

# Music in the Social and Behavioral Sciences: An Encyclopedia

## Transfer Effects

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Music is a highly developed skill from a performance and listening standpoint. Enculturation to the music of a particular idiom or community and formal or informal training have pervasive effects on the cognitive and perceptual systems. Transfer of these effects within and outside of music is interesting to psychology because it represents a kind of learning without direct experience. It also provides insight into the degree to which music relies on modular or domain-general cognitive mechanisms. This is also of interest to practitioners and educators because it can suggest causes and mechanisms of musical aptitude and skill, and suggest potential areas of synergy between domains.

Transfer effects go beyond priming effects or transient effects of music-induced mood; rather, they are long-term learning effects. Music-related transfer includes near transfer from one musical skill to another, and far transfer of musical skills to and from other domains. Most research examines Western classical musicians with years of training, compared to those with little formal training, but the principles of such transfer may hold across wider contexts.

## Effects within Music

Musicianship involves both listening and performance skills. Acquisition of these listening skills [p. 1146 ↓ ] alters how musicians perceive the sounds of music, including pitch, timbre, and timing. This correlates with the context and nature of the training experience. For example, trained musicians' neural and behavioral performance are heightened for the timbre of their personal instruments; that is, trumpeters respond to trumpet sounds better than to violin sounds, and vice versa.

Not only instrument, but also training method affects perception. Musicians with absolute pitch (AP) respond differently to pitches with and without solfège syllables, depending on whether they were trained using a fixed- or variable-*do* system. This suggests that differences in training affect the way that musical knowledge is stored and retrieved. That AP is an ability found among a subset of musicians suggests that training effects interact with individual differences among learners.

The musical system acquired also plays a role in perceptual learning. For example, the scale system used in a particular musical culture affects not only the particular intervals learned, but also tuning tolerances for these intervals. Although most studies on the effects of music examine formally trained musicians, listening skills are acquired by anyone enculturated to a given musical idiom, including nonperformers, and some differences between trained and untrained listeners may be differences in magnitude, rather than kind.

These effects illustrate the influence that musical training has on the processing of musical sound, and suggest routes for musical experience to transfer to other domains: To the degree that music relies on domain-general representations and information processing resources, transfer of experience will occur to and from music.

## Effects of Music

With their shared basis in sound and hierarchical structure, a focus of research on music transfer effects involves language. Musicianship is associated with linguistic abilities, including early reading ability, foreign language pronunciation, and perception of speech in noise, intonation, stress, and lexical tone.

A striking case involves the ability of musicians to perceive and learn lexical tone languages better or more quickly than nonmusicians, even without prior experience. Individuals vary in preexisting ability to accurately discriminate and identify the kinds of pitch patterns crucial to lexical tone, and this ability is correlated with musical training. Success at tone language learning is a multistage process, involving the representation of acoustic information, the establishment of pitch-based categories, and encoding and retrieval of category labels from memory. Musicianship may transfer to all of these levels, as evidenced by its effects both on perceptual encoding of acoustic and temporal properties and higher cognitive functions such as auditory attention and executive function.

## Effects on Music

Musical behaviors are subject to influence from nonmusical experiences. This has been observed in speakers of tone languages, who perform in a musician-like way in comparison to nontone language counterparts, even if they are not musicians, in tasks involving absolute and relative pitch, vocal imitation, interval perception, and melodic memory.

A case that does not depend on tone language experience is the perception of the tritone paradox. In this illusion, tones with no clear central pitch (Shepard tones) create a tritone interval that is ambiguous between an ascending and descending interval. Some listeners tend to hear them as rising, and some as falling. This tendency is influenced by the language of the listener, an effect that has been found between tone and nontone languages, and between different nontone languages. The discoverers of this effect argue that it arises from the pitch patterns (e.g., tones, intonation, and stress) in the speech of the listener's community.

## Models and Mechanisms of Transfer

The brains of trained musicians show structural differences compared to those without training, including more interhemispheric connections and more cortex devoted to auditory, motor, visual, and cognitive functions. Despite these differences, including correlation of such effects with length and onset of training, it remains difficult to firmly establish a causal relationship between musical training and cognitive and neurological differences because of the correlational nature of much of the research in this area. The same [p. 1147 ↓] difficulty applies to the interpretation of transfer effects—whether they represent a true transfer of ability, or a correlation of abilities.

Nonetheless, demonstrations of plasticity in response to relatively short-term training suggest that the effects of musical experience influence domain-general perception. Explaining the transfer of musical experience to other tasks (and vice versa) involves defining the scope of overlap between the two tasks, a corresponding overlap between neural resources, and the degree of top-down influence exerted by musical, linguistic,

or other knowledge. Major theories of music perception and performance differ in detail, but generally assume overlap between music and other domains at basic levels of auditory and motor processing, differing in the degree of modularity at higher levels of processing, planning, and learning. Transfer effects are key to evaluating these models, as well as understanding the general architecture of human perceptual systems and learning mechanisms.

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See Also:

- [Bimusicality](#)
- [Executive Function](#)
- [Modularity](#)
- [Mozart Effect](#)
- [Music Training, Long-Term Effects of](#)
- [Nature–Nurture](#)
- [Nonmusical Abilities](#)
- [Plasticity](#)
- [Second Language Acquisition](#)

#### Further Readings

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