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Universals in the world's musics

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Abstract

Many decades of skepticism have prevented the field of musicology from embracing the importance of musical universals. When universals *have* been discussed, it has generally been in the form of meta-critiques about the concept of universals, rather than in positive proposals about actual universals. We present here a typology of four categories of musical universals and a listing of 70 putative universals in musics cross-culturally. These universals span a wide variety of features, including pitch, rhythm, melodic structure, form, vocal style, expressive devices, instruments, performance contexts, contents, and behaviors.

Keywords

classification, comparative, cross-cultural, music, universals

The cross-cultural approach to the world's musics emerged in the late 19th century as a branch of psychoacoustics and Gestalt psychology, and was referred to as comparative musicology. In 1905, one of the founders of this movement, Erich von Hornbostel, wrote:

> Comparison is the principal means by which the quest for knowledge is pursued. Comparison makes possible the analysis and the exact description of an individual phenomenon by comparing it with other phenomena and by emphasizing its distinctive qualities. But comparison also characterizes individual phenomena as special cases in which the similarities are defined and formulated as 'laws'. Systematization and theory depend on comparison. (von Hornbostel, 1905/1975, pp. 249–250)

According to this view, the musics of the world should be analyzed in such a way as they are amenable to comparison. A major objective of the cross-cultural approach to music should be

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the formulation of generalizations ('laws') about these musics, generalizations that are obtainable only through widespread comparison (Merriam, 1982). From this, it should be possible to develop a general theory of music, one that is grounded in cross-cultural universals.

Universals are a common topic of discussion in linguistics (Croft, 1990; Good, 2008), phonetics (Ladefoged & Maddieson, 1996), phonology (Cruttenden, 1997; Ladd, 2008), and anthropology (Brown, 1991). Although musicology has often been keen to follow trends in other disciplines, this somehow did not happen with regard to universals. The last time that musical universals were considered in a systematic manner by the field was in the 1970s in a pair of special issues devoted to the topic in the journals *Ethnomusicology* (1971) and *The World of Music* (1977). A number of renowned ethnomusicologists weighed in on the topic (List, 1971; Lomax, 1977; McAllester, 1971; Seeger, 1971; Wachsmann, 1971; Blacking, 1977; Harrison, 1977; Hood, 1977; Nattiez, 1977; Nettl, 1977). While some clearly saw the value in thinking about universals, the overall response was arguably little more than a meta-critique of the concept of universals rather than a genuine attempt to consolidate information about the world's musics into a collection of putative universals (although see Harwood, 1976 and Lomax, 1977). The topic of universals has rarely been addressed in the musicological literature since the 1970s (although see the chapters on universals in Wallin, Merker, & Brown, 2000), indicating that universals have little place in the study of world musics. The few optimistic assessments about universals have come from outside the ethnomusicological mainstream (Meyer, 1998; Mâche, 2001; Molino & Nattiez, 2005; although see Nettl, 1983, 2000, 2005). In answering Bruno Nettl's (1977) question 'Is it possible that the search for universals will some day become the central task of the ethnomusicologist?', we can certainly reply that this day has not yet arrived.

We will argue in the following pages that comparison is necessary, that classification is important, that universals are real, and that a general theory of music is not only a possibility but a necessity if we are to understand what music is, how it evolved, and how it is represented in the mind and brain. We can think of at least six good reasons why the study of musical universals should be a center piece of musicology and music psychology:

1. As Nattiez (1977) has pointed out, the question of musical universals is inextricably linked to the question of *what music is*. An understanding of the universal features of the actual musics of the world provides important insight into the necessary features of the possible musics of the world. This is especially so with reference to distinguishing music and language (List, 1963; Feld & Fox, 1994).
2. As both Mâche (2000, 2001) and Nettl (2000) have pointed out, the topic of musical universals is intimately related to the question of *music origins* and, by extension, *human origins* (Wallin et al., 2000; Mithen, 2005; Jordania, 2006). In a world of more than 4,500 singing species, only one species – *Homo sapiens* – lives on the ground, and only one species – *Homo sapiens* – has the ability to follow precise rhythmic patterns so as to permit group singing, drumming, and dancing. What explains the unique place of humans among singing species? Furthermore, to the extent that the study of musical universals highlights some of the necessary features of music, it contributes to the development of hypotheses about what some of the earliest musics might have sounded like (Sachs, 1943). As von Hornbostel (1905/1975) wrote:

> The more extensive the data that we submit for comparison, the sooner we may hope to be able to explain a posteriori the archetypal beginnings of music from the course of its development. These problems absolutely cannot be resolved at a round table. (p. 270)

There has been an explosive interest in music evolution in recent years (Wallin et al., 2000; Hauser & McDermott, 2003; Mithen, 2005; Fitch, 2006; Cross & Morley, 2008). However, a similarly vibrant discussion of musical universals has not followed in kind.

3. At the interface of these two points are Enlightenment theories positing that music and language (or at least song and speech) evolved from a common communicative precursor (Condillac, 1746; Burnett, 1774; Rousseau, 1781). According to these theories, the music and speech of contemporary humans represent different branchings from this common evolutionary precursor. However, such theories – as well as those that argue that music evolved from speech (Spencer, 1857) or that speech evolved from music (Darwin, 1871, 1872) – raise the important question about what it is that makes music distinct from speech. What exactly is musical about music? What are the defining features of music that distinguish it from other audiovocal functions like speech or emotive vocalizations? Similar questions have been raised in cognitive discussions about potential domain specificity for music (Peretz & Morais, 1993; Peretz & Coltheart, 2003; Justus & Hutsler, 2005; Patel, 2008). To answer these kinds of questions, one needs to extract the common core of features that embody the extant musical types.
4. A consideration of musical universals helps delineate the general categories of features that comprise musical systems, and this has important applications to understanding the cultural evolution of music, both diachronically and synchronically. The widespread evidence of musical blending ('syncretism') throughout the world and throughout history argues against the view that musical systems are isolated Gestalts, but instead suggests that different components of musical systems can evolve independently of others, and that some components must necessarily co-evolve with others. For example, rhythms might evolve separate from scales, but interval sizes might in fact co-evolve with scales. In addition, whereas some features of music can undergo rapid cultural evolution, others – for example, features of vocal polyphony in traditional cultures – can show amazing stability over time (see Grauer, 2006, 2007 and Jordania, 2006, for detailed discussions). The study of universals helps delineate those features of music that are subject to cultural evolution and the mechanisms by which they undergo stasis and change over time and location.
5. Likewise, the kind of comparative analysis that leads to a consideration of musical universals helps shed light on the patterns of human migrations and cultural mixtures. Together with archaeological and physical-anthropological evidence, languages have been used for centuries as indicators of the history of cultural interactions. Genetics has more recently been added to the pool (Cavalli-Sforza, Menozzi & Piazza, 1994; Wells, 2007). Musics provide an equally important means of developing an understanding of the history of human diasporas and cultural interactions. If anything, musics are a more reliable indicator than languages of cultural admixture. Musical styles readily undergo syncretisms, whereas languages rarely fuse but instead tend to undergo replacement, such as at times of conquest (Cavalli-Sforza et al., 1994). Hence, musics may better retain the roots of ancestral styles than languages. Such is the case, for example, with the central African Pygmies. No trace of their original language has survived, whereas their music has flourished to this day (Arom, 1991; Grauer, 2006, 2007; Patin et al., 2009). Other interesting examples include the Oessetians, Balkarians and Karchaevis of the Caucasus region, whose musical styles have persisted despite replacement of their original languages (Jordania, 2006).
6. Cognitive and neural theories of music have been based strongly on structural principles derived from Western tonal music (Lerdahl & Jackendoff, 1983; Temperley, 2001). A

quest for universals points the way to a more valid pan-human theory of musical structure. Just as we would not be satisfied with a theory of human language based on Indo-European languages alone, so too a theory of music based on European concert music of the last five centuries ignores many important features of human music and musical behavior. Moreover, a theory of music based on universal features should provide important constraints regarding the cognitive structure of music and the representation of music in the human brain. Fortunately, there have been encouraging trends in the study of cross-cultural music psychology, including neuroscientific studies, suggesting that this area should become a fertile domain of research in the coming years (e.g., Lynch, Eiders, Holler, Urbano, & Wilson, 1991; Trehub, Unyk, & Trainor, 1993; Gregory & Varney, 1996; Balkwill & Thompson, 1999; Carterette & Kendall, 1999; Krumhansl et al., 2000; Morrison, Demorest, Hayward, Cramer, & Maravilla, 2003; Eerola, Himberg, Toiviainen, & Louhivuouri, 2006; Eerola, Louhivuori, & Lebaka, 2009; Nan, Knösche, Syosset, & Friederici, 2008; Wong, Roy, & Margulis, 2009; Demorest et al., 2010). In addition, a small number of ethnomusicologists have adopted cognitive approaches to their field research (e.g., Arom, 1991; Fernando, 2002, 2005). Finally, some of the approaches to Western music theory have been broadened to encompass musics that do not fit into the standard template of tonal music (e.g., Lerdahl, 1989, 1999; Narmour, 1990).

We will now discuss a proposal for a classification scheme of universals, based in large part on the thinking of Bruno Nettl (1983, 2005). In order to understand this scheme, it is important to state our view on how we see musical classification as proceeding. This will be presented as a series of arguments.

1. Our approach to musical classification is typological, similar to classification procedures in several other domains (Croft, 1990; Haspelmath, Dryer, Gil, & Comrie, 2005). Musical systems are decomposable into a series of components or sub-systems, as related to pitch and duration. These components or sub-systems can be organized by category, for example those related to scales or rhythms. Each musical style or musical culture is describable in terms of a *parameter state* for each category of component, such that these parameters can be compared from one culture to the next. This is the stuff of comparative approaches like Lomax's (1968) Cantometrics scheme in which each element to be categorized is coded in terms of a series of possible parameter states. For example, the Cantometric category of 'melodic shape' contains the parameter states 'arched', 'terracelike', 'undulating', and 'descending', and each song's melodic shape is coded by selecting the most accurate of these four possible states. These categories of components are general, grammatical categories, and apply to all cultures to varying extents. The creation of these general categories is an important exercise on its own in universalist thinking, as the categories are universal by definition, and reveal significant structural properties of musical systems or music cultures. What varies between cultures is the parameter state for each category.
2. The various categories are qualitatively different from one another. To a first approximation, categories can be either discrete (nominal) or continuous. For example, scales come in discrete varieties, whereas tempos vary in a continuous manner. Scales and tempos are categorically distinct, and thus a cross-cultural comparison of scales and a cross-cultural comparison of tempos will perforce result in different types of comparison. In addition, many different categorical systems are possible, and this will have a

large impact on the results of any comparative analysis of musical styles, and most especially on musical classification. The objective of creating a cross-cultural categorization scheme has dogged work on comparison, classification, and universals since the 1950s. Our own approach to the sound properties of the world's musics sits fairly closely with standard Western conceptions of pitch, rhythm, texture, and form.

3. Any comparative application of these general, qualitatively-diverse components to the world's musics will yield *different types of generalizations* for the different categories of components. And this will vary as a function of the way we choose to create musical categories. Generalizations about a discrete category like scales and generalizations about a continuous category like tempos will, by necessity, be different.
4. Regardless of the type of category or system analyzed, there will be *varying degrees of generality* for any component when performing a cross-cultural comparison, as based on the frequency of appearance of that trait in the world's musics. In other words, there will be a *gradient of universality* for the family of components, some components being more prevalent than others. This gradient should vary from complete universality to complete culture-uniqueness.
5. The most synthetic principle of this analysis is that, while there should be different types of generalizability for the different category types, the universality of a component should be independent of the category type. In other words, while generalizations about scales and those about tempos should be different in kind, we should be able, in both cases, to define a quantitative function that describes the *degree* of universality of those generalizations, regardless of the category type. This function should be a scalar property: these generalizations should vary along a scale from 'highly prevalent' to 'not at all prevalent', based on the observed frequency-trends of the parameter states across world cultures. Thus, generalizations about scale types and those about tempos, despite their qualitative differences, should be describable in similar terms with regard to the relative prevalence of various types of scales or tempos, respectively, in a cross-cultural sampling of musics.

To summarize this argument, musics are decomposable through typological classification procedures into a group of qualitatively-diverse categories of components. All musics can be described in terms of a parameter state for each category. The categories are universal and grammatical, and it is the parameter states (i.e., their relative frequencies across cultures) that are analyzed in a comparative approach to world musics. While different types of categories will have different types of generalizability, we can describe comparative trends for these components in terms of their prevalence, and this should be independent of category type.

As should be clear from our gradience concept, the universals we propose are statistical and nothing but. They represent general cross-cultural trends, in other words typological generalizations (Good, 2008). Any concept of universality that requires inviolable applicability to every moment of every instance of music from every culture is doomed to failure from the start. Instead, we want to describe the way that music 'tends to be' in general, to extract some invariance from all the diversity. In many respects, calling such features 'universals' is a misnomer. But then again, no feature in any domain of human culture or behavior is universal if it implies inviolability. We employ the traditional term 'universal' here, but we are really talking about cross-cultural trends and typological generalizations.

And this leads to the last point of this section: why universals can exist at all. The two major mechanisms that are typically invoked to explain cross-cultural similarities on a large scale are

descent and *diffusion*. Descent implies biological transmission of a trait via genetic encoding, whereas diffusion implies cultural transmission of a trait via either human migrations or other forms of cultural transmission (e.g., mass media). A third possible mechanism for cross-cultural similarities is convergence (Lockwood & Fleagle, 1999), in other words, the independent emergence of the same trait in multiple populations, although this mechanism is probably insufficient as an explanation for truly universal trends. Diffusionism was a dominant theme during the early period of comparative musicology, due to the influence of *kulturkreis* (culture circle) theories developed in early 20th century Germany (McLeod, 1974).[1] The main point, though, is that descent and diffusion are increasingly difficult to distinguish over time as small-scale societies become ever more acculturated to the large-scale societies that surround them, and as tribal musicians become influenced by the sounds of distant cultures due to the ubiquity of audio technology (Lomax, 1972). Disentangling descent and diffusion is clearly a complex issue, one to which we could devote a great deal of discussion. We will merely make a single point on this topic. In the same way that it is thought that all human beings are born with a potential to discriminate phonemic contrasts in all of the world's languages (Werker, Gilbert, Humphrey, & Tees, 1981; Werker & Tees, 1984), then it must be no less true that all human beings are born with the developmental potential to process all the musical styles that exist in the world today (e.g., Hannon & Trehub, 2005; Phillips-Silver & Trainor, 2005; Winkler, Háden, Ladinig, Sziller, & Honing, 2009; Soley & Hannon, 2010). The cognitive capacity for music-making must be no less than the combination of all the world's musical grammars put together and then some, although this need not imply that all musical styles are equally accessible at the cognitive level (Lerdahl, 1992). And while the great diversity of the world's musical styles is usually invoked as an argument *against* there being any biological constraints in music-making, to us it suggests that what is given to us by biological 'descent' is vast and complex. At the same time, we should not be surprised to learn that there are some general principles underlying the neural capacity to generate the myriad styles that comprise the musical systems of the world.

A typology of musical universals

The quest for musical universals would appear at first glance to be invalidated by two facts about the musics of the world, one geographical and one historical. The geographical fact is that there is a tremendous diversity of musical systems and musical performance styles in the world today. Compare, for example, shamanistic music from the Kamchatka region of Siberia with hunting music of the Central African Pygmies. The historical fact is the observation that musical styles can undergo very rapid cultural evolution, and this has been documented nowhere better than in European music where the phenomenal transition in a single geographical location from Josquin to Boulez took a mere 450 years to occur. It makes no difference if the stylistic distance between Kamchatkan shaman and Pygmy hunter is greater or lesser than that between Josquin and Boulez. The point is that surface-level diversity is there on a tremendous scale, and so it might seem inconceivable that there would be any shreds of invariance in all this diversity. In fact, the existence of musical diversity has served as perhaps the strongest argument against the existence of musical universals (List, 1971).

So, what is the best way to think about the complex issue of musical universals? The previous section of the paper provided a general approach to comparative musical analysis, and made a case for there being a gradient of universality that applies to all categories of musical structure and behavior, independent of category type. This might suggest that it would be possible to

Table 1. A typology of musical universals. Four types of universals are recognized, as described in the text. Below each class of universal is listed a few examples of that type. This listing is not meant to be comprehensive. See text for full listing.

Type 1: CONSERVED UNIVERSALS = all musical *utterances*
- use of discrete pitches
- octave equivalence
- transposability of music
- music organized into phrases
- arousal factors in emotive expression: tempo, amplitude, register

Type 2: PREDOMINANT PATTERNS = all musical *systems* or *styles*
- scales have seven of fewer pitches per octave
- predominance of precise (isometric) rhythms in music
- divisional organization of durational/rhythmic structure
- use of motivic patterns in melody generation
- use of idiophones and drums
- religious/ritual context for music-making
- use of verbal texts in vocal music
- communication-promoting or social-positive attitude towards music

Type 3: COMMON PATTERNS = *many* musical systems or styles
- small tempo range for any given musical form/style
- predominance of syllabic singing
- use of aerophones
- 'voice/instrument cross imitation'
- use of acoustic depiction in music
- association of dance with music

Type 4: RANGE UNIVERSALS = *a discrete set of possible states for all musical systems/styles*
- measured vs. unmeasured rhythmic types
- monophonic vs. heterophonic vs. homophonic vs. polyphonic texture types
- solo vs. group performance arrangements
- ostinato vs. stophic vs. through-composed sectional arrangements

create a typology of universals based on this gradience concept. And in fact, the first attempt to develop a typology of universals followed exactly this approach. This is the approach of Bruno Nettl (1977, 1983, 2000, 2005), and we will take our lead from his work.

Nettl recognizes three principal classes of universal patterns in music, arranged in terms of their degree of generality or universality (see Table 1). What we will call *type 0 universals* are those that apply to all *musical sound*, to every moment of music. They describe music in the most tautological sense of a physical or sensory phenomenon, like the sound of water running. We do not need a comparative approach to music to learn about these properties, and for this reason we will call these properties *tautological universals*. As Nettl has rightly pointed out, there is nothing about these universals that does not apply to many other acoustic processes, like speech or animal song. None of them can be seen as being lines of demarcation between music and other acoustic processes or events. Thus, the features that are most universally true of musical sound are the ones that are least informative in distinguishing music from those things with which it is often confounded. We will not discuss this class further.

Type 1 universals are those that apply to all musical *utterances* or *phenomena*, and thus transcend the level of the purely acoustic or sensory (see examples given in Table 1). As with type 0

universals, type 1 universals can in no way be considered as unique features of music, as some of them are shared with non-musical systems as well. That notwithstanding, they define certain necessary properties of music, no single one of which is sufficient to call something music. We will call these properties *conserved universals*. These are the properties that are most likely to have their origin in biological factors controlling musical production and perception, as demonstrated by their presence in all musical utterances. Thus, these are musical universals that belong more to the domain of the biological than the physical.

Type 2 universals describe what one could call *predominant patterns* in musical cultures. As Nettl describes them, they need not apply to every musical utterance but should apply to all musical *systems* or *styles*, even though component utterances or even entire musical forms within them might lack these musical properties altogether. These are statistical universals in the true sense of the term. It is the collection of these predominant patterns rather than any single one of them that defines the necessary properties of music.

Next, we would like to add two of our own classes of universals to this list that Nettl has started. The first type would simply be an extension of the type 2 universal but further down along the gradient of universality, something that we will call *common patterns* or *type 3 universals*. Common patterns are things that occur in many but by no means all music cultures, most likely because of historical contact, including such things as common religious practice or political rule. They describe regional trends that arise from migration and/or cultural interaction.

Finally, the last type of universal that we would like to describe does not fit onto the gradient of universality at all, but is instead based on the diversity of categories. These we will call *range universals* or *type 4 universals*. Range universals describe the full range of discrete possibilities for a particular category of music or musical behavior. A simple example is the classification of the world's musics as having either a regular pulse ('measured' music in a metric rhythm) or as lacking one ('unmeasured' music in a free rhythm). The dichotomy between measured and unmeasured musics – while an oversimplification – does convey the idea that there is a range of two discrete possibilities encompassing the rhythms of the world's musics. A more complicated example is a consideration of the range of multi-part textures. Most multipart musics can be thought of as falling into a range of four broad texture-types: monophony (same musical lines, synchronous onsets); heterophony (same musical lines, asynchronous onsets); homophony (parallel musical lines, synchronous onsets); and polyphony (different musical lines, different temporal onsets). Virtually all multipart musics can be seen as fitting into one of these categories, yet each culture or musical style differs with respect to its frequency of use of these different types of texture. Range universals are thus informative *in describing the discrete sub-categories that make up the range*, such as the sub-categories 'monophonic', 'heterophonic', 'homophonic', and 'polyphonic'. The range of observed sub-categories defined by the range universals provides a useful way of thinking about universal propensities to create music in one particular way or another. It suggests that there are basic constraints in music-making that force musics to cluster into discrete groupings, the family of such clusters constituting the range universals for those categories. The existence of range universals also suggests that the sub-categories of the range are not universal in and of themselves but instead that they vary in their frequency of appearance across cultures.

In summary, the typology of musical universals presented here is based strongly on Nettl's gradient-of-universality approach, the principal exception being the range universals, which define ranges of discrete predominant-patterns at the regional level. With this typology in mind, we will now go on to look at a list of putative musical universals, organized by category but classified by this typology.

A listing of proposed musical universals

Before presenting our list, we would like to head off several criticisms from the start.

1. *Verification of universality*. It will be impossible in this short article to provide detailed reference material to back up these universals. Readers are encouraged to consult both general and specialized sources in comparative musicology for information pertaining to the categories discussed.[2] It is important to state that the study of musical universals must be based, first and foremost, on a comparative analysis of musics cross-culturally. It cannot be based exclusively on child development, cognitive psychology, neuroimaging findings, evolutionary arguments, or comparisons between human and animal behavior. All of those findings can provide critical support to arguments about musical universals, but the basic evidence must come from collating information from the musics of as many cultures as possible. In other words, musical universals are the proper domain of comparative musicology.
2. *Statistical features, not absolutes*. As mentioned above, the universals we present are probabilistic. They represent reliable cross-cultural trends. A common argument against musical universals is to point to works of contemporary classical music that strongly lack standard musical features. How can 'sound' be a musical universal if John Cage's *4'33"* lacks it? How can 'pitch' be a musical universal if some percussion or electronic works lack pitch? As mentioned earlier, the existence of musical diversity should not be seen as a death knell to the study of musical universals. We recognize that musical diversity is the rule. Our goal is simply to extract some cross-cultural invariance from this sea of musical diversity. We ourselves are well aware of exceptions to all the proposed universals listed below. It will be up to the reader to decide if a description of reliable cross-cultural trends provides a sufficient basis for the study of musical universals, or instead if the dictum 'exceptions invalidate universals' should continue to block any real discussion of the topic.
3. *Structure vs. performance*. The list below is pluralistic in that it includes both structural and performance features of music, as well as social features related to performance contexts, contents, and music-related behaviors. One can reasonably talk about universal trends in all of these areas.
4. *Grammar vs. surface*. Are universals in the sound structure of music the proper domain of musical rules/grammars or of the musical surface? Contrasting deep structure and acoustic surface is common in linguistics, and can be applied to music (Lerdahl & Jackendoff, 1983; Rohrmeier, 2007). For our purposes, we do not find this distinction to be necessary in the quest to identify musical universals. If, for example, one wanted to look at universal trends in scales, this would certainly be based on creating inventories of pitches found in musical performances across cultures. One could debate about whether a scale is a feature of grammar or surface (it is, in fact, both), but it would not change anything about the methods that are necessary to ascertain universal features of world scales. This returns us to our earlier point about the need for musical classification, as classification schemes delineate the categories of features that are going to be subjected to musical analysis cross-culturally. Dowling (1982) characterized various aspects of the 'psychological reality' of scales cross-culturally, and none of them require a selective commitment to either a grammar or surface perspective. They comprise the assignment of frequencies to pitches ('psychophysical scale') and a specification of the sets of

intervals used in a culture's music ('tonal material' most broadly, 'tuning system' more narrowly, and 'mode' with respect to additional features related to melodic movement and direction).

The following 70-item list is divided into two parts, one dealing with music itself – with regard to music's 'sound structure' and 'expressive devices' – and the other dealing with extra-musical features related to 'contexts, contents, and behavior'. A description of the relationship between musical category and universal type is presented in a concluding summary following the list (see also Table 1).

Sound structure and expressive devices

Pitch

1. Use of discrete pitches rather than slides/portamentos (type 1).
2. Octave equivalence = unison choral singing in octaves (type 1).
3. Use of pitch sets = musical scales (type 1).
4. Melodic modes = pitch combination rules (type 2).
5. Scales/modes have seven or fewer pitches per octave (type 2).
6. Predominance of five-note scales (type 2).
7. Scales are composed of unequal intervals, mainly the major 2nd and minor 3rd (type 2).
8. Rooting of songs in the tonic (ground-pitch) of whatever scale type is being used (type 2).
9. 12 pitches per octave as the maximal reproducible division of equal-sized units (type 2). Burns (1999) has argued that 12 chromatic pitches represent a limit to the number of usable pitch relationships within an octave. In scale systems that use microtones, these are used more ornamentally than as contiguous scale tones.
10. Relative pitch: the transposability of pitch-sequences (type 1).

Rhythm

1. Predominance of precise (isometric) rhythms in music (type 2).
2. Co-existence of measured (isometric) and unmeasured (nonmetric) musics in a culture (type 4).
3. Unmeasured music more associated with solo than ensemble forms (type 2).
4. Use of repetitive rhythmic patterns such as rhythmic modes (type 2). Rhythmic modes are formulas that guide the formation of rhythmic patterns for a given style of music; they include such things as the *tala* cycles of Indian classical music, the polyrhythms of African drumming music, and the different meter types of Western music (e.g., duple meter, triple meter).
5. Divisive organization of durational/rhythmic structure (type 2). Rhythmic patterns are organized hierarchically such that lower-level beats are divisions of beats at higher levels.
6. Use of two- and three-note subdivisions of beats in measured works (type 2).
7. Use of few durational values in any given work (type 2).
8. Small tempo range for any given musical form/style (type 3).
9. One or a few basic rhythm-types for any given musical form/genre (type 3).

Melodic structure and texture

1. Music organized into phrases (type 1).
2. Grouping arrangements of tones (hierarchical organization; type 1).
3. Use of motivic patterns in melody generation (type 2).
4. Melodic archetypes: predominance of descending contours alone or descending contours following ascending contours (type 2).
5. General use of small intervals in melodic motion, typically in accordance with movement along a scale (i.e., stepwise motion; type 2).
6. Large intervals tend to be followed by small intervals in the reverse direction (type 2). Huron (2006) has explained this melodic tendency as reflecting the statistical phenomenon of 'regression towards the mean', in this case a regression towards the mean pitch of a melody.
7. Multi-part texture: the monophonic/heterophonic/homophonic/polyphonic spectrum (type 4).
8. Use of a drone pitch (type 3).
9. Homophony (harmonizing) using dissonant intervals, such as a second (type 3). Huron (2006) talks about dissonance as 'the sensory irritation evoked by a vertical sonority' (p. 312). While debates about the naturalness of consonant intervals have raged for millenia, we simply point out here that harmonizing on dissonant intervals, such as seconds, has a surprisingly widespread distribution geographically (Jordania, 2006).

Form

1. The musical work: a beginning, middle, and end (type 2). One caveat regarding this seemingly obvious triad relates to the 'end', as many traditional musical forms do not have precise endings but instead terminate when the social function of the song is fulfilled (e.g., the baby is asleep for a lullaby, or the dance is finished for dance music).
2. Internal repetition, generally with variation (type 2).
3. Hierarchical sectional arrangement: the spectrum of repetition/ostinato, litany/strophe, and through-composed forms (type 4).
4. Musical forms based on four-fold repetition into phrase structures containing four, eight, 12, or 16 bars (type 2).

Vocal style

1. General use of chest voice (type 2).
2. Predominance of syllabic singing (type 2).
3. Use of vocal embellishment (e.g., vibrato, melisma, glides, microtones; type 2).
4. Use of emotive vocalizations during singing (type 3).

Expressive devices

1. Emotional-intensity factors: tempo, amplitude, and register modulation (type 1). The intensity of emotional expression is conveyed in a graded manner through modulations in tempo, loudness and register. This is discussed in Brown (2000) as 'sentic factors'. See Juslin and Laukka (2003) for a meta-analysis of psychological studies of emotion perception with regard to these acoustic cues, and Juslin and Västfjäll (2008) for a detailed theoretical discussion of emotional responses to music.

2. Correlated changes of register with dynamics (e.g., higher = louder) and tempo with dynamics (e.g., faster = louder; type 1). Friberg, Bresin, and Sundberg (2006) summarize a variety of 'performance rules' related to these factors.
3. 'Mode/emotion' associations (type 2). The use of different melodic modes to express different emotions, as in the major/minor distinction in Western music or the various ragas of Indian classical music.
4. Musical performance often progresses through a gradual increase in tempo, dynamism and sometimes register (type 3).

Instruments

1. Existence of instruments, even imported instruments (type 2).
2. Use of idiophones (type 2).
3. Use of drums (type 2).
4. Use of aerophones (type 3).
5. Beating function: either clapping or playing rhythmic instruments (but generally not both; type 2).
6. 'Voice/instrument cross-imitation' (type 3). Melodic instruments are often designed to imitate the vocal style of a culture, and the vocal style of a culture is often imitative of its melodic instruments.

Contexts, contents and behavior

Contexts

1. Religious/ritual context of performance (type 2).
2. Functionality: use of different musical forms specific for different contexts or behaviors (type 1).
3. Context switching (type 3). Use of the same melody with different texts or in different contexts. Sometimes the same text is used with different melodies as well.

Contents

1. Use of words in vocal music (type 2).
2. Use of vocables in vocal music (type 3).
3. Referential/semiotic aspect of music or musical works (type 2). The 'aboutness' or contents of musical works.
4. Music as symbol (type 2). All extra-musical associations of pitches, scale types, musical works, instruments, rhythm types, etc.
5. Music as symboliser (type 2). The use of musical elements to symbolize cultural or literary elements.
6. Occurrence of acoustic depiction (imitation) in music (type 3). Representations of animal sounds (especially in animistic rituals) and environmental sounds; the use of instruments (such as flutes) to depict the human voice.
7. Music is made to communicate specific emotional meanings rather than arbitrary meanings (type 1).
8. Music-induced emotions vary widely, from arousing (e.g., marching music) to soothing (e.g., lullabies; type 4).

9. Communication-promoting or social-positive view of music (type 2). Music as a promoter of communication, social harmony, or positive emotions.
10. Music as a promoter of stress relief and catharsis.
11. Mystical view of music or the power of music (type 2). Music as a supernatural force; music as a channeling mechanism or healing device.
12. Loud music (or sometimes just loud noise) as a defence against negative forces (type 3).

Behavior. This category could be expanded significantly. What are presented here are simply some major trends.

1. Music is mostly produced by groups rather than individuals (type 2).
2. Gender segregation of musical groups and forms (type 3). This often mirrors a culture's division of labor along the lines of gender.
3. Age segregation of musical groups and forms (type 3). Segregation of children's and adult's music.
4. Music coordinates and emotionally unites groups of people (type 2).
5. Music induces bodily movements and physiological changes in listeners (type 1).
6. The association of music with dance (type 2) and of dance with music (the latter almost certainly being a dance universal).
7. Musical censorship (type 3). Prohibitions against musicians, instruments, musical works, scales, intervals, etc.
8. Therapeutic uses of music (type 3).
9. Musical pedagogy: musical development requires social learning during early childhood (type 2).

The universe of universals

This article has attempted to break through the skepticism that has characterized the majority of discussions about universals in musicology. Leaving aside the tautological universals, we see that there are a fair number of what we have called 'conserved universals' (type 1) that describe the properties of musical systems throughout the world. Next, it is impossible to overstate the point that type 1 and type 2 universals – being non-tautological – are only possible to discover from a global, comparative analysis of music, and not 'at a round table', as von Hornbostel (1905/1975) admonishes. These are things that could not have been predicted a priori but which turned out on comparative inspection to show a large degree of uniformity in most, if not all, musical cultures.

The most universal items (type 1) presented in the list are: use of discrete pitches, octave equivalence in unison singing, transposability of music, phrase organization of music, emotional intensity factors in performance, and functionality of musical forms. These are probably the best places to look for biological factors influencing musical form and behavior. Additional features that are highly prevalent in world musics include: pentatonic scales, isometric rhythms, rhythmic modes, repetition in musical structure, motivic patterns, drumming, ceremonial performance contexts, the connection of music with words and movement, among many other features. These seem to be things that apply to many musics much of the time. Importantly, these things were found *in virtually all the categories* of the scheme. They occur as much in the domain of the contexts of and attitudes towards music as in the sound structure and expressive sound-devices of music. None of these things have the

absoluteness of the type 1 universals, yet at the same time they embody very important general properties of musical cognition and behavior.

Now onto the non-universality: the diversity. To say that the scales of the world have seven of fewer pitches is not to say that they are all alike. And in fact, the tonal systems of the world show a very wide diversity, which has led many ethnomusicologists to reject the idea of comparability of musical systems. The musical universals shown here are broad and grammatical. But so too are such universals in phonetics and anthropology. Saying that all cultures have some form of funeral rite does not mean that all such rites are identical in form. Likewise for funeral musics. The basic point is that universality and diversity are flip sides of a coin when doing cross-cultural analyses. The study of universals is aimed at characterizing general cultural categories, and the study of diversity is aimed at examining the forms that these categories assume across cultures. For some of these categories, reliable cross-cultural trends will be evident upon comparative analysis, and this will form the basis for the study of universals in that domain.

Major sources of non-universality or variability in musical systems/cultures are found in: the actual pitch sets used in generating scales; the use of either isometric/heterometric/polymetric/nonmetric rhythmic patterns; the instruments used and the timbre-types preferred; ensemble arrangement for multi-part music, from solo singing to large choruses; preference for monophonic/heterophonic/homophonic/polyphonic texture; and musical form, including degree of repetitiveness from ostinatos to more meandering styles. Many of the things that show greatest variability in form fall into the category of what we have called Range Universals. What this means is that, while the actual forms vary between cultures, several discrete types of states can be described on a global scale. We think that there is much to be learned by the fact that the set of states that characterize range universals are, in general, small in number and wide in distribution. This argues against the idea that anything is possible in music, and instead suggests that there are a few discrete ways in which a given property of music or musical behavior can be realized or constituted.

Finally, we return to the question of how it might be that these universals could exist. The type 1 universals show the greatest indications of being attributable to neural factors involved in musical processing. However, the type 2 universals, being predominant patterns, return us to the earlier dichotomy between descent and diffusion at the species level. We would say that, in order to even address this question, we need to have a much better understanding than we currently do of how musical systems evolve culturally (and possibly biologically). In addition, in discussing musical universals and their underpinnings, it is important to keep in mind that acoustic communication exists throughout the animal kingdom, and that human music, like human speech, is but one of its forms. While music might represent a unique constellation of features, most, if not all, of its individual features can be found in at least some animal species (Wallin et al., 2000). The same can be said of the perceptual capacities (Hauser & McDermott, 2003; Justus & Hutsler, 2005) and production skills (Fitch, 2006) that underlie their expression.

So, is there anything special about music? While more than 4,500 species are said to sing, only a small number of these create coordinated group vocalizations akin to music. Much of what makes music different from the majority of examples of animal song – and from human speech for that matter – are the factors that permit this group coordination to occur in both pitch-space and time. The rhythmic precision of music is distinct from many heterophonic forms of group vocalizing that contain simultaneity in the absence of synchronization (Brown, 2007). Animals that do show synchrony in their calling (e.g., certain species of insects and frogs; see Merker, 2000) are generally solo singers that have monotonic calls involving repetitive use of a single pitch. Such synchronicity is generally done in an antagonistic manner by

competing individuals rather than in a coordinated manner by cooperative groups, although exceptions are found in duetting bird species that show cooperative coordination for territorial purposes (e.g., Mann, Dingess, & Slater, 2006). Humans, instead, show a diverse repertoire of coordinated multipart textures (from monophony to homophony to polyphony) and interactive choral-singing styles (responsorial, antiphonal), all of them generated through intentional coordination by cooperatively-interacting members of a social group. Such coordination is a product of human sociality (Levinson, 2006). Much of this is made possible by the learning capacity of humans, not least the capacity for imitative vocal learning. People can intentionally converge their vocalizations onto a single melodic line so as to sing in the most imitative manner, or they can choose to diverge their musical lines so as to create homophonic blends when such blends are considered aesthetically valued. The human capacity for vocal learning makes possible the cultural evolution of music, ultimately setting the stage for the terrestrial diffusion of musical systems.

The universe of universals is an ever-expanding one. Yet the final word of this article is a plea to reintroduce the comparative approach that has long been absent from ethnomusicological academia, the kind of approach that the founders of comparative musicology, despite their well-known limitations, supported. There are just too many essential questions that cannot be answered without it. 'These problems absolutely cannot be resolved at a round table', nor can they be resolved by looking at the world's cultures one at a time and saying that musical generalizations are outside the realm of musicology. Such generalizations are at the very core of the analysis of world musics. A consideration of musical universals forces us to confront other essential issues such as musical classification, music origins, cross-cultural comparison, and the dynamics of musical change through time and place. It is time for a new movement in comparative musicology to take full advantage of the amazing musical database generated by ethnomusicologists and to address these critical questions, questions that are generating widespread interest among scholars outside of musicology.

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Notes

1. The idea of diffusion was a logical consequence of the 'late evolutionary model' of music origins, based on an assumption that humans 'invented' music. As a late invention, of course, music was thought to be spread to other cultures by diffusion. Today, it is becoming increasingly clear that the faculty of music has very deep evolutionary roots (Wallin et al., 2000; Mithen, 2005; Jordania, 2006), and that at least some of the most important similarities found among the musics of the world must be a result of descent. For a contrasting view, see Patel (2008), who argues that music is a 'technology'.
2. Good sources for general information about musical systems and musical behavior include the following texts: Reck (1977), May (1980), Nettl (1990), Malm (1996), Titon et al. (2005), and Nettl et al. (2008). Most of these works try to present representative samplings of cultures from the various regions of the world, but with little integration or comparison. More detailed and far-ranging is the 10-volume series of the *Garland Encyclopedia of World Music* (Nettl, Stone, Porter, & Rice, 1999). Despite its incredible breadth, this series offers minimal comparative analysis. Only Lomax's landmark publication *Folk Song Style and Culture* (1968) attempts to provide anything of a general comparative and historical synthesis of the entire world of musical styles. Sadly, this work has not attracted many followers or spurred similar lines of research. A more recent comparative survey, with a focus on polyphonic choral singing, is found in Jordania (2006).

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