Initial meaningless syllable. (This was not included in the given text.)  
One transcribed f#, another 'e.' Seven transcribers notate nothing at this point.
2. Final rest. One transcriber notates an eighth rest, two a quarter rest. Six transcribers do not notate a rest.

We now examine the transcriptions to establish the degree of complete concurrence exhibited.

	Concurrence	Nonconcurrence
Pitch	11	1
Duration	4	9

Considering both phrases transcribed, it will be seen that majority opinion is very high concerning both pitch and duration values. On the other hand, there is very much greater concurrence concerning pitch than concerning duration. The points at which the least concurrence is shown in notating durational values are:

1. The rallentando heard in the recording at the beginning of the first measure of Phrase 6 (Figure 3).
2. Sustained pitches found at the ends of phrases and half phrases.
3. Final rests.

In all three cases a regularly recurring pulse that the transcriber could utilize as a means of measurement is lacking.

### Thai Lullaby

Figure 4 offers a comparison of eight transcriptions of the sixth phrase of a Thai lullaby sung by a woman (Disc, Side B, Band 1). The text transcription in the Latin alphabet was made by the author with the assistance of a Thai student at Indiana University.

The transcriptions presented in Figure 4 were made by students in the author's transcription class at Indiana University in 1971.<sup>4</sup> No instructions were given the students concerning the tape speed to be utilized in transcribing. It can be assumed that half tape speed was employed in difficult passages. Majority opinion in this case represents five out of eight students. Referring to staff M we secure the following for six instances of pitch and seven of duration:

	Majority opinion	No majority opinion
Pitch	6	0
Duration	3	4

6.

S Kab yi ma pan

T Kab yi ma pan

U Kab yi ma pan

V Kab yi ma pan

W Kab yi ma pan

X Kab yi ma pan

Y Kab yi ma pan

Z Kab yi ma pan

M Kab yi ma pan x

Figure 4. Thai Lullaby, Phrase 6. Comparison of Transcriptions by Eight Students (Disc, Side B, Band 1).

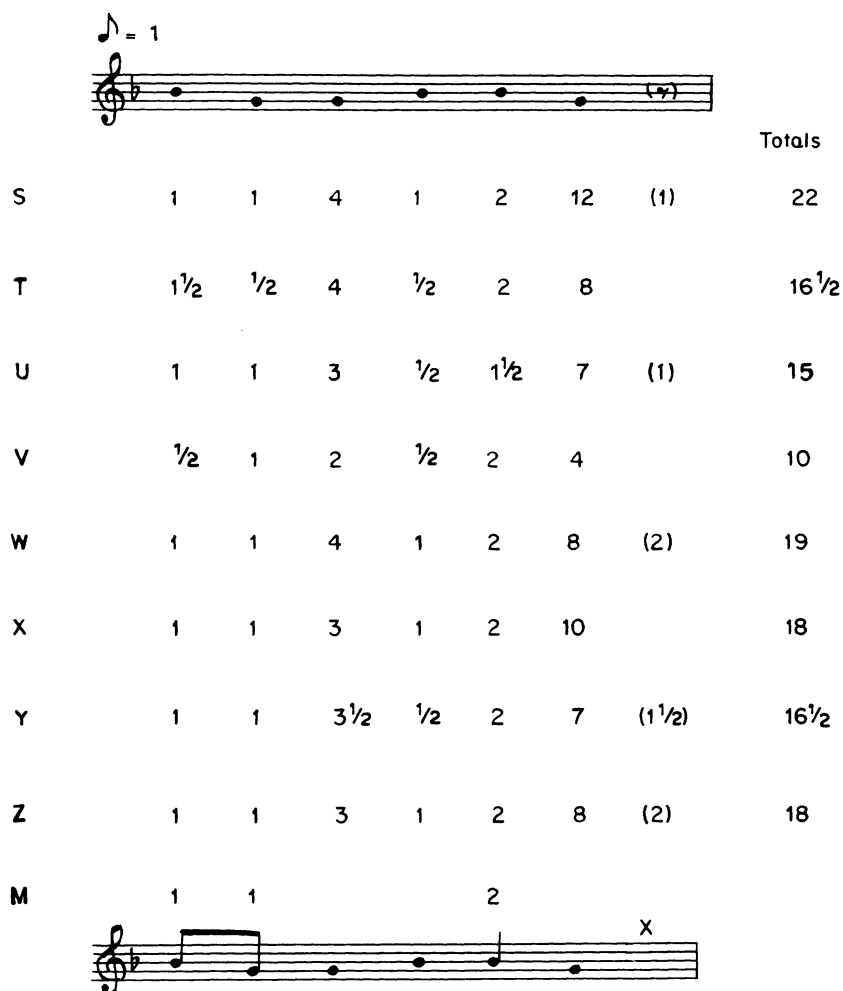


Figure 5. Thai Lullaby, Phrase 6. Comparison of Durational Values in the Eight Transcriptions (Disc, Side B, Band 2).

Figure 5 will clarify the method used in arriving at the majority opinion of the eight transcribers. The pitch sequence is given at the top of the page. Underneath is given the number of eighth note values assigned by each transcriber to each pitch in the phrase. The values assigned to the final rests are placed in parentheses. The last column to the right represents the total duration of the phrase in eighth notes.

Examining Figure 5 for complete concurrence on the part of the transcribers we arrive at the following:

	Concurrence	Nonconcurrence
Pitch	6	0
Duration	0	7

Figure 6 compares transcriptions by the same eight students of Phrase 9, the last phrase of the Thai lullaby (Disc, Side B, Band 2). The entire phrase is sung on a meaningless syllable. We secure the following in six instances of pitch and seven of durational values.

9.

S  
Ei

T

U

V

W

X

Y

Z  
ritard.

M  
Ei

Figure 6. Thai Lullaby, Phrase 9. Comparison of Transcriptions by Eight Students.

	Majority opinion	No majority opinion
Pitch	5	1
Duration	4	3
	Concurrence	Nonconcurrence
Pitch	5	1
Duration	1	6

The balance in majority opinion concerning durational values displayed in the two phrases of the Thai lullaby, 3-4 and 4-3, and the very low degree of concurrence concerning these values, is due to the character of the song. It displays neither pulse nor meter, defining the latter term as a repeated pattern of more accented and less accented pulses.

### Summary

The following table summarizes concurrence and majority opinion found in the transcriptions presented in Figures 1 through 6. The totals for Figures 2 and 3 and for 4 and 6 are combined.

PITCH		
	Concurrence	Nonconcurrence
Rumanian carol	26	4
	Majority opinion	No majority opinion
Yiddish lullaby	20	1
Thai lullaby	11	1
DURATION		
	Concurrence	Nonconcurrence
Rumanian carol	26	4
	Majority opinion	No majority opinion
Yiddish lullaby	20	3
Thai lullaby	7	7

The figures given above indicate that there is substantially more agreement than disagreement among the transcribers. Substantial agreement is lacking only concerning duration in the Thai lullaby. However, when we examine the degree of complete concurrence achieved by the groups of nine and eight student transcribers we find that there is considerably less agreement as far as duration is concerned. Again, counts for Figures 2 and 3 and 4 and 6 are combined.

## PITCH

	Concurrence	Nonconcurrence
Yiddish lullaby	19	2
Thai lullaby	11	1

## DURATION

Yiddish lullaby	12	11
Thai lullaby	1	13

## II COMPARISON OF NOTATED TRANSCRIPTIONS AND ELECTRONIC GRAPHS

The transcriptions previously presented were all made by ear. The only mechanical device utilized was an A 440 bar which served to establish the initial accented pitch of the melody. We shall now attempt to gauge the accuracy of these transcriptions made by ear by comparing them with graphs made by a fundamental analyzer. This comparison is facilitated by the fact that graphs are organized in a fashion similar to notation. Both represent pitch in the vertical axis and duration in the horizontal axis and in the same manner. Movement representing duration is from left to right. In the vertical plane movement is to higher or lower pitches.

Strictly speaking, however, the two methods of producing transcriptions are not comparable. The hand notation is a product of the human mind which attempts to synthesize the data heard and to offer an intelligible description of the whole in symbolic guise. The electronic device, on the other hand, makes no judgments. The fundamental analyzer mechanically reproduces sound signals to which it is sensitive according to its capacity.<sup>5</sup> Further, it may register phenomena which the human ear cannot easily distinguish when the recording is played at the velocity representing that of the original performance. Finally, to make the desired comparisons we must first interpret the electronically produced graphs.

### Yiddish Lullaby

Figure 7 (Disc, Side A, Band 2) offers a comparison of transcriptions in musical notation of Phrase 1 of the Yiddish lullaby with a graph made of that phrase by the Model C Melograph.<sup>6</sup> Of the three staves found above the graph, that marked M represents the majority opinion of the nine student transcribers, K represents a transcription made by Mariana Kahane, and L one made by the author. The approaches utilized in making transcriptions K and L



Figure 7. Yiddish Lullaby, Strophe 2, Phrase 1. Comparison with Melograph of Majority Opinion of Students and Transcriptions by Mariana Kahane and George List (Disc, Side A, Band 2).

are the same as those discussed previously in the case of the transcriptions of the Rumanian carol (Figure 1). Fundamental pitches are represented in the upper section of the graph by a series of dots displayed against a horizontal grid. The distance between any two lines of the horizontal grid is a tempered semitone. The lower section of the graph represents intensity or amplitude in decibels.



We first shall be concerned with the upper section of the graph which represents pitch. The dots representing pitch occur at regular intervals, one dot every four milliseconds. However, it should be noted that the dots do not always represent pitch as we conceive it in notating. When widely dispersed the dots represent pitch complexes produced by a consonant or tape hiss. Pitch in the musical sense is primarily represented by dot clusters which coincide vertically with indications of intensity in the lower or amplitude graph.

Examining the first such cluster of dots to the left of the graph, represented in the transcriptions by the notated initial pitch  $f\sharp$ , it will be seen that this cluster ranges further above the  $f\sharp$  line than below it. On the other hand, the following clusters of dots extend in almost equal distance above and below the 'e' line. The initial pitch,  $f\sharp$ , is therefore slightly sharp. Kahane and I have indicated this by an upwards pointing arrow above the initial note of our transcriptions.

The wavy motion of the dot clusters clearly indicates the vibrato utilized by the singer. The indication of vibration is usually omitted in hand transcriptions since it is almost impossible to accurately represent in notation.

The remaining pitches of the phrase seem to be adequately matched in notation and graph with the exception of the next to last pitch. Here the cluster of dots is located between the  $f\sharp$  and 'g' lines and is therefore somewhat ambiguous. Kahane and I notated this pitch as 'g.' Although the majority of the student transcribers notated this pitch as  $f\sharp$ , it will be seen in Figure 2 that one student transcriber placed an upward pointing arrow above the  $f\sharp$ , and two notated a 'g.' Student D notated an  $f\sharp$  while listening to the recording at full speed and a 'g' while listening at half speed. I cannot speak for Kahane but I assume that my judgment in notating this pitch was influenced by my familiarity with Yiddish songs which commonly utilize the interval of an augmented second.

It is difficult to establish the exact durational limits of the dot clusters. I have therefore made use of the amplitude graph to determine durational values for all pitches sung on one syllable only. When more than one pitch is sung to a syllable, as is the case with the next to last syllable, I of necessity have referred to the pitch graph to assess duration. The measurements of duration are indicated in numbers of millimeters below the amplitude graph and roughly by short vertical lines between the two upper horizontal lines of this graph. The measurements were made before the graph was reduced for publication.

Non-voiced consonants in most cases fall below the range of the amplitude graph and therefore do not show on the graph. Other consonants cause a dip in the amplitude graph and dispersion in the pitch graph. To this nasals and bilabials are exceptions since they can produce a definite tone.

Thus, in most cases, consonants produce a hiatus in the pitch line represented by a continuous flow of dots.

The usual concept, or at least our Western concept, is that a sung tone begins with the initial vowel of the syllable. I have therefore assigned the durational value of initial consonants or consonant clusters to the previous syllable.<sup>7</sup> To this the initial consonant or consonant cluster of the sung phrase must be an exception since it is usually preceded by a rest. How consonants and consonant clusters were handled in the measurement of duration is demonstrated by the manner in which the text is written below the notation of durational values found underneath the amplitude graph. As previously noted, consonants or consonant clusters are usually represented by spaces between the amplitude curves.

The durational values of our Western notation system primarily involve the manipulation of units divisible by two or three. For this reason it is impossible to represent in notation those minute differences in duration which the fundamental analyzer reproduces in its graph. Nevertheless, it will be seen that the durational values notated at the bottom of the graph do reflect proportionately the numerical durational values abstracted from the graph which are found above them. Thus each note value falls within a particular range of millimeters as seen below:





Note values	Duration in millimeters
	11-14
	16
	21-26
	34

Figure 8 (Disc, Side A, Band 3) compares transcriptions in musical notation of the sixth and last phrase of the Yiddish lullaby with a graph of the same phrase made by the Melograph Model C. In this case the dot clusters indicate that some of the pitches in the first half of the graph are somewhat sharp. This fact is not reflected in any of the hand transcriptions. On the other hand, the four eighth notes which are beamed together seem to match the pitches indicated in the graph. The third eighth note apparently takes the form of an inverted mordent and this is reflected in Kahane's transcription. However, this may be considered a slightly exaggerated form of the vibrato that the singer utilizes on almost all pitches sung. The cadential pitch seems well represented by the cadential f#.

Turning to the amplitude graph, we find that the initial numerical durational values derived from the graph, 10-12-12-12-14-15, do indeed represent a type of *rallentando*. There seems to be no means of representing this phenomenon with complete accuracy in note values. The voiced lateral

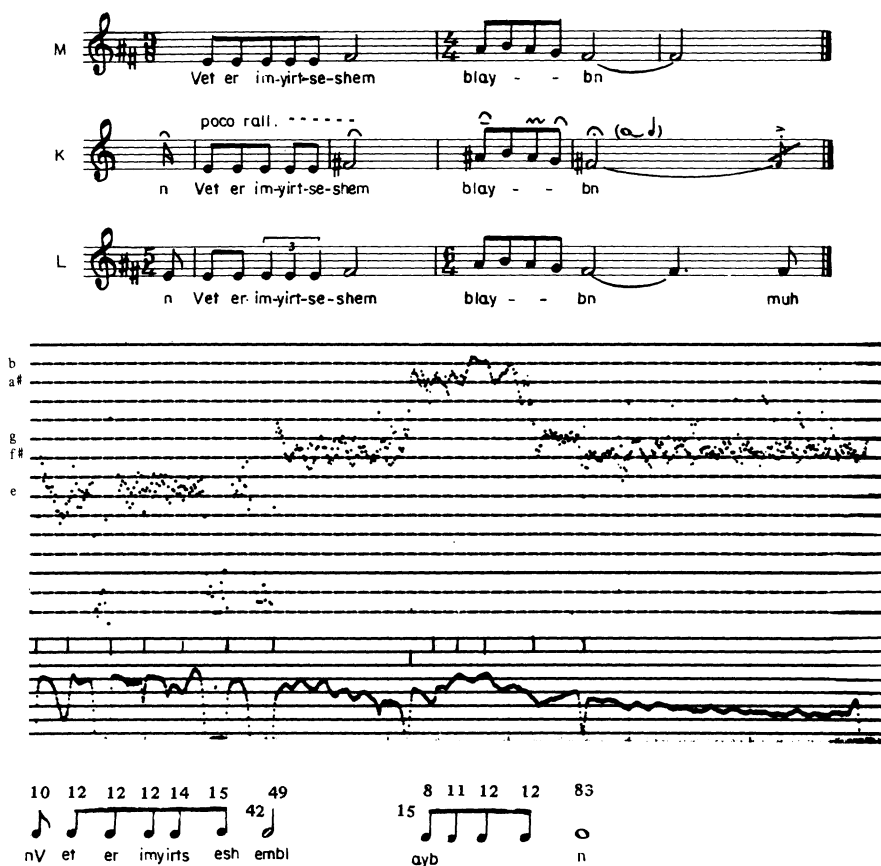





Figure 8. Yiddish Lullaby, Strophe 2, Phrase 6. Comparison with Melograph of Majority Opinion of Students and Transcriptions by Mariana Kahane and George List (Disc, Side A, Band 3).

"l" of the initial consonant cluster of the word "blaybn" is given considerable durational value by the singer. In my calculations of durational values, as in Figure 8, I assign the durational value of this consonant to the previous syllable. It would seem that Kahane has assigned the value of this consonant cluster to the first of the group of four eighth notes (the half circle open at the bottom found over this note indicates that it is slightly longer in duration than written). I have indicated the alternative interpretation both above and below the amplitude graph, that is, in numbers of millimeters below the graph and in short vertical lines above it. Even when this alternative interpretation is taken into consideration, the durational values of the notated transcriptions and those of the electronic graph are seen to be in reasonable proportion.

Note values	Duration in millimeters
	10(8)-15
	49(42)
	83

Note that Kahane and I not only notate a preliminary meaningless phone, as did two of the student transcribers (Figure 3), but also a final sound or accent not reproduced by the student transcribers. Neither of these phenomena are found in the text as given by the singer.

### Thai Lullaby

Figure 9 (Disc, Side B, Bands 1 and 2) compares transcriptions in musical notation of Phrases 6 and 9 of the Thai lullaby with graphs of these phrases made by the Melograph Model B.<sup>8</sup> Kahane did not transcribe the Thai lullaby.

As in the graphs previously presented made by the Melograph Model C, pitch is represented on the upper of the two graphs and amplitude on the lower. However, the pitch graphs made by the Model B represent the fundamentals by means of a solid line rather than by a line of dots. This solid line is displayed against a millimeter grid which facilitates measurement of duration. I therefore have utilized the upper graph only in deriving both pitch and durational values.

The numbers located immediately above the pitch graphs represent the measurement of duration in millimeters. As before, in the measurement of duration I have assigned the value of all consonants or consonant clusters, with the exception of the first, to the preceding syllable. In such measurement the text reads



rather than



To make matters clear the text in both cases has been associated with rhythm values derived from staff L. The consonant cluster "by" and the consonant "p" produce a dispersion of the line or a short gap. The "m" is reproduced as an upward glide. In each case, with the exception of the initial "K," the durational value of the particular consonant or consonant cluster has been added to that of the previous pitch. In addition, I have included in the measurement of a pitch the following upward or downward movement of the line produced by the stylus as it responded to a change in the fundamental.

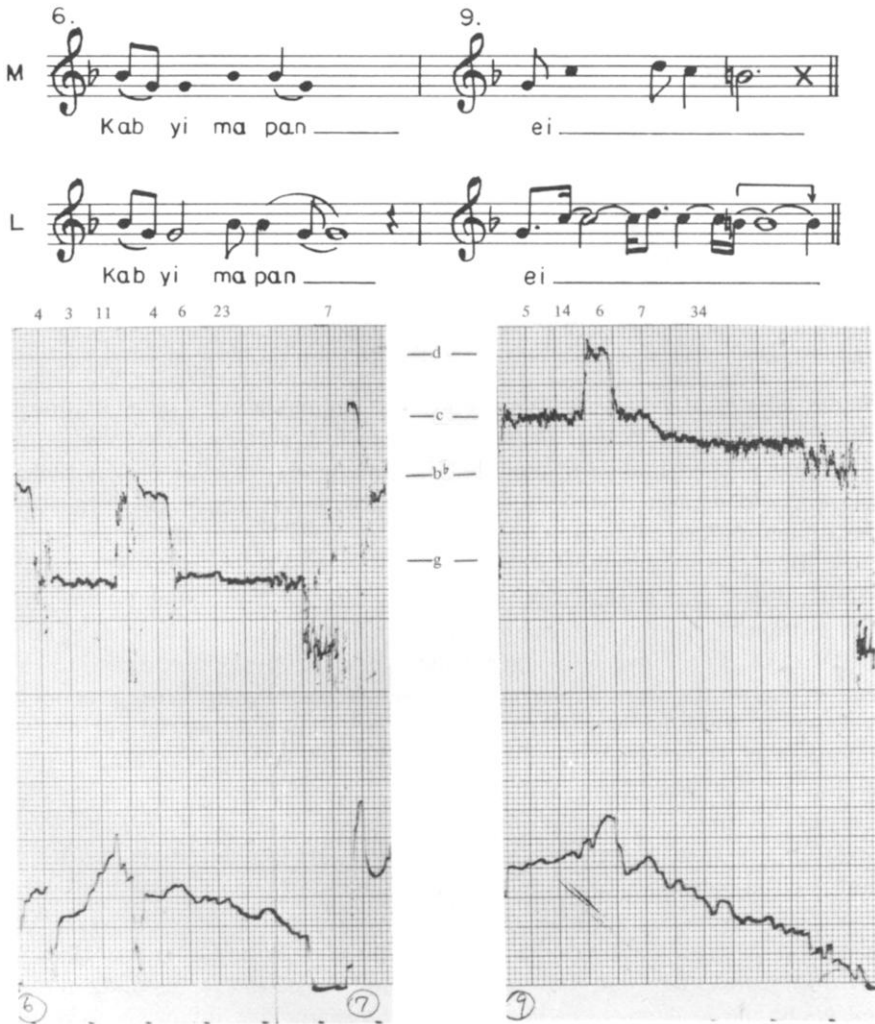











Figure 9. Thai Lullaby, Phrases 6 and 9. Comparison with Melograph of Majority Opinion of Students and Transcription by George List (Disc, Side B, Bands 1 and 2).

Thus the downward slanting line following the first pitch of "Kab" adds one millimeter to the durational value of the syllable.

In examining staff L it can be seen that the durational values notated are in rough proportion to the measurement of durational values in millimeters on the graph. This is shown on the next page:

Note values	Duration in millimeters
	3-4
	5-6
	6
	7
	7
	11
	14
	23
	34

Where durational values are as short as a sixteenth note (see second through fifth note values in the left column above) there is no clear differentiation of such values. The notation value given the final pitch of Phrase 6 is somewhat short in comparison to the duration indicated in the graph, that given the final pitch of Phrase 9 is somewhat long.

Turning to the vertical axis, each large square of the graph grid equals a tempered semitone, each smaller square 20 cents. I interpret pitch by assessing the relationship of the plateaux produced by the stylus to the horizontal lines of the grid. For convenience in reading I have assigned pitch names to the heavier horizontal lines. However, the level of the song is 20 cents or more lower than indicated in the transcriptions in notation. I, and all but one of the student transcribers, represented the initial pitch by  $c^1$  (middle C).<sup>9</sup> However, throughout the graph the plateaux representing this pitch lie one or two of the smaller squares below the heavy line marked "c."<sup>10</sup> The pitch level of this tone is therefore 20 to 40 cents flat in comparison to what is indicated in the transcriptions in notation offered in Figure 9.

The  $b^b$  and 'g' in Phrase 6 are found at an even lower pitch level. On the other hand, in Phrase 9 the initial plateau representing 'c' is very close to the line representing that pitch and the following plateau representing 'd' is a bit above the 'd' line and is therefore a little sharp. The following plateau is also close to the 'c' line.

The final pitch of Phrase 9 presents a problem in notation. Referring to Figure 6 it will be seen that the majority of the student transcribers notated this pitch as a  $b^b$ . Three out of eight indicated that it then fell in pitch, a quarter tone, a semitone or a full tone. I notated the final pitch as a sharp  $b^b$  which then returned gradually to  $b^b$ . The graph of Phrase 9 indicates that the pitch is a  $b^b$  falling off towards the end in a diffuse vibrato.

The singer learned this lullaby from her nurse who sang it to her as a child. It therefore would probably be classified as a folksong. The instruments utilized in Thai art music are tuned in a different temperament than that

utilized in our Western music. It is conceivable that Thai folksongs may be influenced by Thai instrumental art music or that in themselves they are based on a different conception of scale temperament than that which we hold. Since the difference in intervals is quite small we might not recognize these differences in making a transcription by ear. Of the four tones utilized in the Thai lullaby, the upper two, 'd' and 'c,' generally lie close to the established pitch level, that is, 20 cents below the heavy lines to which these pitch names were assigned, throughout the two graphs. On the other hand, the next to lowest tone, *bb*, frequently lies below this pitch level and the lowest tone, 'g,' is consistently lower.

Unfortunately, throughout the graph the plateaux taken to represent a particular tone vary in pitch by 20 or more cents. There is a further complication. Seeger states in his notes accompanying the melograph of the Thai lullaby that the visibility of accuracy of the stylus-line used is gauged at 20 cents. We therefore have a total possible variance of 40 cents, 20 cents variance in the plateaux representing a particular tone and 20 cents produced by the stylus itself. Under these circumstances an accurate assessment of the tuning of the scale utilized in this song is not possible. It therefore would seem reasonable to assume that the pitches notated reflect what is found in the graph with an accuracy equal to those notated in the Yiddish lullaby.

### III CONCLUSIONS

What conclusions can be derived from the examination and analysis of this admittedly limited quantity of material?

#### Comparison of Notated Transcriptions

Let us first determine what can be learned by the comparison of the hand and ear transcriptions of the same recordings made by several individual transcribers (Figures 1-6).

##### 1

There is more agreement or concurrence among the transcribers in the notation of pitch than in the notation of duration.

##### 2

The notation of reasonably stable pitches is more reliable than the notation of those that are unstable. The notation of pitches that closely approximate those found in the established scale are more accurate than the notation of pitches that are not.

## 3

Notation of durational values is more reliable when the performance is in *tempo giusto* style, when there is a regular pulse, as in the Rumanian carol, or a reasonably regular meter, as in the Yiddish lullaby. In *rallentando*, as in Phrase 6 of the Yiddish lullaby, or in *parlando rubato* style where there is neither regular pulse nor regular meter, as in the Thai lullaby, notation of durational values is less reliable.

## 4

Notation of durational value of the final pitch of a phrase is less reliable than the notation of the other durational values of the phrase. Little emphasis is placed by most transcribers on the accurate notation of a pause following the final pitch of a phrase and separating this phrase from the following phrase. A psychological factor seems operative here in that attention or concentration seems to diminish at the interstices of phrases.

## 5

Finally, and this is the principal point to be derived from this aspect of the analysis, the comparison of transcriptions in the form of notation made by ear from the same recorded performance by a number of individuals indicates that these transcriptions are generally equivalent, that is, they display considerably more concurrence than divergence in the notation of pitch and duration.

### Comparison of Notated Transcriptions and Electronic Graphs

When we attempt to compare notations made by hand and ear with transcriptions in the form of electronically derived graphs of fundamentals and amplitude, we are faced with two problems, both difficult of solution. The first problem is how to accurately interpret the graph, the second is how to apply the interpretation made within the restrictions of the Western notation system. Taking these two problems into consideration, it seems possible to arrive at the following conclusions:

## 1

Should the transcribers have had access to the graphs as well as to the recordings they would have been in a position to make some slight adjustments in accuracy of pitch. This of course assumes that they accept the methods of interpreting the graphs offered above and find them reliable. Thus the student transcribers through reference to the graph would have added an



upward pointing arrow above the first pitch of the Yiddish lullaby. All transcribers also would change the eighth note in the second measure of the Yiddish lullaby (Figure 7) to a flat 'g' or a sharp f#. My notation of the final pitch of the Thai lullaby (Figure 9) would be changed from a sharp  $b\sharp$  to a  $b\flat$ . Note that all these corrections represent changes of not more than a quarter tone. By reference to the graph we can determine exactly what occurs in the last sustained pitch of the Thai lullaby. However, I, for one, know of no means of accurately reflecting this phenomenon in musical notation.

## 2

Durational values can also be made somewhat more accurate by reference to the graph. This is particularly true in the case of performances in *parlando rubato* style, such as the Thai lullaby, where there is no pulse to act as a guide. Thus, following the graph, certain modifications should be made in my transcription of the Thai lullaby (Figure 9). The rest at the end of Phrase 6 should be notated as a dotted eighth rather than a quarter rest. Similarly, the 'd' in Phrase 9 should be notated as a dotted eighth note rather than a quarter. The cadential pitch of Phrase 6 should probably be written as a whole note rather than an eighth tied to a whole and the first note making up the sustained cadential pitch of Phrase 9 should be an eighth note rather than a sixteenth. Again, it should be noted that the modifications made are slight, involving in most cases the duration of a sixteenth note, only in one case a durational value as large as an eighth note. The graph informs us exactly what duration values make up the *rallentando* at the beginning of Phrase 6 of the Yiddish lullaby (Figure 8). Again, there seems to be no means of accurately reflecting this phenomenon in musical notation.

## 3

Finally, and this is the principal point to be derived from this aspect of the discussion, when transcriptions in the form of notation made by ear and hand are compared with electronically produced graphic transcriptions of the same recorded performance the former display proportionally more accuracy than inaccuracy, and the modifications made on the basis of the information offered by the graph are slight.

## IV SUMMARY

The inescapable conclusion is that the capability of the unaided human ear should not be underestimated. The evidence indicates that transcriptions made by ear in notated form are sufficiently accurate, sufficiently reliable to

provide a valid basis for analysis and comparative studies of the two aspects of musical style discussed, pitch<sup>11</sup> and duration.

#### FOOTNOTES

1. This article is a revised version of a paper read at the Joint Meetings of the American Musicological Society and the Society for Ethnomusicology at Duke University, Durham, North Carolina, November 13, 1971.

2. Words similar to *june* are usually accented on the second syllable in Rumanian folk speech. In the most common form of the carol refrain the *ne* of *junelui* receives an agogic accent, thus:



It can be seen that the rhythm of *june* above, omitting the final syllable *lui*, has the same durational value as the initial *june* of the refrain (Phrase 2) of Figure 1.

For these reasons, and others, Kahane feels that the *ne* of *junelui* receives a heavier accent than the *ju* and that this should be indicated by the placement of the bar line.

3. From A through I the student transcribers were Lida Belt, Joel Brown, Ellie Duque, Elsie Fardig, Ellen Kauffman, Judy Mahy, Christopher Marshall, Carol Robertson, and Ronald Smith. All were graduate students with one exception, who was a senior. A wide variety of age, training, and experience is represented.

4. From S through Z the student transcribers were Susan Aitel, Joy Viernes-Enriquez, Lynn Frederick, Miriam Gargarian, John McAloon, Maria Medeiros, Richard Moyle, and Norma Ortiz. All were graduate students with two exceptions, one was a post-doctoral student, the other a senior. Again, a wide variety of age, training, and experience is represented.

5. Fundamental analyzers have additional limitations. They can only produce a reliable graph of a single melodic line. They cannot reproduce two fundamentals simultaneously, as would be necessary in realizing part singing. Nor can they produce a clearly delineated graph if more than one individual performs the same melodic line since there will be sufficient differences between the fundamentals produced by the various participants to cause confusion. For this reason no graph was prepared of the Rumanian carol.

6. I am indebted to the Institute of Ethnomusicology, University of California at Los Angeles, and to Michael Moore, Laboratory Technician at the Institute, for the preparation of graphs of the Yiddish lullaby for me in 1971.

7. The utilization of this concept here can be justified on two grounds. First, the methods utilized in ethnomusicology have been developed to a great extent in our Western culture. Second, the three songs transcribed derive from folk cultures where knowledge of music writing is rare and theoretic concepts concerning music are not commonly found. Should these three folk cultures possess concepts akin to or differing from that employed in the analysis this is not known to me.

8. I am indebted to the Institute of Ethnomusicology, University of California at Los Angeles, and to Charles Seeger, for the preparation of graphs of the Thai lullaby in 1961.

9. One student transcriber assigned 'b' rather than 'c' as the first pitch. Since all the interval relationships within the transcription were the same as in the other student transcriptions, I transposed this transcription to the same pitch level as the other transcriptions for inclusion in Figures 6 and 9.

10. As indicated previously, all transcriptions in notation are written an octave higher than heard.

11. Although vibrato is at least partially a pitch phenomenon, it has not been taken into consideration since no means has as yet been developed of accurately notating vibrato.

## SOURCES OF RECORDINGS

Rumanian carol. *Colinde*. Sung by a group of male carol singers. Recorded in Almaş, Sălişte, Illia, Hunedoara (Tr.), in 1956. Rumanian Institute of Ethnography and Folklore, Bucharest, tape mg 912b. Indiana University Archives of Traditional Music, tape EC 3484.2.

Yiddish lullaby. Self recorded by Ruth Rubin, New York City, November, 1958.

Thai lullaby. Sung by Kanda Thammongkol. From sound track of TV film, *Music in Infancy*. Recorded by the Indiana University Radio and Television Service, Bloomington, 1958.

## THE RELIABILITY OF TRANSCRIPTION

Contents of soundsheet (phonorecording)

(In Side A, Bands 1-3, and Side B, Bands 1-2, each item is heard at 7.5 ips, then at 3.75 ips, and again at 7.5 ips. Side A, Band 4, and Side B, Band 3, are heard at 7.5 ips only.)

Side A

Band 1	Rumanian carol, Strophe 1.	Figure 1
Band 2	Yiddish lullaby, Strophe 2, Phrase 1.	Figures 2 and 7
Band 3	Yiddish lullaby, Strophe 2, Phrase 6.	Figures 3 and 8
Band 4	Yiddish lullaby, Strophe 2 in full.	

Side B

Band 1	Thai lullaby, Phrase 6.	Figures 4 and 9
Band 2	Thai lullaby, Phrase 9.	Figures 6 and 9
Band 3	Thai lullaby in full.	