Social Cognition and Melodic Persistence:
Where Metadata and Content Diverge

Eleanor Selfridge-Field

CCARH, Braun Music Center #129
Stanford University
Stanford, CA 94305-3076
esfield@stanford.edu

Abstract

The automatic retrieval of members of a tune family from a database of melodies is potentially complicated by well documented divergences between textual metadata and musical content. We examine recently reported cases of such divergences in search of musical features which persist even when titles change or the melodies themselves vary. We find that apart from meter and mode, the rate of preservation of searchable musical features is low. Social and gestural factors appear to play a varying role in establishing the "melodic" identity of widely transmitted songs. The rapid growth of social computing bring urgency to better understanding the different ways in which "same" or "similar" can be defined.

Keywords: melodic similarity, musical features, social cognition, tune families.

1. Introduction

The durability of specific musical features in members of tune families seems to vary from case to case. Some families cohere by title but not content, others by content but not title. Among tune-family studies of the past half century in anthropology, folk music research, ethnomusicology, and historical musicology, text-based research has emphasized the stability of meter and scansion in British and Canadian folksong. Group members in folksong research have usually been identified by title (a principal component of metadata in music information retrieval). Ethnomusicology has evaluated social function in relation to content and stability. In pre-industrialized communities such of the Hopi of the Western U.S., cases in which musical "similarity" is equated with commonality of social function (List 1975), to the apparent exclusion of musical content, raises a profound question as to whether the concept of musical similarity is itself so culture-bound as to have no relevance in large parts of the world. (We do not address this question here but urge readers to consider its provocative nature.)

Tune-family research has included delineating processes of song transmission and musical borrowing, locating the geographical and/or temporal margins of a persistent melody, establishing the range of uses to which a single melody has been put, and exploring the diverse ways in which it can be elaborated. The study of similarity and its perceptual correlates has obvious value in the examination of music plagiarism claims (Cronin, 1998).

In historical musicology tune-family members may be related by title, as well as place and period of origin, performing medium, seasonal association, and other criteria which may be present in music files as metadata. Several recently described families consist of members with divergent titles and origins which have been culled on the basis of musical content. These diametrically opposed approaches to similarity merit close attention by the music-query community because the sudden rise of interest in social computing portends the likelihood of conflicting paths to social agreement on identity of musical works. Whether the level of agreement in collective perceptions of music will be greater or lesser for communities nurtured online is currently unknown.

2. Tune-Family Identification

An exploration of tune families attests to a surprising diversity within what, in a field such as "title," might appear to be identical works. It also documents cases in which what is arguably the same melody turns up under dozens of different titles and many associated parameters (place of origin, date of publication, lyrics). In the first case, metadata is eminently useable but potentially misleading. Identical names do not produce identical music. In the second, metadata searches may be useless but to investigate all the corresponding pieces, they first need to be encoded symbolically. While title and social identity do not fully constrain musical content, superficial changes to apparent identity (e.g., by lyrics added to an instrumental piece, or by lyrics replaced to make a hymn or patriotic song out of a folksong) do not necessarily liberate it.

Most current applications in music query seek to present probability-of-match rankings to internet users or to recommend "similar" pieces (often as suggested by artist or popular-music genre, less often on the basis of similarities

of timbre, tempo, or "mood") in a list of available recordings. As quantities of data grow and as electronically available repertories become more diverse, procedures which search by musical parameters will be required. It is in this eventuality that the lessons offered by tune-family research provide pertinent points for consideration.

In relation to the large effort already devoted to tagging "moods" and "genres" for works held in audio databases, the quantity of tools to identify works by social function (e.g., wedding music, funeral music) is infinitesimally small. This may simply reflect the fact that audio databases hold little other than popular music of the past thirty years. Music with a social role distinct from pure entertainment may be conveyed by other means (including memory). Musical memory is notoriously prone to error with respect to detail but robust for contour and meter. Musical memory would have been the chief means of preservation for most of the repertories mentioned here, although the studies examined confine themselves to printed exemplars.

3. Findings from Tune-Family Meta-analysis

In terms of the preservation of musical features among members of a single tune family, systematic examinations (Selfridge-Field, 2004, 2006) yield low scores for collections formed by cultural agreement over time. The underlying surveys include collections assembled by musicologists, ethnomusicologists, folksong and dance researchers, hymnologists, and anthropologists. The results suggest that social definitions of musical similarity mask a range of associations that do not necessarily privilege *musical* content. Social perception seems to make a significant contribution to group definitions of similarity. The families represented here are shown in Table 1 and are referenced subsequently by letter.

Table 1. Tune families examined.

Code	Title	Earliest known use
A	The Morris Tune	Dance (duple meter)
B	The Folìa	Dance (triple meter)
C	The Dance of Mantua	Dance (duple meter)
D	Go Tell Aunt Rhody	Gavotte in operetta (?)
E	Danny Boy	Folksongs (2)

What we can learn from tune families falls into three categories of information: (1) features obvious from the listing itself, (2) features of the content which vary from case to case, and (3) deductions which can be made from this combination of findings. Using the codes given in Table 1, A and B are title-based collections, while C-E are content-based collections.

FINDING #1: Among members of both title-based and content-based collections, four families (A-D) have some *association with dancing*. three distinct categories emerged. The Morris tune (A; a collection of tunes associ-

ated with Morris dancing) offers an impressive example of persistence, although the degree of melodic preservation is great only in terms of metrical stability and general contour. Ward (1986) traced this melody over four centuries and three continents, showing its drifts toward tonality and metrical regularity but also the independence of variations in its two strains from one another. An early instance of A is shown in Figure 1, a later one in Figure 2.

Figure 1. The Morris tune (A), Strains 1 and 2, as given by Thomas Weelkes (1608).

Figure 2. The Morris tune (A), both strains as given by Edward Jones (1802).

FINDING #2: The next most frequent feature of tune-family collections was a *nationalistic* (or other ethnic) association. This suggests that if a song has particular social value, its degree of preservation is high, despite its widespread dissemination.

The "Dance of Mantua" (B; Tagliavini 1994), with 68 printed instantiations (Figure 3), is essentially the same as the Israeli national anthem ("Hatikva" or "The Hope"; Figure 4). Its adoption as a national anthem (1948) postdated centuries of oral transmission, particularly among communities of instrumentalists whose ranks are now believed to have included many Jewish exiles.

Figure 3. The anonymous Dance of Mantua (C; "Ballo di Mantova"), early seventeenth-century.

Figure 4. "Hatikva" (C_1) the Israeli national anthem (1948).

The "Dance of Mantua" is multiply nationalistic in that it also occurs in Smetana's symphonic poem *Má Vlast* (*The Fatherland*; Figure 5), in which it represents the River Moldau (or Vltava in Czech). This theme has antecedents in Bohemian folksong not included in Tagliavini (1994).

Figure 5. The River Moldau theme (C_2, from the first movement of Smetana's *Má Vlast*.

The second family, with weaker coherence among the camdidates, is available in the case of the "Londonderry Aire"/"Danny Boy" (Audley 2000). As the "Londonderry Aire" it is considered a folksong, but as "Danny Boy" it has a designated author and formal title. Audley's study

provides a different genealogy for the verse part of the song (shown in Figure 6) than for the chorus (Figure 7). The first genealogy is also longer by about a generation.
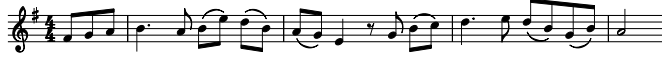

Figure 6. Beginning of the verse of the Londonderry Aire/ Danny Boy (E).

Figure 7. Early example of what became the chorus of the Londonderry Aire/Danny Boy (E₁).

What formed the song as we know it today was a nineteenth-century concatenation of two then unrelated songs. The number of titles turned up in Audley's search is extensive. Londonderry (the town) was initially a fortress guarding Scottish settlers around a port on the north coast of (Northern) Ireland. Londonderry's ethnic, social, and political identities have been contested repeatedly. As "Danny Boy," the same song has been associated in recent decades with the Republic of Ireland (Eire) and with Irish immigrants in the U.S. (likening its social function to that of "Hatikva" of "Moldau" in Israel and Bohemia). In such cases particular melodies seem to have a *totemic role*, in that they give mnemonic assistance to cultural memory.

FINDING #3: Cases in which a composed melody passes into common usage are fewer than those of persistent reuse of a tune of unknown origin. Among the studies reviewed, an unusual one is that of Sickbert (1999), who finds in a gavotte in Rousseau's opera *Le Devin du village* (1752; Figure 7) the origins of the American folk song "Go Tell Aunt Rhody" (Figure 8).
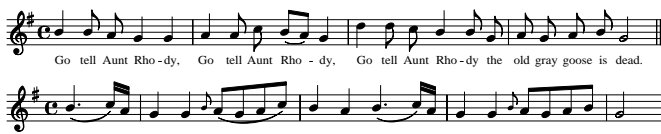

Go tell Aunt Rho-dy, Go tell Aunt Rho-dy, Go tell Aunt Rho-dy the old gray goose is dead.

Figure 7. Rousseau: Gavotte (D) from *Le Devin du village.*

Figure 8. "Go Tell Aunt Rhody (D₁)."

This pair of "matches" is somewhat disputable. Rousseau's piece has a melodic range of a perfect fourth but includes four different note durations (plus that of the grace note). "Aunt Rhody" spans a perfect fifth but includes only two durational values. To judge from studies of music perception, the difference of a third between the first notes of Bar 3 is so significant (because of its occurrence at the start of the second phrase) that these melodies should probably not be considered to belong to the same melodic family.

Collections *formed on the basis of contour and mode* may not be sufficiently persuasive to satisfy either cognitive or social selection criteria. These two melodies are certainly more similar to each other than some of the pieces said by List's Hopi subjects to be "the same." Most of Sickbert's items conform well to the melody in Figure 8 but less well to the melody in Figure 7. Some of Ward's "Morris tune" members are so shapeless as to barely qualify as any particular melody. In contrast, there is very little in Tagliavini's collection that is open to dispute.

FINDING #4: *Melodies may be preserved in parallel*, in which case coexistence may be a necessary condition of a match. The technique is pervasive in dance music of the sixteenth through eighteenth centuries. Variations of the so-called *folie d'Espagne* (Spanish follies) set by numerous composers including Corelli and Vivaldi were intended to evoke a mental state—madness. The corresponding dance became faster and faster to mimic frenzy, as in Sicily's *tarantella*. This points to a mimetic role.

As a subject for query, the *folia* required both a treble and a bass line corresponding in meter, mode, and contour to Figures 9 and 10.

Figure 9. The Folìa treble (B₁), all iterations but last.

Figure 10. The Folìa bass (B₂), last iteration.

Artistic settings of La Folìa may lack any explicit statement of either the treble or the bass line and yet in their various incarnations they remained inseparable. As in much other music called "classical" today, the artistry was one of concealment. Figure 11 (the start of a keyboard setting by Alessandro Scarlatti) offers only one of myriad settings.
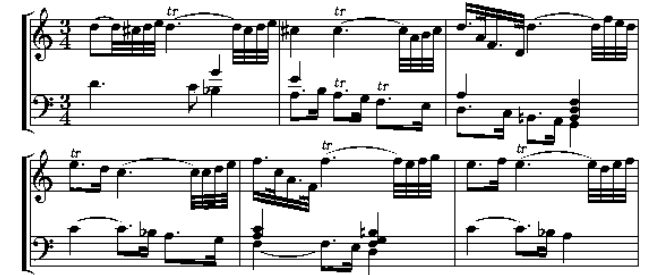

Figure 11. Start of a keyboard variation by A. Scarlatti on B₁,₂ ("La Folìa di Spagna").

Figure 11 raises a further question about the cognitive limits of perceived similarity.

4. Common Features of Family Members

What would be useful to extrapolate from tune collections such as those cited here is a set of musical features which consistently sustain a singular melodic identity across time and place. Apart from more subtle questions (e.g., How much deviation is too much? Under what circumstances does the answer depend purely on features internal to the

music? How often does it depend on social agreement?), what can be learned from large families of tunes? Table 2 gives an overview of feature sustenance in the five families considered above. Pitch-contour assessments concern surface activity. Implied contours are almost always preserved but they are difficult to search. The tune-families are identified as in Table 1.

Table 2. Persistence of specific features within tune families.

Feature preserved	Family					
	A	B	C	D	E	Totals
Title	1	2	4	4	3	14
Composer attribution	4	4	3	3	3	17
Social function	1	3	4	4	4	16
Meter	1	1	2	1	3	8
Mode	1	1	2	1	2	7
Pitch contour	1	3	2	2	2	10
Pitches on accented beats	3	3	2	3	2	13
Pitches initiating and terminating phrases	2	3	1	3	3	12
Totals	14	20	20	21	22	

Key

always	1
usually	2
sometimes	3
Rarely or never	4

Recalling that A and B are title-driven, while the other three families are content-driven, we note that meter and mode vary less in *de facto* social collections (A, B) than in those constituted by individual selection. The overall preservation of mode (overall score = 7) is the most striking feature consistently present among all the families. We should expect meter (score = 8) to be persistent in melodies associated with dancing and this is borne out (only E has no connection to dancing). Meter and mode do not by themselves cull short lists of match candidates in large databases (those with > 1000 items); see Sapp et al. (2004) because they are too general. Metadata offers little help, since titles (score = 14) and composer attributions (score = 17) vary more than the musical content! So too does social function (insofar as it is recorded) except in one family. The main implication is clear: neither via metadata- nor via musical-content searches can capture the same clusters of potential match candidates as those identified in recent tune-family research. Agreement on contour (score=10) comes at the price of excessive generality. As folksong re-searchers have long held, terminal notes of phrases (score = 12) seem to offer one of the more promising parameters for content searches.

Future work might fruitfully address correspondences in initial, metrically accented, and terminal notes of parallel phrases within tune-family members (the "Aunt Rhody" question) and their cognitive correlates. How much can component parts of a song vary without asserting a new identity (social or individual) on the song itself? Ahlbäck (2004) touches on some aspects of this question, particularly for repertories with complex and irregular meters, in his wide-ranging enquiry. More studies in the social perception and cognition of melody are essential to the future of music query in the boundless terrain of "simple" song.

Acknowledgments

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