Music in the Social and Behavioral Sciences: An Encyclopedia

Tone Language

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Book Title: Music in the Social and Behavioral Sciences: An Encyclopedia
Chapter Title: "Tone Language"
Pub. Date: 2014
Access Date: December 16, 2014
Publishing Company: SAGE Publications, Inc.
City: Thousand Oaks
Print ISBN: 9781452283036
Online ISBN: 9781452283012
DOI: http://dx.doi.org/10.4135/9781452283012.n397
Print pages: 1137-1139

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Tone (or lexical tone) is the incorporation of pitch into the phonological inventory of a language. Every tone language is different, but typological generalizations across languages distinguish tone from other uses of pitch in language. Pitch is also a fundamental component of most forms of music, and there are important similarities and differences between linguistic and musical pitch. Linguistic influence on musical behaviors (and vice versa) provides insight into the cognitive relationship between music and language.

Tone Language Typology

Up to 70 percent of the world's languages can be classified as tone languages, with most occurring in Africa, east and southeast Asia, and the Americas. Pitch is linguistically used in several ways; lexical tone refers specifically to the use of syllable pitch to distinguish individual words. This is distinct from intonation, which distinguishes sentence types (e.g., statement versus question), indicates focus, or conveys extralinguistic information. Pitch accent sometimes refers to languages (e.g., Japanese or Norwegian) that use word-level pitch, but in a more limited way. Thus, one way of classifying languages is as a continuum, from nontone languages (e.g., French) at the less-tonal **[p. 1137 ↓]** end to lexical tone languages (e.g., Mandarin) at the more tonal end.

Languages are also classified by the type and number of tones that they contain. Register tone languages contain only level tones (they may contain noncontrastive rising or falling tones by phonological rule); an example is Yoruba (Niger-Congo, Nigeria), with low, mid, and high tones. Contour tone languages contain tones in which the pitch changes over the course of the syllable (e.g., rising, falling, or more complex shapes); an example is Mandarin (Sino-Tibetan, China), with high-level, falling, rising, and dipping tones.

Register tone languages may contain from 2 to 5 tones. Contour tone languages may contain as many as 13 tones, but the complexities of tonal phonology make determining the exact number of tone categories in a language difficult. Generally, tone languages

with more tones are rarer than those with fewer, and phonetically complex tones (e.g., concave or convex) are rarer than simple tones (e.g., rising, falling, or level).

Phonetics and Perception

Tones are not defined by fixed frequencies, but by their shape and position within the pitch range of the speaker. In most register tone languages, tones are separated by 2 to 3 semitones (rather than maximal dispersion within the range), with the total pitch range increasing for languages with more tones. Contour tones are rare in languages with three or fewer tones, which suggests that contour tones result when an upper bound on level tones within vocal pitch range is reached.

Tone perception depends on many acoustic factors, including fundamental frequency, harmonics, voice quality, and duration. This redundancy aids accurate perception in noise or of a degraded signal, such as whispered speech. Pitch is the primary phonetic component of tone, but the pitch of a syllable can be perceived along several dimensions, which can be classified as static (e.g., average or endpoint pitch) or dynamic (e.g., direction, slope, or shape of pitch change). Speakers attend to these dimensions based on their relative importance to their language's tonal inventory, or to particular tonal contrasts. This sensitivity affects the perception of unfamiliar tones when learning a second language. Speakers of nontone languages tend to rely only on static pitch dimensions of syllables when encountering lexical tones.

Relationship to Music

With their shared basis in pitch, behavioral overlap and influence between lexical tones and music is consistent with major theories about the relationship between language and music. The auditory systems of musicians and tone language speakers resemble one another in the way that they represent pitch information in the auditory cortex and brainstem compared to nonmusicians and nontone language speakers, respectively. This includes better representation of fundamental frequency and spectral harmonics, and more accurate tracking of rapidly changing frequencies, with all acoustic properties

relevant to a variety of musical and speech tasks. Crossover effects have accordingly been observed in both directions.

One of the most cited cases is the high occurrence of absolute pitch (AP) among Mandarin-speaking musicians. The cause of this prevalence is challenging to explain, primarily because lexical tones are not defined by fixed pitch values, and it is difficult to disentangle linguistic effects from cultural, genetic, and musical influences. AP is a complex ability, and early acquisition of lexical tones may affect perceptual, cognitive, and memory systems involved in AP. Tone language speakers (nomusicians) also outperform nontone language counterparts in other musical tasks involving absolute and relative pitch, such as vocal imitation, interval perception, and melodic memory. In the other direction, nontone language musicians show better perception lexical tones and faster tone language learning, consistent with shared resources for pitch representation.

Although these effects are numerous, they are not unbounded: Not every aspect of tone or music perception is affected by experience with the other; rather, they can be related to specific features of musical or linguistic structure, and the architecture of the auditory system. Development of these models has the potential to influence therapeutic applications and approaches to language learning and teaching.

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http://dx.doi.org/10.4135/9781452283012.n397
See Also:

- Auditory System
- Brain Stem
- Intonation
- Nonmusical Abilities
- Pitch, Absolute
- Pitch, Relative
- Pitch Perception
- Protolanguage
- Tone
- Transfer Effects

- Whistled Speech

Further Readings

Bradley, Evan D. “Pitch Perception in Lexical Tone and Melody.” Reviews of Research in Human Learning and Music , v.1 (2013).

Deutsch, Diana, TrevorHenthorn, and MarkDolson. “Absolute Pitch, Speech, and Tone Language: Some Experiments and a Proposed Framework.” Music Perception , v.21/3 (2004).

Kraus, Nina and KarenBanai. “Auditory-Processing Malleability: Focus on Language and Music.” Current Directions in Psychological Science , v.16/2 (2007). http://dx.doi.org/10.1111/j.1467-8721.2007.00485.x

Patel, Aniruddh D. and John R.Iversen. “The Linguistic Benefits of Musical Abilities.” Trends in Cognitive Sciences , v.11/9 (2007). http://dx.doi.org/10.1016/j.tics.2007.08.003

Schellenberg, E. Glenn and Sandra E.Trehub. “Is There an Asian Advantage for Pitch Memory?” Music Perception , v.25/3 (2008). http://dx.doi.org/10.1525/mp.2008.25.3.241

Yip, Moira. Tone . New York: Cambridge University Press, 2002. http://dx.doi.org/10.1017/CBO9781139164559